What Should Investors Care About?
Mutual Fund Ratings by Analysts vs. Machine Learning Technique[*]

Si Cheng   Ruichang Lu   Xiaojun Zhang

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We examine two forward-looking mutual fund ratings provided by Morningstar: the *analyst rating* produced by human analysts and the *quantitative rating* generated by machine learning technique. The analyst rating identifies outperforming funds, while the quantitative rating fails to do so—such a difference is mostly due to the selection of analyst coverage. Moreover, the tone in the analyst report contains incremental soft information in predicting fund performance. Finally, retail investors do not follow analyst recommendations, but instead chase the quantitative rating. The overall evidence highlights the importance of mutual fund analysts in information production and implies a capital misallocation problem in mutual fund investment.

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1. Introduction

Recent statistics from the Investment Company Institute show that the total net assets managed by 8,078 U.S. mutual funds exceeded 17.7 trillion dollars as of December 2018. Meanwhile, retail investors hold 89 percent of the U.S. mutual fund net assets and rely on mutual funds to meet long-term personal financial objectives.[1] However, an extensive literature documents that the average risk- and style-adjusted returns of mutual funds appear to be negative on an after-fee basis, casting doubt on the skill of average fund managers.[2] In the presence of a large number of available mutual funds, it is not a trivial task for individual investors to identify a small subset of skilled managers and optimize their capital allocation. Naturally, there is a high demand for professional investment recommendations.

In 2011, Morningstar rolled out the *forward-looking* Analyst Rating on mutual funds—to help investors make investment decisions. Given that the analyst coverage is limited by the size of the Morningstar analyst team, Morningstar further developed a machine learning model to create the Quantitative Rating in June 2017. The quantitative rating is analogous to the rating a Morningstar analyst might assign to a fund if it were covered. Yet, to date, there has been little attention devoted to the predictive qualities and information content of the analyst rating and quantitative rating. This study attempts to fill that void by examining the economic implications of these investment recommendations generated by man vs. machine learning.

From an individual investors' perspective, machine learning techniques significantly expand the rating coverage and provides easy access to a wide range of fund ratings at a reasonable cost.[3] Although the quantitative rating aims to replicate the output of an analyst as faithfully as possible, the investment recommendations produced by human analysts and machine learning could differ in several ways. First, analysts may acquire additional information from interviews with portfolio managers and key executives (Morningstar 2011a), and such soft information cannot be easily incorporated into the

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[1] See https://www.ici.org/pdf/2019_factbook.pdf. The total net assets managed by U.S. mutual funds have drastically increased from about 135 billion dollars in 1980, to 7 trillion dollars in 2000 and 11.8 trillion dollars in 2010. A contemporaneous trend is that individual investors shifted from directly holding stocks to mutual funds since the 1980s, as shown in French (2008).
[2] See, e.g., Malkiel (1995), Gruber (1996), Carhart (1997), Wermers (2000), Christoffersen and Musto (2002), and Gil-Bazo and Ruiz-Verdú (2009).
[3] By the end of 2018, Morningstar analysts cover 30% of the U.S. actively managed equity mutual funds, with the remaining funds covered by quantitative rating. The annual subscription fee is $199 for the analyst rating and quantitative rating.

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quantitative rating. Second, analysts may selectively cover the most popular funds with higher potential to attract investors (Morningstar 2011a), and such selection effect could reflect the fundamental difference between analyst-covered funds and machine-covered funds. Third, analysts not only issue ratings but also write detailed research reports to justify the rating decisions. The analyst report could contain additional information beyond the ratings and is not available for machine-covered funds. In this paper, we provide the first large-scale empirical evidence of whether and how analyst rating differs from quantitative rating, what is the information content in both ratings and the analyst report, and how investors react to such information.

We manually compile the Morningstar analyst reports and analyze a comprehensive dataset of U.S. actively managed open-end equity mutual funds between 2011 and 2018. We begin by investigating the return predictability of the analyst rating and quantitative rating. First, we find that the analyst rating successfully identifies outperforming funds in the univariate portfolio sort, while the quantitative rating fails to do so. For instance, Gold-rated funds recommended by analysts outperform the benchmark by 1.46% per year, while Gold-rated funds based on the quantitative rating deliver an insignificant style-adjusted return of 0.41% per year during the same period.

It is empirically challenging to understand the economic forces underlying the difference in return predictability, as a fund can only be covered by either analyst or machine in a specific month. To ensure a fair comparison, we replicate the machine learning method adopted by Morningstar and reconstruct the quantitative ratings for *all* funds. We find that among analyst-covered funds, the machine learning-predicted rating is on a par with analyst rating in identifying superior funds. However, the predicted rating fails to identify outperforming funds among the noncovered universe. This implies that analyst rating outperforms the quantitative rating in predicting fund performance mostly due to the selection of analyst coverage. Our findings suggest that the two seemingly closely related forward-looking ratings could be very different, and investors should be aware of such a difference instead of naively considering the quantitative rating as an equivalent substitute for the analyst rating.

To shed further light on the role and value of analysts, we examine the information content contained in the analyst rating and analyst report. Despite the analyst rating being a useful indicator to identify outperforming funds, it accounts for observable fund characteristics. In contrast, the analyst

report contains unique and incremental information in predicting mutual fund performance. We follow Loughran-McDonald Sentiment Word Lists (Loughran and McDonald 2011, 2016) to identify the positive and negative tones in the analyst report. In particular, a one-standard-deviation increase in the positive tone increases the raw return by 0.69% per year and style-adjusted return by 0.27% per year, after controlling for analyst rating, known fund characteristics, and managerial skill proxies. More importantly, the return predictability is further enhanced when the tone is at odds with the five-tier analyst rating. For instance, Gold-rated funds with more negative tone display lower future performance, while Negative-rated funds with a more positive tone tend to rebound. These results are consistent with the notion that machine learning algorithm has the potential to exploit publicly available information and generate valuable investment advice, while human analysts have the advantage to collect and incorporate soft information.

We move on to investigate mutual fund investors' reaction to the Morningstar ratings. We find that investors do not react to the analyst rating, but instead rely on past performance, star rating, and quantitative rating. For instance, a one-standard-deviation increase in the star rating and quantitative rating increases fund flows by 17.35% and 2.95%, respectively. Although analyst recommendations are largely ignored by mutual fund investors, institutional investors take advantage of the information value of the analyst rating and report, as suggested by the evidence that they withdraw from Gold-rated funds with a more negative tone.

Finally, we conduct a similar textual analysis based on the summary section and the title of the analyst report instead of the full report. We find that only the tone in the full analyst report predicts style-adjusted return, suggesting that a thorough analysis of the whole report is necessary to extract the useful information. However, investors strongly react to the tone in the summary section and the title but not in the full analyst report. This further indicates that mutual fund investors are not sophisticated in processing information and making investment decisions, and they are likely to be affected by the information that attracts their attention. The overall evidence implies a capital misallocation problem in mutual fund investment, especially among retail investors.

Our findings are robust to a series of alternative tests, such as replacing the net-of-fee performance with gross-of-fee performance, analyzing different investment horizons, using an alternative proxy for

the tone in the analyst report, and expanding our analysis to the entire universe of active funds including equity, bond, and hybrid funds.

To summarize, our findings highlight the importance of mutual fund analysts in information production and imply a capital misallocation problem in mutual fund investment. The analyst rating consolidates a broad set of known fund characteristics and serves as a user-friendly indicator to guide the investment decisions for individual investors. The analyst report further adds value by revealing incremental and unique soft information on future performance, and this likely represents a limitation for quantitative rating. In addition, investors should not treat the quantitative rating as an equivalent substitute for the analyst rating, mostly due to the selection of analyst coverage and the soft information contained in analyst report.

The main contribution of this paper is as follows. First, our findings relate to the burgeoning literature on the adoption of financial technology (Fintech) and particularly to studies exploring the investment recommendations generated by man vs. machine learning. In recent years, there is a growing popularity of applying novel statistical methods and machine learning techniques in the financial industry, such as in credit rating, financial advising, and asset management.[4] Our findings suggest that a new model of man plus machine could be more effective, i.e., analysts can ride on the advantage of machine learning technique in processing publicly available information, while allocate more effort to collect and analyze private, soft information. In addition, although technology adoption could significantly reduce the information production cost and enhance financial inclusion, investors should be aware of the potential limitations and pitfalls. In our context, the quantitative rating should not be considered as an equivalent substitute for the analyst rating.

Second, to the best of our knowledge we are the first to uncover the information value of the analyst rating and analyst report, and to highlight the importance of soft information in mutual fund investment. The past work proposes various economic forces that help identify skilled fund managers, and most indicators focus on mutual funds' investment behavior inferred from hard information such as portfolio

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[4] See, e.g., D'Acunto, Prabhala, and Rossi (2019), Aubry, Kräussl, Manso, and Spaenjers (2020), Berg, Burg, Gombović, and Puri (2020), Coleman, Merkley, and Pacelli (2020), Fuster, Goldsmith-Pinkham, Ramadorai, and Walther (2020), Gu, Kelly, and Xiu (2020), van Binsbergen, Han, and Lopez-Lira (2020), and Reher and Sokolinski (2021).

holdings and other fund characteristics.[5] We find that the tone in the analyst report provides incremental soft information that augments the known fund characteristics and managerial skill proxies, suggesting that mutual fund analysts play an important role in acquiring and processing information as well as facilitating more efficient capital allocation across mutual funds. The soft information acquired by analysts is highly valuable and cannot be easily captured by the more sophisticated machine learning algorithm, therefore represents an important advantage of human analysts in the age of big data and Fintech. The improved information environment could reduce the search cost in the mutual fund industry and, as a result, lead to a more efficient asset management market and financial market (Gârleanu and Pedersen 2018).

Third, our findings contribute to the literature on the behavior of mutual fund investors. Existing literature documents that investors chase past performance and especially the Morningstar star rating.[6] Since mutual fund performance is not persistent over time (e.g., Carhart 1997; Fama and French 2010), such behavior cannot be rationally justified. Additional evidence further supports the concept that individual investors appear to be unsophisticated in mutual fund investment (e.g., Campbell 2006; Choi and Robertson 2020).[7] Our findings extend this literature by showing that mutual fund investors largely ignore the valuable information provided by Morningstar analysts. Unlike other complicated managerial skill indicators proposed by academic research, the analyst rating is easy to access and follow in real time.[8] Therefore, investors who rely on the star rating could easily switch to the analyst rating and improve their performance.

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[5] Proxies for managerial skill include, for instance, industry concentration index (Kacperczyk, Sialm, and Zheng 2005), return gap (Kacperczyk, Sialm, and Zheng 2008), latent information acquisition (Mamaysky, Spiegel, and Zhang 2008), active share and tracking error (Cremers and Petajisto 2009; Petajisto 2013), R-square (Amihud and Goyenko 2013), time-varying stock picking and market timing (Kacperczyk, Van Nieuwerburgh, and Veldkamp 2014), fund turnover (Pástor, Stambaugh, and Taylor 2017), herding behavior (Jiang and Verardo 2018), active fundamental performance (Jiang and Zheng 2018), active fund overpricing (Avramov, Cheng, and Hameed 2020), and tax efficiency (Sialm and Zhang 2020).

[6] See, e.g., Chevalier and Ellison (1997), Sirri and Tufano (1998), Barber, Huang, and Odean (2016), Berk and van Binsbergen (2016), Ben-David, Li, Rossi, and Song (2019), and Choi and Robertson (2020).

[7] For instance, individual investors invest in high-fee funds (Wilcox 2003; Barber, Odean, and Zheng 2005), time the market poorly (Frazzini and Lamont 2008; Lou 2012; Akbas, Armstrong, Sorescu, and Subrahmanyam 2015; Friesen and Nguyen 2019), and favor funds with lottery-like features or holding lottery stocks (Bailey, Kumar, and Ng 2011; Agarwal, Jiang, and Wen 2020) as well as funds that attract their attention through advertising (Jain and Wu 2000; Barber, Odean, and Zheng 2005; Bergstresser, Chalmers, and Tufano 2009) and media coverage (Solomon, Soltes, and Sosyura 2014; Kaniel and Parham 2017).

[8] Most managerial skill indicators proposed by academic study require access to multiple data sources and cannot be easily constructed by individual investors. In addition, the relatively high-skilled fund managers can only be identified after analyzing the entire universe of mutual funds, e.g., funds ranked in the top decile based on active share.

Finally, our findings provide a fresh look at the role of analysts in financial markets. An extant literature in finance and accounting highlights the importance of equity and debt analysts in firms' information environment.[9] We extend this literature by emphasizing the role of analysts in the asset management industry. Unlike the sell-side analysts, brokers, and online investment platforms that face potential conflicts of interest,[10] Morningstar analysts provide independent ratings and intend to help investors make investment decisions. Our findings suggest that Morningstar analysts help improve the capital allocation across mutual funds through the selection of analyst coverage and the production of soft information. In a similar vein, our study also sheds light on the long-standing debate on the issuer-paid and investor-paid rating models.[11]

In a recent paper closely related to our work, Armstrong, Genc, and Verbeek (2019) document that the analyst rating is positively related to fund flows and performance. Relative to their important work, we present timely evidence on the newly launched quantitative rating and focus on the vastly different economic implications of the ratings provided by man vs. machine learning. We show that the analyst rating outperforms the quantitative rating in predicting fund return, due to the selection of analyst coverage. We further employ textual analysis to explore the information value of the analyst report, and find that the analyst report contains unique soft information and the return predictability is significantly enhanced when the tone in analyst report is at odds with the analyst rating. Finally, we separately examine the reactions from institutional investors and individual investors, and show that only institutional investors take advantage of the information value of the analyst report, implying a capital misallocation problem among retail investors. Collectively, our analysis enriches the discussions surrounding the Fintech adoption in the financial service industry, and suggests important avenues for automating financial research.

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[9] Healy and Palepu (2001) suggest that the information asymmetry between capital providers and firm managers drives the demand for information intermediaries, who engage in private information production to uncover managers' superior information. Also see, e.g., De Franco, Vasvari, and Wittenberg-Moerman (2009), Johnston, Markov, and Ramnath (2009), Mansi, Maxwell, and Miller (2011), De Franco, Vasvari, Vyas, and Wittenberg-Moerman (2014), and Gurun, Johnston, and Markov (2016).

[10] For instance, brokers and online investment platforms tend to recommend affiliated funds and funds offering higher sales compensation (e.g., Christoffersen, Evans, and Musto 2013; Cookson, Jenkinson, Jones, and Martinez 2021).

[11] See, e.g., Beaver, Shakespeare, and Soliman (2006), Cornaggia and Cornaggia (2013), Xia (2014), and Bhattacharya, Wei, and Xia (2019).

The rest of the paper is organized as follows. Section 2 describes the institutional background, data, and variable construction. Section 3 relates the analyst rating and quantitative rating to fund future performance. Section 4 relates the analyst rating and quantitative rating to investor response in terms of fund flows. Section 5 provides additional analysis and robustness checks. Section 6 concludes.

2. Data and Sample Construction

2.1 Morningstar Analyst Rating

In November 2011, Morningstar officially launched its Analyst Rating for mutual funds. The Morningstar Analyst Rating is generated from forward-looking analysis of a fund. This contrasts with the backward-looking Morningstar Star Rating, which assigns 1 to 5 stars based on a fund's past risk-adjusted returns versus category peers.[12]

Morningstar analyst ratings are assigned on a five-tier scale running from Gold to Negative. The top three ratings, i.e., Gold, Silver, and Bronze, indicate that analysts think highly of a fund. The differences between them correspond to differences in the level of analyst conviction in a fund's ability to outperform its benchmark and peers through time, given its risks. In addition, Morningstar identifies five key areas that are crucial to predict the future success of funds: People, Process, Parent, Performance, and Price. The ratings on each of these five pillars are assigned on a three-tier scale, i.e., Negative, Neutral, and Positive. In addition to the overall rating and ratings on the five pillars, Morningstar issues detailed analyst reports, which justify the rating decision, evaluate each of the five key pillars, provide details on how the fund might behave in different market environments, and highlight key developments in performance and portfolio holdings.

Morningstar analysts collect and analyze information from public filings and private communications with the insiders. The analysts typically start by performing an in-depth review of the fund and form their initial view, after which they interview the portfolio manager and other relevant parties. Separately, they also seek interviews with key parent executives, analysts, risk managers, and traders. After manager interviews and consultation with their peers, analysts produce an internal rating note that assesses each of the five key pillars. The analysts then present this note to the Morningstar

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[12] The detailed methodology of Morningstar analyst rating and star rating is described in Morningstar (2011a, 2011b).

rating committee, and only when the committee is satisfied with the soundness of the judgments expressed in each area, the final rating is approved. Analysts also closely monitor their funds and provide timely updates. Fund ratings and reports are updated up to four times per year on a regular schedule; the frequency depends on the fund size, type, and rating level.

To avoid potential conflicts of interest, Morningstar does not charge fund companies to be rated, nor do fund companies commission the ratings. Morningstar commercializes its fund research by including ratings and reports in various products and services, and through licensing its intellectual property. Fund analysts focus on providing in-depth, accurate, and useful analysis for the benefit of investors, advisors, and institutions, not fund companies. Morningstar also separates its analyst team from commercial activities to avoid any real or perceived conflicts of interest.

In addition, analyst teams have ample discretion in determining their coverage universe, and the coverage is not determined by quantitative screens on performance or limited only to a "best of breed" universe. In practice, analysts evaluate fund assets under management as one gauge of investor interest, but they also cover new and/or small funds if they believe investors would be interested in or benefit from learning more about a fund. Morningstar also frequently canvases its analyst teams, internal consulting units, and external users to identify offerings that might merit coverage.

Figure 1 provides an example from the Morningstar website. As shown in subfigure (a), the analyst rating status (i.e., covered or noncovered) and the star rating (i.e., 3-Star in this example) are publicly available. To further access the corresponding analyst rating and analyst report as shown in subfigure (b), investors must become registered members and pay an annual subscription fee of $199, while the star rating is publicly available without additional cost.[13]

2.2 Morningstar Quantitative Rating ─ Machine Learning Approach

One caveat of the analyst rating is that coverage is limited by the size of the Morningstar analyst team. In June 2017, to expand the number of funds it covers, Morningstar developed a machine learning model that uses the decision-making processes of the analysts, their past rating decisions, and the data

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[13] The full analyst report consists of a summary section and detailed descriptions on each of the five pillars. We provide a snapshot for demonstration.

used to support those decisions. The machine learning model is then applied to the funds that are not covered by analysts and generates the Morningstar Quantitative Rating, which aims to be analogous to the rating a Morningstar analyst might assign to the fund if it were covered.

Morningstar opts to build a model that replicates the output of an analyst as faithfully as possible (Morningstar 2018). The estimation is a two-step process. Morningstar first estimates the pillar ratings in five key areas including People, Process, Parent, Performance, and Price for each fund, and then estimates the overall rating. To estimate the pillar ratings, Morningstar includes more than 180 attributes and more than 10,000 rating updates in the training sample. For each pillar, two random forest models are estimated to determine the probability that funds will be rated Positive or Negative. Morningstar then aggregates these probabilities to produce the overall pillar rating and fund rating.[14]

Investors could potentially benefit from the novel quantitative rating in terms of the breadth of coverage and the frequency of updates. The quantitative coverage universe is many times larger than the analyst coverage universe. Additionally, the Morningstar quantitative rating has the unique advantage of maintaining a monthly update cycle—a frequency unsustainable by human analysts. The quantitative rating is denoted by a superscript 'Q' to differentiate from the analyst rating, and no additional report is generated for the quantitative rating. Both the analyst rating and quantitative rating are only available to registered members.

2.3 Sample and Variable Construction

We obtain the monthly analyst rating, quantitative rating, and star rating from the Morningstar mutual fund database. We manually download the analyst reports from the Morningstar website. The monthly net-of-fee returns and total net assets (TNA), and other quarterly fund characteristics such as turnover and expense ratio, come from the Center for Research in Security Prices (CRSP) mutual fund database. We identify equity funds based on the objective codes from CRSP following Kacperczyk, Sialm, and Zheng (2008). We exclude funds identified by the CRSP "index_fund_flag" as index funds, as well as funds whose name contains the following strings: "Index," "Ind," "Ix," and "Indx." We

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[14] Morningstar revised its methodology in 2019 and only included three pillars afterwards, i.e., People, Process, and Parent (Morningstar 2019). This does not affect the quantitative ratings in our sample period ending in 2018.

further restrict our sample to funds that have TNA of at least $15 million (see Elton, Gruber, and Blake 1996; Amihud and Goyenko 2013; Pástor, Stambaugh, and Taylor 2015), receive a Morningstar star rating, and are at least three years old to avoid the incubation bias (Evans 2010).[15]

Our full sample includes all U.S. actively managed equity mutual funds between November 2011 and December 2018, while the analysis on quantitative rating starts from June 2017 due to data availability. As a robustness check, we expand to the entire universe of U.S. actively managed mutual funds, as the Morningstar ratings could be used by all investors regardless of the asset class. We consolidate multiple share classes into portfolios by adding together share-class TNA and by value weighting share-class characteristics (e.g., ratings, returns, fees) based on lagged share-class TNA. Our final sample includes 3,256 unique equity funds, consisting of 1,056 funds being covered by Morningstar analysts at least once.

2.4 Summary Statistics

We report the summary statistics in Table 1. In panels A1 and A2, mutual funds are sorted to portfolios according to the analyst rating and star rating each month. Both ratings are rounded to the nearest integer. Panel A1 reports the average number of funds in each month, and Panel A2 reports the percentage number of funds within the universe of analyst covered funds. First, Panel A1 shows that about 22% (556 out of 2,475 funds) of the funds are covered by Morningstar analysts, consistent with the limited capacity of the Morningstar analyst team. As shown in Figure 2 subfigure (a), the analyst coverage has been increasing over time, ranging from 8% in 2011 to 30% by the end of 2018.

Second, Panel A2 indicates that about 67% of the funds are recommended by Morningstar analysts (i.e., rated as Bronze or above), 31.5% receive a Neutral rating, and only 1.5% receive a Negative rating. This is in contrast to the Morningstar star rating, which covers a broad range of funds and adopts a more symmetric ranking scheme (Morningstar 2011b). Thus, this preliminary evidence suggests that funds covered by Morningstar analysts are likely to perform better and engage more interest of fund investors,

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[15] The restrictions on size and age also make the rated funds and non-rated funds more comparable in other aspects. In the same spirit, we only consider non-rated funds in the same style (defined by the Lipper objectives from CRSP) as the rated funds. That is, if a certain style does not have any fund covered by Morningstar analysts, all funds tracking this style are excluded from our analysis. In addition, we exclude styles with less than 10 funds.

and this is in line with the objective of the Morningstar analyst rating, i.e., identify funds that should be able to outperform peers and benefit investors.

Third, the analyst rating and star rating are not highly correlated. For instance, among the 13% of funds receiving a Gold rating from analysts, only 3.5% also receive a 5-Star rating and 9% appear to be 3-Star and 4-Star funds. Unreported results show that the correlation between analyst rating and star rating is 0.41 in our sample. This is not surprising given that the analyst rating emphasizes five key areas to evaluate the future success of funds, including People, Process, Parent, Performance, and Price, while the star rating purely relies on the historical performance and therefore is backward-looking in nature.

Panels B1 and B2 report similar statistics when mutual funds are sorted to portfolios according to the quantitative rating and star rating. Panel B1 shows that about 71% (1,723 out of 2,418 funds) of the funds are covered by a quantitative rating. Consistent with the improved analyst coverage, Figure 2 subfigure (b) indicates that 70% of the funds receive a quantitative rating at the end of 2018, compared with 75% in June 2017. Unlike the analyst rating, about 21% of the funds receive a Negative quantitative rating, 51% receive a Neutral rating, and only 28% are recommended to investors (i.e., rated as Bronze or above). Unreported results also suggest that the quantitative rating is more correlated with the star rating (the correlation is 0.6).

Panel C of Table 1 reports the mean, median, standard deviation, and quantile distribution of monthly analyst, quantitative and star ratings, fund returns and style-adjusted returns, fund flow, and other quarterly fund characteristics. Panel C1 focuses on the full sample, while panels C2 and C3 report similar statistics for analyst-covered funds and the remaining funds not covered by analysts, respectively. Comparing with the noncovered funds, analyst-covered funds tend to be larger and older, charge lower fees, and display a higher star rating and style-adjusted return as well as lower turnover. Unreported results confirm that the differences in those fund characteristics are statistically significant.

3. Performance Implications

In addition to the traditional and widely used star rating based on historical performance, Morningstar offers two forward-looking rating metrics, i.e., analyst rating and quantitative rating. Given

the lack of persistence in good performance among mutual funds (e.g., Carhart 1997; Fama and French 2010), the forward-looking ratings could be more useful for market participants and provide better guidance for fund investment compared with the star rating. Morningstar commercializes this research by including ratings and reports in various products and services, and hence is incentivized to provide accurate, unbiased information to investors. Moreover, investors are not allowed to short mutual funds, therefore, they will disproportionally benefit from buy recommendations, i.e., positive ratings. In this section, we explore whether the forward-looking ratings help identify funds that outperform their peers and, as a result, benefit investors.

Since Morningstar ratings are easy to follow and could be directly used by investors to select mutual funds, we begin with a univariate analysis and examine whether the forward-looking ratings predict fund performance. Given the obvious difference in fund coverage and sample period, we separately assess the return predictability of the analyst rating and quantitative rating. Next, we examine the information content of Morningstar ratings, i.e., whether the return predictability is attributed to known fund characteristics or/and other private sources. Finally, we employ textual analysis to investigate the information value of the analyst report, which is only available for analyst-covered funds.

3.1 Analyst Rating vs. Quantitative Rating

To assess whether the forward-looking ratings predict fund performance, we perform a portfolio-based analysis. In particular, at the end of each month t, we sort mutual funds into five portfolios according to the Morningstar analyst rating or quantitative rating. We report the month $t + 1$ value-weighted (net-of-fee) return for each portfolio as well as the difference between the best-rated and the worst-rated funds ("Gold − Negative"). We also report portfolio returns for funds receiving a nonrecommended rating (i.e., rated as Negative or Neutral), and funds receiving a recommended rating (i.e., rated as Bronze, Silver, or Gold), as well as the difference between them ("REC – Non-REC"). The net-of-fee returns are further adjusted by the style return of funds. In addition to the one-month holding period, we also consider monthly rebalanced strategies with a one-year investment horizon.[16]

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[16] The average length of analyst coverage is 34 months in our sample, and on average it takes 24 months to update the analyst rating. Unreported results also confirm our findings in alternative horizons up to three years.

The standard errors in all estimations are corrected for autocorrelation with three lags using the Newey and West (1987) method.

The results are reported in Table 2 Panel A. Several findings are worth noting. First, analyst recommended funds, especially the Gold-rated funds, significantly outperform the benchmark both statistically and economically. For instance, Gold-rated funds outperform the benchmark by 0.91% (0.83%) per year, and recommended funds outperform the benchmark by 0.53% (0.50%) per year based on a one-month (one-year) holding period.[17] The return spreads between Gold-rated funds and Negative-rated funds, and between recommended funds and nonrecommended funds are statistically and economically significant on a style-adjusted basis.[18] For perspective, 5-Star funds outperform the benchmark by 0.46% (0.53%) per year based on a one-month (one-year) holding period (Internet Appendix Table IA1). Therefore, Gold-rated funds recommended by analysts outperform 5-Star funds by 100% (57%) based on a one-month (one-year) holding period on a style-adjusted basis.

Second, moving to the subperiod after July 2017, during which the quantitative rating is available, we find that Gold-rated funds recommended by analysts continue to outperform their peers and display even more prominent economic magnitude compared with the full sample. For instance, Gold-rated funds outperform the benchmark by 1.46% (1.25%) per year and outperform the 5-Star funds by 30% (42%) based on a one-month (one-year) holding period.

Finally, unlike the analyst rating, the quantitative rating fails to identify funds that outperform their peers. Gold-rated funds based on quantitative rating deliver an insignificant style-adjusted return of 0.41% (0.38%) per year based on a one-month (one-year) holding period. Our findings suggest that the two seemingly closely related forward-looking ratings could be very different, and investors should be aware of such a difference instead of naively considering the quantitative rating as an equivalent substitute for the analyst rating.[19]

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[17] The monthly style-adjusted return for Gold-rated funds is 0.076% based on a one-month holding period, which translates to an annualized return of $0.076\% \times 12 = 0.91\%$.

[18] Unreported results further show that analyst-covered funds outperform noncovered funds, indicating a selection effect of analyst coverage. For instance, analyst-covered funds outperform the benchmark by 0.43% (0.42%) per year based on a one-month (one-year) holding period, while noncovered funds underperform the benchmark by 0.28% (0.26%) per year.

[19] Morningstar (2018) shows that the quantitative rating successfully predicts fund performance based on a backtesting period from January 2003 to February 2017. We focus on the out-of-sample period after the official launch of the quantitative rating, and conduct our analysis from July 2017.

The quantitative rating might underperform the analyst rating to identify superior funds for the following reasons. First, Morningstar analysts may acquire soft information from interviews with portfolio managers and key executives, and such information that augments the observable characteristics cannot be easily incorporated into the quantitative rating. We label this as the *information channel*. Second, Morningstar analysts may selectively cover a subset of funds with higher potential to attract investors (Table 1), and prioritize their coverage on easy-to-rate funds, such as funds with longer tracking records and more information available, as well as those willing to communicate with analysts. These features could be related to fund quality; for instance, successful funds are more likely to voluntarily disclose more information, hence are also more likely to be covered by analysts. We label this as the *selective coverage channel*.

To test the above hypotheses, it is necessary to have both human analysts and the machine learning algorithm rate the same set of funds. It is empirically challenging, as a fund can only be covered by either an analyst rating or a quantitative rating in a specific month. To ensure a fair comparison, we reconstruct the quantitative ratings for *all* funds, following the methodology described in Morningstar (2018). Specifically, we train random forest models to predict analyst rating and apply to all funds. Our self-constructed quantitative rating starts from 2014, as we require at least 3 years for the training sample, and the forward rolling is made on a monthly basis. We label it as *Predicted Analyst Rating*. For the analyst-covered funds, we can compare the investment recommendations generated by man (i.e., analyst rating) vs. machine learning (i.e., predicted analyst rating).

We repeat the analysis in Panel A while sorting portfolios according to the Morningstar analyst rating or predicted analyst rating. We separately consider the analyst-covered funds and noncovered funds. If the outperformance of analyst rating (compared to the quantitative rating) is due to the information channel, we expect analyst rating continues to outperform the predicted analyst rating, as the latter is purely generated from observable hard information. In contrast, the selective coverage channel indicates that the predicted analyst rating could be on a par with analyst rating among analyst-covered funds, but is not able to identify outperforming funds among the noncovered sample. The rational is that both human analysts and machine learning algorithm rely on standard, publicly available

information to rank funds, and analyst-covered funds can be better assessed using observable characteristics.

As shown in Panel B of Table 2, among the analyst-covered funds, both analyst rating and predicted analyst rating successfully identify outperforming funds.[20] For instance, Gold-rated funds outperform the benchmark by 0.95% (1.22%) per year based on analyst rating (predicted analyst rating) with a one-month holding period. The slight underperformance of analyst rating suggests that the informational advantage is not likely to be the main driving force for the different predictive qualities of analyst rating vs. quantitative rating.

Moving to the noncovered funds, the predicted analyst rating fails to identify outperforming funds, consistent with the previous results on quantitative rating. Collectively, our findings imply that the analyst rating outperforms the quantitative rating in predicting fund performance mainly through the *selective coverage channel*.

As a robustness check, we also construct a matched sample of analyst-covered funds and machine-covered funds that are observationally similar. Specifically, we compute propensity scores based on a logistic regression using a rich set of fund characteristics, including fund style; *1M Return*, defined as monthly fund return; *1M Flow*, defined as monthly fund flow; *Log(Fund TNA)*, defined as the logarithm of fund total net assets; *Expense Ratio*, defined as the annualized fund expense ratio; *Turnover*, defined as the annualized fund turnover ratio, and *Log(Fund Age)*, defined as the logarithm of the number of operational months since fund inception. The information channel implies that the analyst rating should continue to outperform the quantitative rating in the matched sample, while the selective coverage channel indicates no significant difference in return predictability between analyst rating and quantitative rating within the matched sample, in which the differences in other observable fund characteristics shrink significantly.

We tabulate the results in Internet Appendix Table IA2. In the propensity-matched sample, both the analyst rating and quantitative rating fail to identify outperforming funds. Gold-rated funds

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[20] The correlation between Morningstar analyst rating and predicted analyst rating is 0.54.

recommended by analysts no longer outperform the benchmark once we control for the selection effect of analyst coverage. The overall findings confirm the selective coverage channel.

One caveat is that the machine learning algorithm is trained on analyst-covered funds and analyst ratings. Given the potential difference in the underlying data generating process, it is possible that the existing training sample is not sufficient to generate robust rating estimates for noncovered funds. Therefore, our findings should not be interpreted as evidence against using machine learning methods to provide financial advice, but merely raise questions on the implementation of quantitative rating and propose avenues to enhance the rating quality. For instance, it could be helpful to build up a more representative training sample by at least temporarily randomizing some of the analyst coverage, or set an alternative objective function to predict performance instead of analyst rating and train the machine learning algorithm in the full sample. Therefore, it is premature to conclude whether automated ratings can/should fully or partially substitute for human analysts, and how to optimize the labor division between man and machine.

Collectively, we find that Morningstar analysts are able to identify outperforming funds. Compared with the widely adopted star rating, the analyst rating serves as a better tool to facilitate capital allocation for mutual fund investors. In particular, the Gold rating not only delivers higher style-adjusted return on an after-fee basis, but it also allows investors to focus on a small subset of funds when making investment decisions, i.e., on average there are only 67 Gold-rated funds per month, compared with 200 5-Star funds (Table 1). This is highly valuable in practice, given that investors have limited attention and information processing power (e.g., Kahneman 1973). In addition, investors should not treat the quantitative rating as an equivalent substitute for the analyst rating, despite the fact that quantitative rating is designed to closely replicate the analyst recommendations via advanced machine learning techniques.

3.2 Regression Analysis of Return Predictability

Our early findings suggest that the analyst rating serves as a useful tool for mutual fund investors. The analyst rating identifies funds with superior future performance and, more importantly, it is easy to

observe and follow. Investors who rely on the star rating could easily switch to the analyst rating and improve their performance.

Next, we examine the sources of such return predictability. On the one hand, Morningstar analysts could rely on observable fund characteristics and summarize them in a user-friendly five-tier rating. On the other hand, Morningstar analysts could acquire additional information through private communications with the insiders, and therefore analyst rating might predict fund performance after controlling for the observable fund characteristics. We estimate the following monthly panel regression:

$$Perf_{f,t} = \alpha + \beta_1 Rating_{f,t-1} + cM_{f,t-1} + e_{f,t} \tag{1}$$

where $Perf_{f,t}$ refers to the monthly performance (measured by net-of-fee return and style-adjusted return) of fund f in month t, and $Rating_{f,t-1}$ refers to the analyst rating or quantitative rating.[21] $Rating_{f,t-1}$ is further replaced with four dummy variables indicating Negative, Bronze, Silver, and Gold ratings. Vector *M* stacks all other control variables, including the *Star Rating*, defined as fund star rating; *1M Return*, *1M Flow*, *Log(Fund TNA)*, *Expense Ratio*, *Turnover*, and *Log(Fund Age)*, all defined as before. We include month fixed effects and cluster the standard errors by fund and month.

The results are reported in Table 3. Models 1 to 4 (models 5 to 8) focus on the analyst rating over the entire sample period (subperiod after July 2017), while models 9 to 12 focus on the quantitative rating (only available after July 2017). First, if we focus on style-adjusted performance, the return predictability of the analyst rating does not go beyond observable fund characteristics (models 3 and 7). The alternative rating proxies in the five-tier scale also do not predict superior benchmark-adjusted performance (models 4 and 8).[22] This supports our previous finding that analyst rating does not contain incremental information beyond the predicted analyst rating, which is estimated from known fund characteristics (Table 2 Panel B). Our findings also imply that machine learning algorithm has the

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[21] Although the quantitative rating does not predict fund performance in a univariate test (Table 2 Panel A), we include it here as a robustness check.

[22] Armstrong, Genc, and Verbeek (2019) show that Gold-rated funds deliver better performance after controlling for fund characteristics. The key difference between our analysis and theirs is that they consider all funds (i.e., both analyst-covered funds and noncovered funds), while we focus on funds covered by analysts whenever analyst rating is required for the analysis. Given the selection of analyst coverage as documented before, restricting to analyst-covered funds allows us to control for the analyst coverage and better examine the return predictability of the analyst rating. Such a difference also applies to the flow tests in Section 4.

potential to exploit publicly available information and generate valuable investment advice to assist analysts and investors.

Second, in line with the univariate portfolio sort, the quantitative rating has no return predictability in regression analysis (models 9 to 12). Unreported results confirm our findings over different investment horizons, as well as across various performance measures on a gross-of-fee and risk-adjusted basis.

Overall, the empirical evidence suggests that the return predictability of the analyst rating could be attributed to known fund characteristics. However, this should not be taken as evidence against utilizing the analyst rating in mutual fund investment, as individual investors cannot easily estimate similar predictive models using a comprehensive dataset. A user-friendly indicator such as the analyst rating is still highly valuable to individual investors in guiding their investment decisions.

3.3 The Textual Analysis of Analyst Report

The analyst rating is a discrete measure on a five-tier scale, while the underlying fund quality is continuous. It is possible that the analyst rating per se is not granular enough to capture the cross-sectional variation in fund quality beyond known fund characteristics. Therefore, the analyst report provides a natural setting to further explore the information content of the analyst research.

To quantify the qualitative information contained in analyst report, we follow Loughran-McDonald Sentiment Word Lists (Loughran and McDonald 2011, 2016) to identify the positive and negative tones.[23] To gauge the economic impact of the analyst rating and tone, we sort mutual funds into 15 (i.e., 5×3) portfolios according to the analyst rating and positive tone in the full analyst report at the end of month t. We report the month $t + 1$ value-weighted return for each portfolio, as well as the differences between the best-rated and the worst-rated funds ("Gold $-$ Negative"), and between the top and the bottom tercile of positive tone ("HML"). We focus on the net-of-fee style-adjusted return and one-month holding period for brevity, while our findings remain unchanged in alternative performance measures and horizons.

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[23] Linguistic tone is also employed to quantify the qualitative information contained in news articles, firms' 10-K filings, and credit rating action reports (e.g., Tetlock 2007; Tetlock, Saar-Tschansky, and Macskassy 2008; Loughran and McDonald 2011; Agarwal, Chen, and Zhang 2016).

We tabulate the results in Table 4. First, the tone in the analyst report is informative for future performance. For instance, funds with a high positive tone (low negative tone) outperform the benchmark by 0.68% (0.56%) per year. Negative-rated funds with a low positive tone (high negative tone) underperform the benchmark by 6.58% (5.84%) per year.

Second, the return predictability is further enhanced when the tone is at odds with the five-tier analyst rating. For investors interested in Gold-rated funds, the negative tone is much more informative than the positive tone. For instance, Gold-rated funds with a low negative tone outperform the benchmark by 1.87% per year, while Gold-rated funds with high negative tone outperform the benchmark by an insignificant 0.17% per year—the return spread between funds with high and low negative tone is highly significant and economically sizable. In contrast, the positive tone does not further differentiate Gold-rated funds, and the return spread between funds with high and low positive tone is insignificant. Therefore, investors following Gold-rated funds should pay more attention to the negative information in the analyst report, and properly identifying the negative tone further improves their performance by more than 100%, i.e., 1.87% per year for Gold-rated funds with less negative tone compared with the unconditional benchmark-adjusted return of 0.91% for Gold-rated funds (Table 2 Panel A).[24]

We further investigate whether the tone of the analyst report predicts fund performance after controlling for the observable fund characteristics. We estimate the following monthly panel regression:

$$Perf_{f,t} = \alpha + \beta_1 Rating_{f,t-1} + \beta_2 Tone_{f,t-1} + \beta_3 Rating_{f,t-1} \times Tone_{f,t-1} + cM_{f,t-1} + e_{f,t} \tag{2}$$

where $Tone_{f,t-1}$ refers to the positive and negative tones in the full analyst report. All other variables are defined as in Equation (1).

The results are reported in Table 5, with models 1 to 4 for net-of-fee fund return and models 5 to 8 for style-adjusted return as the dependent variable. Several findings are worth noting. First, the tone of

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[24] As a robustness check, we further adjust for the common risk factors based on Fama-French-Carhart four-factor model (FFC), consisting of the market factor, the size factor, the book-to-market factor, and the momentum factor (Fama and French 1993; Carhart 1997). Unreported results confirm our findings. Specifically, Gold-rated funds with a low negative tone outperform by 1.14% per year in FFC-adjusted returns. Among Gold-rated funds, funds with a low negative tone outperform those with a high negative tone by 1.18% per year. In contrast, the positive tone does not further differentiate Gold-rated funds on a risk-adjusted basis.

the analyst report, especially the positive tone, is a strong predictor of future performance across all specifications, after controlling for the actual analyst rating and other fund characteristics. For instance, a one-standard-deviation increase in positive tone increases the raw return by 0.80% per year (Model 1) and style-adjusted return by 0.21% per year (Model 5).[25] In addition, the return predictability is enhanced when the tone is at odds with the five-tier analyst rating. Gold-rated funds with a more negative tone display lower future performance, while Negative-rated funds with a more positive tone tend to rebound (models 3 and 7).

More importantly, the tone of the analyst report predicts fund performance after controlling for other managerial skill proxies documented in the literature (models 4 and 8). Specifically, we control for *Active Share* (Cremers and Petajisto 2009; Petajisto 2013), *R-square* (Amihud and Goyenko 2013), *Industry Concentration Index* (Kacperczyk, Sialm, and Zheng 2005), and *Return Gap* (Kacperczyk, Sialm, and Zheng 2008). Detailed descriptions of all variables are provided in Appendix A. We document that a one-standard-deviation increase in positive tone increases the raw return by 0.69% per year (Model 4) and style-adjusted return by 0.27% per year (Model 8). Unreported results are quantitatively and qualitatively similar when we consider fund performance over different investment horizons as well as on a gross-of-fee basis, and when we further control for fund fixed effects.

Our findings imply that Morningstar analysts possess unique soft information that augments known fund characteristics, and such information is reflected in detailed discussions in the analyst report rather than in the five-tier analyst rating. Combining the analyst rating and the descriptive information from the analyst report provides a more comprehensive assessment of fund quality, and therefore better a prediction of the fund performance.

One potential concern is that the tone of the analyst report better predicts fund performance simply because it is a continuous measure and naturally captures more cross-sectional variation when compared to the five-tier analyst rating. To pin down the information content in the analyst report, we repeat the analysis in Equation (2) and replace the analyst rating with predicted analyst score—a continuous variable generated by the random forest models as previously described. This is an intermediate output

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[25] The impact of style-adjusted fund return is 0.21% per year, computed as 0.034×0.507×12, where 0.034 is the regression coefficient in Model 5, and 0.507 is the standard deviation of *PosTone* (as reported in Table 1 Panel C2).

before we classify funds into five tiers based on the rating distribution breakpoints (Morningstar 2018). If the return predictability mechanically comes from a more granular nature of the tone measure, we expect the predicted analyst score to be a strong predictor for fund performance and absorbs the predictive power of the tone measure. On the other hand, if the tone of the analyst report remains to predict future performance in the presence of a continuous rating proxy, it reinforces the notion that the analyst report reveals unique soft information.

As shown in Internet Appendix Table IA3, the predicted analyst score is not associated with future performance after controlling for observable fund characteristics (Model 2). More importantly, the tone of the analyst report, especially the positive tone, continues to predict future performance (Model 5).[26] This confirms that Morningstar analysts play a vital role in collecting and processing soft information, highlighting the fundamental difference between investment recommendations provided by man vs. machine learning in this context. The highly valuable soft information cannot be easily incorporated by machine learning techniques, and a more granular, even continuous machine learning-based rating may not be significantly more informative.

Overall, we find that the analyst rating outperforms the widely adopted star rating in identifying high-quality funds and serves as a useful tool for mutual fund investors. The return predictability of the analyst rating could be attributed to known fund characteristics, but the tone in the analyst report contains incremental and unique soft information on future performance. Our findings highlight the importance of mutual fund analysts in information production and the information value of the analyst report. Finally, although the two forward-looking ratings seem to be closely related, the analyst rating outperforms the quantitative rating in predicting fund returns mainly due to the selection of analyst coverage and the soft information contained in analyst report.

4. Do Fund Investors React to Forward-looking Ratings?

Our performance tests suggest that the analyst rating and in particular the tone in the analyst report help identify high-quality funds, and a natural subsequent question is whether investors utilize this

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[26] For completeness, we also consider funds not covered by Morningstar analysts. The results are consistent with Table 3, i.e., the machine learning-based rating displays no return predictability beyond known fund characteristics.

information. Existing work suggests that investors chase past performance and especially the Morningstar star rating (e.g., Chevalier and Ellison 1997; Sirri and Tufano 1998; Barber, Huang, and Odean 2016; Berk and van Binsbergen 2016; Ben-David, Li, Rossi, and Song 2019; Choi and Robertson 2020). Given that fund managers often fail to beat the benchmark and that good performance is not persistent over time, it seems irrational to rely on past performance and the star rating. On the other hand, investors may not yet be aware of the availability and usefulness of the Morningstar analyst rating, and more importantly, may not subscribe to such information.[27] If the investment decision is largely based on the star rating or even the quantitative rating rather than the analyst rating, this could further lead to a capital misallocation problem and have a detrimental effect on investor welfare. Hence, in this section, we explore whether fund investors react to the analyst rating and quantitative rating.

4.1 Investors' Reaction to Analyst Rating and Quantitative Rating

We start by investigating investors' reaction to the analyst rating and quantitative rating. Specifically, we estimate the following monthly panel regression:

$$Flow_{f,t} = \alpha + \beta_1 Rating_{f,t-1} + cM_{f,t-1} + e_{f,t} \tag{3}$$

where $Flow_{f,t}$ refers to the monthly flow of fund f in month t. All other variables are defined as in Equation (1). We include month fixed effects and cluster the standard errors by fund and month.

The results are tabulated in Table 6. Models 1 to 3 (models 4 to 6) focus on the analyst rating over the entire sample period (subperiod after July 2017), while models 7 to 9 focus on the quantitative rating (only available after July 2017). We find that past performance is a strong predictor of fund flows in all specifications.[28] In addition, the analyst rating is associated with higher fund flows in the stand-alone specification, after controlling for various fund characteristics including past fund return (Model 1). However, the predictive power of the analyst rating is subsumed by the star rating in the joint specification. The economic magnitude of the star rating remains sizable after controlling for the analyst rating, i.e., a one-standard-deviation increase in the star rating increases fund flows by 17.35% (Model

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[27] Unlike the star rating that is publicly available on the Morningstar website, the analyst rating and quantitative rating are only visible to paid users at a cost of $199 per year.

[28] Unreported results confirm our findings using alternative fund performance measures. First, we consider past performance over longer horizons such as the past year and the past three years. Second, we employ style-adjusted return and risk-adjusted return as well as the rank of these performance measures.

2).[29] In Model 3, we replace the analyst rating with dummy variables indicating Negative, Bronze, Silver, and Gold ratings, and Gold-rated funds do not appear to attract more capital inflows. Our findings also remain intact in the recent period after July 2017 (models 4 to 6).

In an unreported univariate sort without considering other fund characteristics, 41.6% of the Gold-rated funds based on the analyst rating receive positive flows while 14.1% of the Negative-rated funds receive positive flows, leading to a spread of 27.5%. A parallel analysis on the star rating shows that 61.3% of the 5-Star funds receive positive flows while only 6.3% of the 1-Star funds receive positive flows, leading to a much more economically sizable spread of 55%. The findings are similar using alternative proxies for capital inflows in both percentage and dollar terms. Collectively, mutual fund investors on average do not behave rationally in making investment decisions. They rely on Morningstar star rating and invest in funds with high past performance, and largely ignore the valuable information provided by analysts.

As shown in models 7 to 9 of Table 6, the quantitative rating is positively associated with future inflows after controlling for various fund characteristics including past fund return and star rating, especially for Gold-rated funds. For instance, a one-standard-deviation increase in the quantitative rating (star rating) increases fund flows by 2.95% (15.67%) in Model 8. Moreover, Gold-rated funds attract 11.34% more inflows (Model 9). This is surprising, given that the quantitative rating does not predict future performance. This is not likely due to the increasing awareness of the Morningstar rating service and membership subscription, as the registered members are able to access both analyst rating and quantitative rating, while investors do not respond to the analyst rating during the same subperiod after July 2017. Our findings are also robust to alternative flow measures by further adjusting for the style average. Unreported results confirm that investors react to the star rating and the quantitative rating but not the analyst rating. For instance, a one-standard-deviation increase in the quantitative rating (star rating) increases style-adjusted flows by 3.58% (17.42%).

It is possible that the quantitative rating received more publicity and attracted investor attention when it was first launched, leading to a significant investor reaction to the quantitative rating. In a

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[29] The impact of the fund flow is 17.35%, computed as 0.395×0.952/2.167, where 0.395 is the regression coefficient in Model 2, 0.952 is the standard deviation of *Star*, and 2.167 is the standard deviation of *Flow* (as reported in Table 1 Panel C2).

similar vein, we revisit the investor reaction to the analyst rating in the first two years after its initial launch, i.e., December 2011 to November 2013. Unreported results suggest that, in contrast, investors did not respond to the analyst rating right after the launch of this service.[30]

4.2 Investors' Reaction to Tone in Analyst Report

Our early results indicate that the tone in the analyst report dominates the analyst rating in predicting future performance. We move on to examine investor reaction to the tone in the analyst report. Existing evidence documents that institutional investors respond to useful measures such as fees and risk-adjusted performance (Del Guercio and Tkac 2002; Evans and Fahlenbrach 2012), we therefore also consider whether the more sophisticated institutional investors behave differently from retail investors. Specifically, we estimate the following monthly panel regression:

$$Flow_{f,t} = \alpha + \beta_1 Rating_{f,t-1} + \beta_2 Tone_{f,t-1} + \beta_3 Rating_{f,t-1} \times Tone_{f,t-1}$$
$$+ \beta_4 Tone_{f,t-1} \times INST_{f,t-1} + \beta_5 Rating_{f,t-1} \times Tone_{f,t-1} \times INST_{f,t-1} \quad (4)$$
$$+ \beta_6 INST_{f,t-1} + cM_{f,t-1} + e_{f,t}$$

where $INST_{f,t-1}$ refers to a dummy variable that equals 1 if the primary share class in the fund is an institutional share class and 0 otherwise. Our findings remain unchanged if we identify institutional fund by requiring all share classes of the fund to be institutional share classes. All other variables are defined as in equations (2) and (3). We include month fixed effects and cluster the standard errors by fund and month.

As shown in Table 7, investors mostly react to negative tone in addition to past fund return and the star rating. For instance, a one-standard-deviation increase in negative tone reduces fund flows by 1.39% (Model 1). When we jointly assess the analyst rating and tone, investors withdraw from Gold-rated funds when the tone is more negative (Model 3).

Compared with retail investors, institutional investors do not appear to be more sensitive to the tone in the analyst report in general (Model 4). However, only institutional investors exploit the conflicting signal between the tone and the five-tier analyst rating, i.e., they withdraw from Gold-rated funds when

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[30] We cannot rule out the possibility that investors have paid more attention to financial innovation and become more adaptive to technology development in recent years, which could explain the popularity of the machine learning-based quantitative rating.

the tone is more negative (models 5 and 6). Indeed, this is when the analyst rating and analyst report are the most valuable, as indicated by the stronger return predictability in tables 4 and 5. On the other hand, retail investors tend to invest in Negative-rated funds with a more negative tone (Model 6), and this could be driven by the preference for lottery characteristics instead of expected performance.

Since we document that the analyst rating does not predict future performance beyond known fund characteristics, the lack of response to the analyst rating itself should not be viewed as evidence of investor irrationality. However, investors instead rely on past performance, the star rating, and the quantitative rating. All three signals do not accurately reflect the fund quality and are less informative about future performance compared with the analyst rating. In addition, only institutional investors take advantage of the information value of the analyst rating and analyst report. Therefore, the overall evidence implies a capital misallocation problem in mutual fund investment, especially among retail investors.

5. Additional Analysis

5.1 The Title and Summary Section of Analyst Report

Our main analysis examines the tone in the full analyst report. The full report starts with a summary section that provides an overview of the fund, followed by detailed descriptions on each of the five pillars. The summary section is also included in the briefing report that Morningstar sends to subscribers. Furthermore, the title of the report could easily attract readers' attention and all investors could preview the title without subscribing to the Morningstar premium service. In this subsection, we investigate the information content of the summary section and the title of the analyst report, as well as how investors react to that information. We construct similar proxies for positive and negative tones based on the summary section and the title, and repeat the regression analysis in equations (1) and (3).

The results are presented in Table 8, with models 1 and 2 for net-of-fee fund return, models 3 and 4 for style-adjusted return, and models 5 and 6 for fund flow as the dependent variable. We consider a horse race by including tones in the full report, the summary section, and the title in the same specification. First, only the tone in the full analyst report predicts style-adjusted return (models 3 and

4). This suggests that the full analyst report contains more information than the summary section and the title, and a thorough analysis of the whole report is necessary to extract the useful information.

Second, investors strongly react to both the positive tone and negative tone in the summary section of the analyst report. Investors also react to a negative tone in the title of the report. However, they do not react to the tone in the full report, despite the fact that only the full report contains useful information related to future performance. This indicates that mutual fund investors are not sophisticated in processing information and making investment decisions, and they are likely to be affected by information that attracts their attention, i.e., the title and the summary section, instead of the full report. This further implies that Morningstar could improve their mutual fund rating products by offering a concise analyst report with key information summarized in a few paragraphs, and this will make the analysts' research more accessible to individual investors and thus a better guide for their investment decisions.

5.2 Rating Initiation and Termination

Mutual funds undergo changes in analyst coverage over time, i.e., the coverage by Morningstar analysts may be terminated or initiated. Since June 2017, if a fund is no longer covered by an analyst, it will be rated by the machine learning algorithm and receive a quantitative rating. In this subsection, we investigate the fund return around the switch between analyst rating and quantitative rating. Mutual funds are sorted into two portfolios according to the change in analyst coverage at the end of month t, i.e., funds newly covered by analysts (Analyst Initiation) and funds no longer covered by analysts (Analyst Termination). We report the average monthly value-weighted (net-of-fee) return for each portfolio, as well as the difference between them ("Termination − Initiation") from month $t - 12$ to $t - 1$ and month $t + 1$ to $t + 12$. The net-of-fee fund returns are further adjusted by the style return of funds.

We tabulate the results in Table 9. First, we do not find a significant difference in style-adjusted return between newly covered funds and terminated funds *before* the rating switch, suggesting that past performance is not the primary selection criterion for analyst coverage. Second, terminated funds significantly underperform newly covered funds after the switch. The overall findings are consistent

with the selection effect of analyst coverage, i.e., Morningstar analysts choose to cover better funds with higher potential to attract investors, and the remaining funds are rated by the machine learning algorithm.

5.3 Five Pillars of Analyst Rating

We provide additional analysis to better understand how the five key areas related to the analyst rating affect the fund performance and flow. As described before, the Morningstar analyst rating emphasizes five pillars to evaluate the future success of funds, including People, Process, Parent, Performance, and Price. Each pillar is rated on a three-tier scale, i.e., Negative, Neutral, and Positive. To proceed, we estimate the following monthly panel regressions:

$$Perf_{f,t} = \alpha + \beta_1 Pillar\ Rating_{f,t-1} + \beta_2 Pillar\ Tone_{f,t-1} + \beta_3 Rating_{f,t-1}$$
$$+ \beta_4 Tone_{f,t-1} + cM_{f,t-1} + e_{f,t} \tag{5A}$$

$$Flow_{f,t} = \alpha + \beta_1 Pillar\ Rating_{f,t-1} + \beta_2 Pillar\ Tone_{f,t-1} + \beta_3 Rating_{f,t-1}$$
$$+ \beta_4 Tone_{f,t-1} + cM_{f,t-1} + e_{f,t} \tag{5B}$$

where $Pillar\ Rating_{f,t-1}$ refers to the rating on each of the five key pillars in determining the Morningstar analyst rating, including People, Process, Parent, Performance, and Price. We transform the qualitative ratings into ascending numbers as follows: Negative = 1, Neutral = 2, and Positive = 3. $Pillar\ Tone_{f,t-1}$ refers to the positive and negative tones for each of the five pillars. All other variables are defined as in equations (1) and (3). We include month fixed effects and cluster the standard errors by fund and month.

We report the results in Table 10, with models 1 to 4 for net-of-fee fund return, models 5 to 8 for style-adjusted return, and models 9 to 12 for fund flow as the dependent variable. Several findings are worth noting. First, none of the five pillars predicts fund performance on a style-adjusted basis except for the Price pillar that is marginally significant at the 10% level (models 5 to 6). This is consistent with our early finding that the analyst rating does not predict fund performance beyond known fund characteristics. In addition, a negative tone for the process pillar is associated with lower future performance and remains significant after controlling for the tone of the full analyst report, highlighting the relevance and importance of mutual funds' investment process (models 7 to 8).

Second, as shown in Model 10, higher ratings in the Parent and Price pillars are associated with more capital inflows, after controlling for various fund characteristics including the overall analyst rating and the star rating. Not surprisingly, the Performance pillar is no longer significant once we control for the star rating. On the one hand, this supports our early argument that the analyst rating differs from the star rating and provides additional information to investors. On the other hand, although mutual fund investors do not react to the overall analyst rating or analyst report, they appear to pay more attention to fund companies and fees when making investment decisions. Intuitively, mutual funds attract investor attention through intensive marketing and advertising activities (e.g., Jain and Wu 2000; Barber, Odean, and Zheng 2005; Bergstresser, Chalmers, and Tufano 2009), and the marketing effort is shared within a company (unlike portfolio management at fund level) (e.g., Gallaher, Kaniel, and Starks 2006; Jiang and Zhang 2017). Large, resourceful fund companies may score high in the Parent pillar and meanwhile be able to attract more investors due to good reputation and high publicity. In addition, fund expenses are easy to observe and directly affect the ultimate return received by investors, therefore low-fee funds attract more capital inflows.

Finally, we find that the Process pillar is negatively associated with fund flows, suggesting that investors are unlikely to understand (or pay attention to) the investment process of mutual funds, such as security selection and portfolio construction. Furthermore, investors do not rationally react to the tones in the five pillars beyond the ratings, and tend to invest less in funds with positive tone in the People pillar while invest more in funds with negative tone in the Parent and Performance pillars.

5.4 Robustness Tests

We conduct three sets of robustness checks. First, we expand to the entire universe of active funds covered by Morningstar including equity, bond, and hybrid funds. Second, we consider gross-of-fee performance. Finally, we employ an alternative proxy for the tone in the analyst report.

In our main analysis, we focus on actively managed equity mutual funds. We expand to the entire universe of active funds covered by Morningstar and conduct the portfolio analysis as in Table 2 by sorting mutual funds into five portfolios according to the Morningstar analyst rating and quantitative rating. We tabulate the results in Internet Appendix Table IA4. Consistent with the results on equity

funds, we find that Morningstar analysts successfully identify high-quality funds that outperform the benchmark in all asset classes. For instance, Gold-rated and recommended funds outperform the benchmark by 0.78% and 0.46% (0.72% and 0.44%) per year based on a one-month (one-year) holding period. We also confirm that the quantitative rating fails to identify outperforming funds in the expanded sample. Compared with unreported results on the 5-Star rating, Gold-rated funds outperform the 5-Star funds by 86% (100%) based on a one-month (one-year) holding period after adjusting for benchmark return and fees. Collectively, the Morningstar analyst rating is a better indicator of future performance compared with the star rating and quantitative rating.

Consistent with the findings on equity funds, unreported results confirm that the analyst rating does not predict fund performance beyond known characteristics in the entire universe of active funds. More importantly, the tone in the analyst report remains a strong predictor of future performance, after controlling for the actual analyst rating and other fund characteristics. We also find that investors rely on past performance and the star rating, and largely ignore the analyst rating.

Although the net-of-fee return matters most to mutual fund investors, the gross-of-fee performance better proxies for the skill of mutual fund managers. As shown in in Internet Appendix Table IA5, the return predictability of the analyst rating is statistically significant and economically sizable. If we focus on the one-month holding period, Gold-rated funds outperform the benchmark by 0.98% per year, while 5-Star funds outperform the benchmark by 0.54% per year. This is an 82% increase in gross-of-fee performance on a style-adjusted basis. Consistent with the price (i.e., expense ratio) being a key area in the analyst rating, the gross-of-fee return difference between Gold-rated funds and 5-Star funds is slightly smaller than the net-of-fee measure, i.e., Gold-rated (5-Star) funds outperform the benchmark by 0.91% (0.46%) per year as shown in Table 2 Panel A (Internet Appendix Table IA1). Overall, the higher gross-of-fee return implies that Morningstar analysts indeed identify better managerial skill, and the outperformance of recommended funds is not entirely driven by the lower fees they charge.

Our early results suggest that the tone in the analyst report contains incremental and unique soft information on fund future performance, and we examine the positive tone and negative tone separately. We conduct a robustness test by aggregating the positive and negative tones. Specifically, we define

the net tone as the difference between the positive tone and negative tone, hence a higher net tone indicates a more positive report.

We tabulate the results in Internet Appendix Table IA6, with models 1 to 4 for net-of-fee fund return and models 5 to 8 for style-adjusted return as the dependent variable. Consistent with our main results, the net tone is a strong predictor of future performance, after controlling for the actual analyst rating and other fund characteristics (models 5 and 6). We also interact all rating indicators (i.e., Negative, Bronze, Silver, and Gold ratings) with the net tone, and find that the tone only matters for funds with extreme ratings, i.e., Negative- and Gold-rated funds. The net tone itself no longer predicts fund performance once we control for the interactions between ratings and net tone. In particular, Gold-rated funds with higher net tone (i.e., more positive tone) display higher future performance, and Negative-rated funds with higher net tone tend to rebound (Model 8). This confirms that the return predictability of an analyst recommendation is further enhanced when the tone and analyst rating are at odds with each other.

We also investigate how mutual fund investors react to the net tone in the analyst report. We report the results in Internet Appendix Table IA7. We confirm that average investors do not react to the analyst rating but instead rely on past performance and the star rating. Only institutional investors take advantage of the information value of the analyst report, i.e., they withdraw from Gold-rated funds when the net tone is more negative (models 6 to 8).

6. Conclusion

In addition to the backward-looking star rating, Morningstar recently introduced two novel rating metrics for mutual funds: the analyst rating and the quantitative rating based on the machine learning technique. They are independent, forward-looking metrics that are intended to help investors make investment decisions. We find that Morningstar analysts are able to identify outperforming funds. For instance, Gold-rated funds recommended by analysts outperform the benchmark by 0.91% per year, representing a 100% performance improvement over the traditional 5-Star rating. The analyst rating also allows investors to focus on a small subset of funds when making investment decisions and is highly valuable in practice.

In contrast, the quantitative rating fails to identify funds that outperform their peers. The analyst rating outperforms the quantitative rating in predicting fund performance mostly due to the selection of analyst coverage. Our findings suggest that the two seemingly closely related forward-looking ratings could be very different, and investors should be aware of such difference instead of naively considering the quantitative rating as an equivalent substitute for the analyst rating.

In terms of the information content, analyst rating aggregates the observable fund characteristics to a useful performance indicator, while the analyst report contains unique and incremental information in predicting mutual fund performance. The return predictability is further enhanced when the tone is at odds with the analyst rating. These findings highlight the importance of mutual fund analysts in information production and the information value of the analyst report. The soft information obtained from analyst interviews is not yet identified by the more sophisticated machine learning algorithm and is not yet incorporated into the quantitative rating.

Furthermore, although the analyst rating is easy to observe and follow, investors do not react to such information and instead rely on past performance, the star rating, and the quantitative rating—all three signals do not accurately reflect the fund quality and are less informative about future performance compared with the analyst rating. In addition, only institutional investors take advantage of the information value of the analyst report. Therefore, the overall evidence implies a capital misallocation problem in mutual fund investment, especially among retail investors.

Our findings provide timely evidence to understand the role of FinTech and propose important avenues for automating financial research. For instance, it might make sense to temporarily randomize the assignments of some human analysts to build up a representative training sample, or employ an alternative objective function to directly predict fund performance in the full sample. Both could contribute to a more robust and competent quantitative rating product. Going forward, a man plus machine model that maximizes the advantages of man and machine could facilitate better information discovery and improve investor welfare. In addition, it is important to cater to the limited attention of individual investors, and offer a concise analyst report with key information summarized in a few paragraphs using simple language.

Our findings also have important implications for investor education and financial service provision. The development of the delegated asset management industry in the past few decades allows individual investors to outsource the day-to-day portfolio management decisions to professional fund managers. However, an unintended consequence of the growing market size and variety of financial products is that fund selection could be at least as complicated as a direct stock investment. Our findings call for increased attention to offer continuous financial education to individual investors and inform them of the up-to-date, valuable financial services and tools.

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Appendix A: Variable Definitions

Variables	Definitions
A. Rating Measures	
Analyst Rating	We transform the Morningstar analyst ratings into ascending numbers as follows: Negative = 1, Neutral = 2, Bronze = 3, Silver = 4, and Gold = 5. When a fund has multiple share classes, its analyst rating is computed as the share class total net assets (TNA)-weighted analyst rating of all share classes, where the TNA values are one-month lagged.
Quantitative Rating	We transform the Morningstar quantitative ratings into ascending numbers as follows: Negative = 1, Neutral = 2, Bronze = 3, Silver = 4, and Gold = 5. When a fund has multiple share classes, its quantitative rating is computed as the share class total net assets (TNA)-weighted analyst rating of all share classes, where the TNA values are one-month lagged.
Star Rating	The Morningstar rating ranging from 1 to 5 stars. When a fund has multiple share classes, its star rating is computed as the share class total net assets (TNA)-weighted star rating of all share classes, where the TNA values are one-month lagged.
PosTone	The percentage of positive words in the full analyst report, following Loughran and McDonald (2011, 2016) Sentiment Word Lists.
NegTone	The percentage of negative words in the full analyst report, following Loughran and McDonald (2011, 2016) Sentiment Word Lists.
NetTone	The percentage of positive words minus the percentage of negative words in the full analyst report, following Loughran and McDonald (2011, 2016) Sentiment Word Lists.
B. Fund Performance and Flow Measures (in %)	
Fund Return	The monthly net-of-fee return reported by the CRSP survivorship bias-free mutual fund database. When a fund has multiple share classes, its total return is computed as the share class total net assets (TNA)-weighted return of all share classes, where the TNA values are one-month lagged.
Gross-of-Fee Fund Return	Fund total return plus one-twelfth of the annualized expense ratio.
Style-adjusted Return	Fund returns minus the TNA-weighted average return of the funds in the same style, defined as Lipper objective in the CRSP mutual fund database; the TNA values are one-month lagged.
Gross-of-Fee Style-adjusted Return	Gross-of-fee fund returns minus the TNA-weighted average gross-of-fee return of the funds in the same style, defined as Lipper objective in the CRSP mutual fund database; the TNA values are one-month lagged.
Fund Flow	Fund flow in a given month t is computed as follows: $Flow_{f,t} = [TNA_{f,t} - TNA_{f,t-1} \times (1 + r_{f,t})]/TNA_{f,t-1}$, where $TNA_{f,t}$ refers to the TNA of fund f in month t, and $r_{f,t}$ refers to fund total return in the same month.
C. Other Fund Characteristics	
Log (Fund TNA)	The logarithm of the total net assets as reported in the CRSP survivorship bias-free mutual fund database, in millions.
Expense Ratio (in %)	The annualized expense ratio as reported in the CRSP survivorship bias-free mutual fund database.
Turnover	The annualized turnover ratio as reported in the CRSP survivorship bias-free mutual fund database.
Log (Fund Age)	The logarithm of the number of operational months since inception.
Active Share	Active share in a given quarter q is computed as follows: $AS_{f,q} = \frac{1}{2}\sum_i |w_{i,f,q} - w_{i,f,q}^b|$, where $w_{i,f,q}$ is the investment weight of stock i by fund f in quarter q, $w_{i,f,q}^b$ is the investment weight of stock i in fund f's benchmark portfolio in the same quarter, following Cremers and Petajisto (2009), and Petajisto (2013).
TR^2	R-square of fund f in a given month t, $R_{f,t}^2$ is obtained from the Fama-French-Carhart four-factor model (Fama and French 1993; Carhart 1997) with a 24-month estimation period. More specifically, we regress monthly fund excess return on the market, size, book-to-market, and momentum factor returns. The logistic transformation of R-square in a given month t is then

	computed as follows: $TR_{f,t}^2 = \log\left[\sqrt{R_{f,t}^2 + c} \Big/ \left(1 - \sqrt{R_{f,t}^2 + c}\right)\right]$, where $c = 0.5/n$, and n is the sample size ($n = 24$), following Amihud and Goyenko (2013).
ICI	Industry concentration index in a given quarter q is computed as follows: $ICI_{f,q} = \sum_{j=1}^{10}\left(\omega_{j,f,q} - \overline{\omega}_{j,q}\right)^2$, where $\omega_{j,f,q}$ is the investment weight of industry j in fund f in quarter q, and $\overline{\omega}_{j,q}$ is the investment weight of industry j in the market portfolio in the same quarter, following Kacperczyk, Sialm, and Zheng (2005).
Return Gap	Return gap is computed as the difference between fund gross-of-fee return and holding-based return, where gross-of-fee return is the fund total return plus one-twelfth of the annualized expense ratio, and holding-based return is the investment value-weighted average of stock returns of a fund's most recently reported holding portfolio, following Kacperczyk, Sialm, and Zheng (2008).

Figure 1: Example of Morningstar Analyst Rating

This figure shows the snapshots of Wells Fargo Premier Large Company Growth Fund on the Morningstar website (https://www.morningstar.com/funds/xnas/ekjax/quote). Subfigure (a) shows that, without premium membership, investors cannot observe the actual rating information. Subfigure (b) shows that, with a premium membership, all detailed ratings and the analyst report are shown to investors.
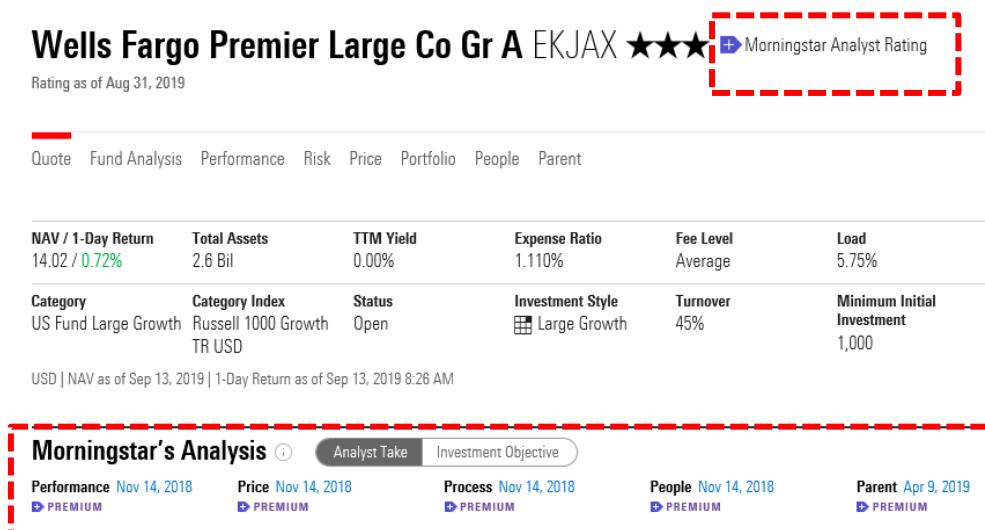
(a) Snapshot without Morningstar Premium Membership
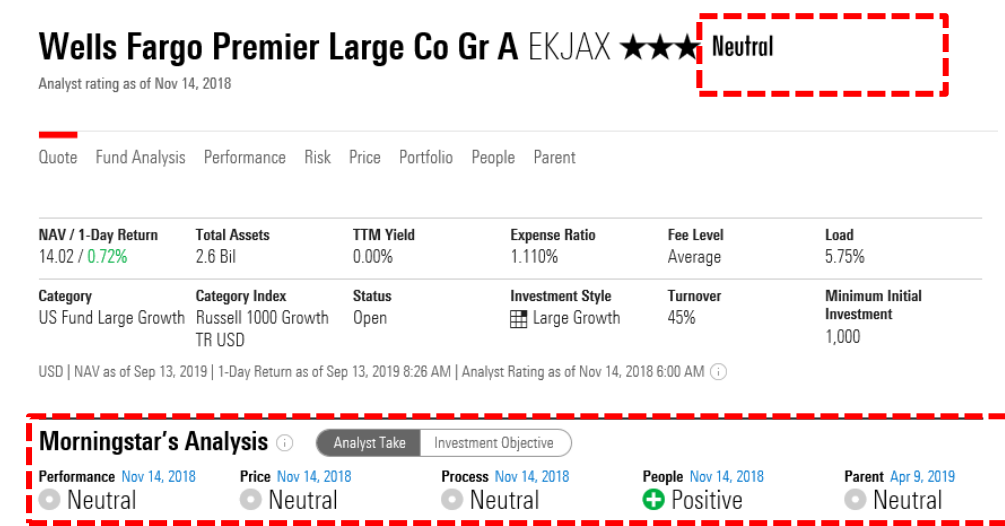
(b) Snapshot with Morningstar Premium Membership

Figure 1—Continued

This strategy hasn't delivered.

Connor Young, Analyst

Summary | by Connor Young Nov 15, 2018

Despite experienced management, Wells Fargo Premier Large Company Growth's approach doesn't give the strategy an edge. It earns a Morningstar Analyst Rating of Neutral.

A recent departure doesn't diminish this team. Former comanager Bruce Olson retired in April 2018 after two decades with the team. While his departure is a loss, the team remains in good hands. Thomas Ognar has led the Heritage Growth Equity team since 2002, and he's worked with comanager Joseph Eberhardy since the 1990s. Robert Gruendyke, associate portfolio manager since 2015, stepped into Olson's role. Gruendyke is capable and experienced, with 10 years of team tenure. Five analysts help the managers fill the portfolio.

The team took control of this strategy in May 2010, but it has executed the approach at Neutral-rated all-cap-focused Wells Fargo Growth SGRAX since 2002. There, the team has added significant value through its small-cap picks. This strategy focuses on large- and mid-cap stocks, so it doesn't play to one of the team's key strengths. The team attempts to identify firms with robust, sustainable, and underappreciated growth prospects. It focuses on firms with top-quartile revenue, cash flow, and earnings growth within their respective industries, and management buys when its growth expectations for a stock are higher than the market's. This difference can make holdings look relatively expensive, so the strategy consistently lands in the high-growth section of the Morningstar Style Box. The team's emphasis on mid-cap stocks gives the portfolio a smaller-cap tilt relative to the Russell 1000 Growth Index. As of September 2018, the portfolio's average market cap of $78 billion was well below the index's $104 billion.

Since current management took the reins in May 2010 through October 2018, the strategy's annualized return of 13.6% trailed the index's 15.1%. Its aggressive profile has led to higher volatility than the bogy, so it also trailed on a risk-adjusted basis. The strategy has not proved it can deliver consistent results in the competitive large-growth arena, and middling fees don't help.

Process | ⬤ Neutral | by Connor Young Nov 15, 2018

This strategy's approach fails to distinguish itself in the competitive large-growth category, so it earns a Neutral Process rating.

The team attempts to identify large- and mid-cap companies with robust, sustainable, and underappreciated growth prospects. It focuses on firms with top-quartile revenue, cash flow, and earnings growth over a full market cycle within their respective industries. The team purchases these firms when its growth expectations for a firm are higher than the market's. This difference can make holdings look relatively expensive, often pushing price multiples above the Russell 1000 Growth benchmark's.

The team combines quantitative and qualitative analysis. The quant screens look for firms that meet certain growth requirements, which vary by industry. The team then dives into company fundamentals by reviewing financial statements and meeting with company management. It then uses valuation analysis to compare its internal growth estimates with outside resources, which ultimately drives its buy and sell decisions.

The managers have plenty of leeway in building this portfolio of about 90 stocks. The fund can invest 0.5 to 2.0 times the benchmark's allocation in traditional growth sectors (such as technology, healthcare, and consumer discretionary) and between 0 and 5 times the benchmark's allocation in all other sectors. Individual positions are limited to 7% of assets.

Consistent with management's emphasis on higher-growth fare, the portfolio's sales and earnings-growth rates have historically been above the Russell 1000 Growth benchmark's. Similarly, the portfolio's price multiples such as price/earnings and price/cash flow have trended higher than the bogy's. Profitability metrics, including returns on assets and invested capital, tend to fall short of the benchmark's, so investors shouldn't count on this strategy for downside protection.

The team conducts research across the market-cap spectrum and typically allocates more assets than the benchmark to mid-cap stocks. As of September 2018, the strategy's 20% stake in mid-cap stocks exceeded the benchmark's 13% weighting, and its average market cap of $74 billion was well below the bogy's $104 billion.

The portfolio had a significant overweighting in financials, stemming from sizable positions in Visa V and Mastercard MA, which the managers believe will be large beneficiaries as consumers move away from cash transactions. It also held several online brokerages, including Charles Schwab SCHW and MarketAxess Holdings MKTX. Conversely, management has trimmed technology names because of rising valuations, bringing the portfolio's tech exposure below the benchmark's.

(b) Snapshot with Morningstar Premium Membership

Figure 2: Morningstar Rating Coverage Over Time

Subfigure (a) indicates the percentage of mutual funds covered by Morningstar analysts between November 2011 and December 2018. Subfigure (b) indicates the percentage of mutual funds receiving the quantitative rating (%Quantitative Rating) between June 2017 and December 2018.
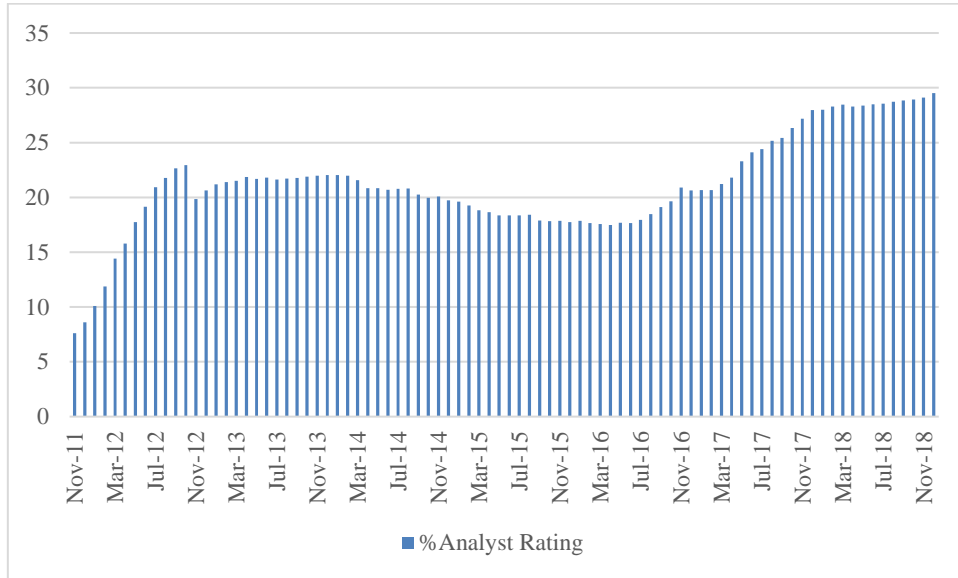
(a) The Coverage of Morningstar Analyst Rating
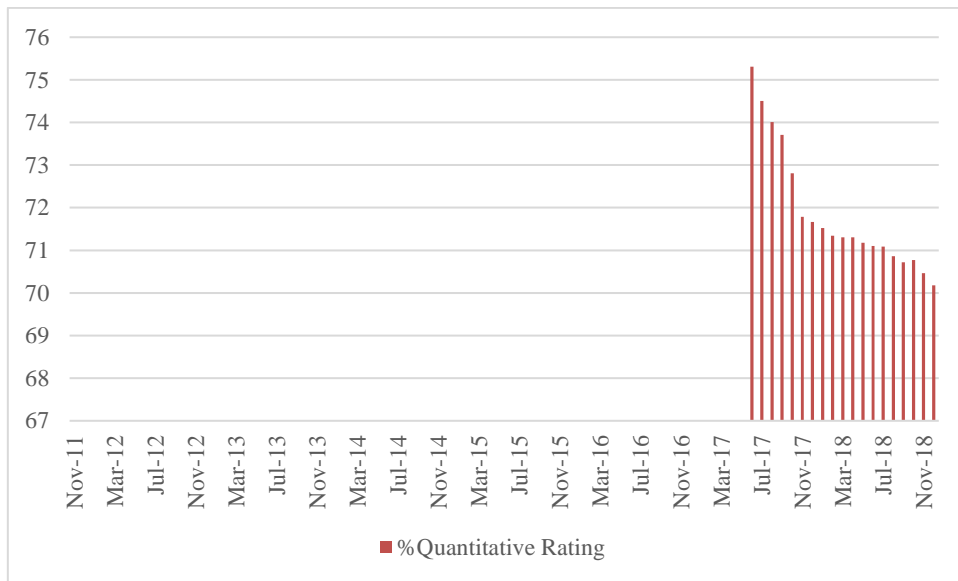
(b) The Coverage of Morningstar Quantitative Rating

Table 1: Summary Statistics

In panels A1 and A2, mutual funds are sorted to 30 (i.e., 6×5) portfolios according to the analyst rating and star rating each month. Both ratings are rounded to the nearest integer. Panel A1 reports the average number of funds in each portfolio, and Panel A2 reports the percentage of funds within the universe of funds covered by Morningstar analysts. Panels B1 and B2 report similar statistics when analyst rating is replaced with quantitative rating. Panel C reports the mean, median, standard deviation, and quantile distribution of monthly Morningstar ratings, fund return and style-adjusted return, fund flow, and other quarterly fund characteristics, with Panel C1 for the full sample, and panels C2 and C3 for funds covered by Morningstar analysts and the remaining funds not covered by analysts, respectively. The full sample ranges for the period November 2011 to December 2018, while data on quantitative rating starts from June 2017. Appendix A provides detailed definitions of each variable.

Analyst Rating	Star Rating					All
	1	2	3	4	5	
Panel A1: Number of Funds						
Noncovered	127	451	773	448	119	1,918
Negative	3	3	2	0	0	7
Neutral	9	47	73	41	11	181
Bronze	3	19	66	70	22	180
Silver	1	8	33	51	29	121
Gold	0	1	14	33	19	67
All	142	530	960	643	200	
Panel A2: Percentage of Funds						
Negative	0.5	0.6	0.3	0.1	0.0	1.5
Neutral	1.6	8.4	12.9	6.9	1.7	31.5
Bronze	0.5	3.6	11.8	12.4	3.9	32.1
Silver	0.2	1.5	6.0	9.3	5.1	22.1
Gold	0.0	0.3	2.6	6.4	3.5	12.8
All	2.7	14.4	33.6	35.0	14.3	

Quantitative Rating	Star Rating					All
	1	2	3	4	5	
Panel B1: Number of Funds						
Noncovered	9	78	232	262	114	695
Negative	84	171	92	10	3	359
Neutral	29	207	446	167	31	879
Bronze	0	6	112	110	27	256
Silver	0	0	38	95	36	169
Gold	0	0	9	36	15	60
All	121	462	928	681	226	
Panel B2: Percentage of Funds						
Negative	4.9	9.9	5.4	0.6	0.1	20.9
Neutral	1.7	12.0	25.8	9.7	1.8	51.0
Bronze	0.0	0.3	6.5	6.4	1.6	14.8
Silver	0.0	0.0	2.2	5.5	2.1	9.8
Gold	0.0	0.0	0.5	2.1	0.9	3.5
All	6.6	22.3	40.4	24.3	6.5	

Table 1—Continued

	Mean	Std.Dev.	Quantile Distribution				
			10%	25%	Median	75%	90%
Panel C: Quantile Distribution of Fund Characteristics							
Panel C1: Full Sample							
Analyst Rating	0.680	1.373	0.000	0.000	0.000	0.000	3.000
Quantitative Rating	1.529	1.320	0.000	0.000	2.000	2.000	3.032
Star Rating	2.975	1.124	1.773	2.097	3.000	3.939	4.108
Fund Return	0.687	3.061	-2.922	-0.642	0.669	2.418	4.408
Style-adjusted Return	-0.041	1.122	-1.364	-0.573	-0.029	0.505	1.265
Fund Flow	-0.421	2.631	-2.812	-1.405	-0.542	0.341	1.925
Log (Fund TNA)	6.210	1.694	3.918	4.933	6.239	7.390	8.491
Expense Ratio	1.001	0.361	0.547	0.773	1.002	1.224	1.438
Turnover	0.722	0.858	0.139	0.259	0.480	0.850	1.440
Log (Fund Age)	5.253	0.563	4.443	4.954	5.339	5.606	5.870
Panel C2: Analyst Covered Funds							
Analyst Rating	3.110	1.033	2.000	2.000	3.000	4.000	5.000
PosTone	1.720	0.507	1.077	1.378	1.694	2.043	2.373
NegTone	1.376	0.518	0.779	1.016	1.317	1.678	2.071
NetTone	0.343	0.740	-0.590	-0.139	0.361	0.843	1.256
Star Rating	3.436	0.952	2.000	2.960	3.476	4.000	4.897
Fund Return	0.658	3.075	-2.987	-0.656	0.707	2.412	4.307
Style-adjusted Return	-0.015	1.088	-1.288	-0.540	-0.010	0.531	1.246
Fund Flow	-0.536	2.167	-2.602	-1.348	-0.542	0.271	1.450
Log (Fund TNA)	8.060	1.195	6.483	7.286	8.105	8.895	9.627
Expense Ratio	0.888	0.314	0.492	0.693	0.917	1.104	1.254
Turnover	0.576	0.759	0.110	0.200	0.380	0.660	1.100
Log (Fund Age)	5.456	0.469	4.890	5.192	5.462	5.737	6.040
Active Share	0.818	0.146	0.615	0.704	0.851	0.944	0.981
TR^2	2.860	1.681	0.384	1.670	3.066	3.982	4.884
ICI	0.113	0.195	0.009	0.021	0.040	0.082	0.373
Return Gap	-0.131	1.797	-1.226	-0.424	-0.057	0.247	0.793
Panel C3: Noncovered Funds							
Quantitative Rating	2.107	1.089	1.000	1.363	2.000	2.832	3.929
Star Rating	2.846	1.134	1.192	2.000	3.000	3.783	4.000
Fund Return	0.695	3.057	-2.904	-0.638	0.658	2.420	4.438
Style-adjusted Return	-0.048	1.131	-1.386	-0.583	-0.034	0.498	1.271
Fund Flow	-0.389	2.745	-2.874	-1.421	-0.542	0.363	2.108
Log (Fund TNA)	5.693	1.432	3.709	4.598	5.729	6.768	7.500
Expense Ratio	1.033	0.367	0.565	0.800	1.030	1.256	1.484
Turnover	0.762	0.879	0.140	0.270	0.520	0.910	1.500
Log (Fund Age)	5.196	0.575	4.347	4.875	5.298	5.572	5.817

Table 2: Mutual Fund Returns Sorted by Morningstar Ratings: Analyst Rating vs. Quantitative Rating

In Panel A, mutual funds are sorted into five portfolios according to the analyst rating or quantitative rating (both rounded to the nearest integer) at the end of month t. We report the month $t + 1$ value-weighted return for each portfolio, as well as the difference between the best-rated and the worst-rated funds ("Gold − Negative"). We also report portfolio returns for funds receiving a nonrecommended rating (i.e., rated as Negative or Neutral), and funds receiving a recommended rating (i.e., rated as Bronze, Silver, or Gold), as well as the difference between them ("REC – Non-REC"). The net-of-fee fund returns are further adjusted by the style return of funds. We also report the monthly portfolio returns over a one-year holding period. We report results in the full sample between November 2011 and December 2018, as well as in the subperiod after July 2017. Panel B reports similar statistics when portfolios are sorted by the analyst rating or predicted analyst rating for analyst covered funds and noncovered funds (i.e., funds not covered by Morningstar analysts) in the subperiod after 2014. Appendix A provides detailed definitions of each variable. Newey-West adjusted t-statistics are shown in parentheses. Numbers with "*", "**", and "***" are significant at the 10%, 5%, and 1% level, respectively.

	Panel A: Value-weighted Net-of-fee Fund Return Sorted by Analyst Rating and Quantitative Rating											
	Analyst Rating								Quantitative Rating			
	Full Sample				Post July 2017				Post July 2017			
Rank	1-Month		1-Year		1-Month		1-Year		1-Month		1-Year	
	Return	Style-adj	Return	Style-adj	Return	Style-adj	Return	Style-adj	Return	Style-adj	Return	Style-adj
Negative	-0.202	-0.555**	-0.207	-0.569***	-0.321	-0.227	-0.568	-0.405	0.047	-0.094**	0.008	-0.103***
	(-0.66)	(-2.40)	(-0.75)	(-2.83)	(-0.52)	(-0.83)	(-1.12)	(-1.70)	(0.06)	(-2.45)	(0.01)	(-3.31)
Neutral	0.691***	0.003	0.688***	0.005	0.146	-0.059	0.120	-0.061	0.075	-0.087**	0.076	-0.083*
	(2.79)	(0.16)	(2.77)	(0.20)	(0.19)	(-0.82)	(0.16)	(-0.91)	(0.11)	(-2.26)	(0.11)	(-1.83)
Bronze	0.708***	0.024	0.703***	0.023	0.138	0.011	0.126	0.004	0.102	-0.069	0.125	-0.045
	(2.90)	(1.32)	(2.96)	(1.23)	(0.19)	(0.28)	(0.18)	(0.12)	(0.15)	(-1.22)	(0.18)	(-1.15)
Silver	0.761***	0.038***	0.782***	0.040***	0.114	0.015	0.145	0.022	0.233	-0.009	0.185	-0.019
	(3.00)	(2.69)	(3.09)	(3.04)	(0.16)	(0.43)	(0.20)	(0.64)	(0.28)	(-0.18)	(0.23)	(-0.43)
Gold	0.696***	0.076***	0.673***	0.069***	0.302	0.122**	0.264	0.104**	0.121	0.034	0.212	0.032
	(3.05)	(4.57)	(2.94)	(4.35)	(0.43)	(2.42)	(0.37)	(2.14)	(0.16)	(0.66)	(0.29)	(0.65)
Non-REC (≤ Neutral)	0.685***	0.001	0.682***	0.001	0.143	-0.060	0.118	-0.062	0.069	-0.088**	0.062	-0.086*
	(2.78)	(0.04)	(2.75)	(0.07)	(0.19)	(-0.85)	(0.16)	(-0.93)	(0.10)	(-2.33)	(0.09)	(-2.05)
REC (≥ Bronze)	0.709***	0.044***	0.708***	0.042***	0.177	0.045*	0.172	0.038	0.158	-0.026	0.160	-0.021
	(2.97)	(5.28)	(3.00)	(4.87)	(0.25)	(1.82)	(0.24)	(1.49)	(0.21)	(-0.58)	(0.22)	(-0.57)
Gold − Negative	0.898***	0.631***	0.880***	0.638***	0.622**	0.350	0.832**	0.508*	0.074	0.128**	0.204	0.135**
	(3.33)	(2.69)	(3.61)	(3.12)	(2.20)	(1.29)	(2.71)	(2.04)	(0.58)	(2.35)	(1.61)	(2.56)
REC − Non-REC	0.024	0.043**	0.026	0.041**	0.034	0.105*	0.053	0.100*	0.089	0.062*	0.098	0.066*
	(0.96)	(2.30)	(0.86)	(2.04)	(0.51)	(1.83)	(0.68)	(1.92)	(0.96)	(2.10)	(1.57)	(1.99)

Table 2—Continued

Rank	Analyst Covered Funds								Noncovered Funds			
	Analyst Rating				Predicted Analyst Rating				Predicted Analyst Rating			
	1-Month		1-Year		1-Month		1-Year		1-Month		1-Year	
	Return	Style-adj	Return	Style-adj	Return	Style-adj	Return	Style-adj	Return	Style-adj	Return	Style-adj
Negative	-0.640*	-0.766**	-0.702**	-0.797***	-0.357	-0.536**	-0.516*	-0.650***	0.351	-0.020	0.330	-0.017
	(-1.79)	(-2.42)	(-2.52)	(-3.00)	(-0.91)	(-2.16)	(-1.74)	(-3.14)	(1.31)	(-0.41)	(1.30)	(-0.32)
Neutral	0.482	-0.014	0.474	-0.017	0.449	-0.026	0.436	-0.035	0.474	-0.029	0.487	-0.029
	(1.56)	(-0.56)	(1.53)	(-0.71)	(1.46)	(-0.90)	(1.42)	(-1.35)	(1.59)	(-1.51)	(1.64)	(-1.31)
Bronze	0.450	0.005	0.458	0.005	0.471	-0.000	0.489	0.006	0.495	-0.066**	0.492	-0.032
	(1.52)	(0.26)	(1.58)	(0.23)	(1.61)	(-0.01)	(1.66)	(0.31)	(1.62)	(-2.25)	(1.60)	(-1.25)
Silver	0.512*	0.041**	0.534*	0.042**	0.390	-0.028	0.374	-0.030	0.302	-0.087	0.326	-0.070*
	(1.68)	(2.32)	(1.76)	(2.52)	(1.41)	(-1.12)	(1.37)	(-1.22)	(0.94)	(-1.67)	(1.12)	(-1.88)
Gold	0.556*	0.079***	0.533*	0.070***	0.602*	0.102***	0.612*	0.098***	0.398	-0.026	0.481*	0.021
	(1.85)	(3.62)	(1.77)	(3.50)	(1.91)	(5.17)	(1.93)	(5.51)	(1.37)	(-0.66)	(1.78)	(0.62)
Non-REC (≤ Neutral)	0.480	-0.015	0.470	-0.019	0.446	-0.028	0.431	-0.038	0.461	-0.030	0.473	-0.028
	(1.55)	(-0.62)	(1.52)	(-0.80)	(1.45)	(-0.99)	(1.41)	(-1.47)	(1.58)	(-1.65)	(1.63)	(-1.37)
REC (≥ Bronze)	0.499	0.038***	0.502*	0.037***	0.509*	0.040***	0.513*	0.039***	0.408	-0.074***	0.421	-0.045**
	(1.67)	(3.64)	(1.69)	(3.21)	(1.70)	(3.55)	(1.72)	(3.41)	(1.35)	(-3.24)	(1.44)	(-2.66)
Gold − Negative	1.196***	0.844**	1.235***	0.867***	0.959***	0.638**	1.128***	0.748***	0.047	-0.005	0.151	0.038
	(3.42)	(2.64)	(4.18)	(3.20)	(3.04)	(2.54)	(4.69)	(3.58)	(0.40)	(-0.07)	(1.23)	(0.52)
REC − Non-REC	0.019	0.054**	0.031	0.055**	0.063	0.068**	0.082**	0.076***	-0.054	-0.044*	-0.052	-0.017
	(0.68)	(2.48)	(1.03)	(2.58)	(1.59)	(2.51)	(2.45)	(3.26)	(-0.92)	(-1.95)	(-1.02)	(-0.75)

Panel B: Value-weighted Net-of-fee Fund Return Sorted by Predicted Analyst Rating (Post 2014)

Table 3: Morningstar Ratings and Mutual Fund Performance

This table presents the results of the following monthly panel regressions with month fixed effects and their corresponding t-statistics with standard errors clustered by fund and month,

$$Perf_{f,t} = \alpha + \beta_1 Rating_{f,t-1} + cM_{f,t-1} + e_{f,t},$$

where $Perf_{f,t}$ refers to the monthly performance of fund f in month t, and $Rating_{f,t-1}$ refers to the analyst rating (models 1 to 8) or quantitative rating (models 9 to 12). $Rating_{f,t-1}$ is further replaced with four dummy variables indicating Negative, Bronze, Silver, and Gold ratings. Vector M stacks all other control variables, including the Star Rating, 1M Return, 1M Flow, Log(Fund TNA), Expense Ratio, Turnover, and Log(Fund Age). The dependent variable $Perf_{f,t}$ is measured by net-of-fee return (models 1, 2, 5, 6, 9, and 10) and style-adjusted return (models 3, 4, 7, 8, 11, and 12). Models 1 to 4 focus on the full sample period, while models 5 to 12 focus on the subperiod after July 2017. Appendix A provides detailed definitions of each variable. Numbers with "*", "**", and "***" are significant at the 10%, 5%, and 1% levels, respectively.

	Net-of-fee Fund Return Regressed on Lagged Fund Characteristics											
Rating =	Analyst Rating				Analyst Rating (Post July 2017)				Quantitative Rating			
	Return		Style-adj Return		Return		Style-adj Return		Return		Style-adj Return	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12
Rating	0.001		0.002		-0.001		0.014		0.011		0.003	
	(0.05)		(0.16)		(-0.03)		(0.41)		(0.26)		(0.24)	
Negative		-0.484**		-0.138		-0.702**		-0.149		0.045		0.030
		(-2.30)		(-1.11)		(-2.55)		(-0.72)		(1.10)		(1.16)
Bronze		-0.051		-0.009		-0.041		0.020		0.019		0.008
		(-1.59)		(-0.48)		(-0.83)		(0.45)		(0.35)		(0.38)
Silver		-0.047		-0.018		-0.050		0.018		0.093		0.024
		(-1.09)		(-0.59)		(-0.59)		(0.24)		(1.09)		(0.70)
Gold		-0.007		0.010		0.055		0.054		-0.016		0.031
		(-0.12)		(0.26)		(0.47)		(0.48)		(-0.10)		(0.81)
Star Rating	0.021	0.018	0.023	0.022	0.029	0.024	0.039	0.038	0.035	0.039	0.050**	0.053**
	(0.78)	(0.66)	(1.16)	(1.12)	(0.58)	(0.48)	(1.10)	(1.06)	(0.94)	(1.13)	(2.25)	(2.26)
1M Return	-0.039	-0.040	0.005	0.005	-0.049	-0.049	-0.016	-0.016	-0.033	-0.033	-0.011	-0.012
	(-0.96)	(-0.98)	(0.53)	(0.51)	(-0.75)	(-0.76)	(-1.02)	(-1.03)	(-0.49)	(-0.50)	(-0.60)	(-0.60)
1M Flow	-0.002	-0.001	-0.003	-0.003	0.007	0.007	0.013	0.013	-0.009	-0.009	0.005	0.005
	(-0.12)	(-0.09)	(-0.64)	(-0.61)	(0.31)	(0.32)	(0.96)	(0.95)	(-0.64)	(-0.66)	(0.72)	(0.70)
Log (Fund TNA)	-0.006	-0.006	0.013	0.013	0.006	0.007	0.011	0.011	0.013	0.013	0.003	0.003
	(-0.22)	(-0.23)	(1.53)	(1.52)	(0.09)	(0.09)	(0.57)	(0.55)	(0.24)	(0.23)	(0.36)	(0.32)
Expense Ratio	0.193	0.204	-0.005	-0.001	-0.064	-0.066	-0.004	-0.004	-0.025	-0.040	-0.044	-0.051
	(1.16)	(1.22)	(-0.19)	(-0.05)	(-0.14)	(-0.15)	(-0.07)	(-0.06)	(-0.06)	(-0.10)	(-0.73)	(-0.83)
Turnover	-0.120**	-0.119**	0.001	0.002	-0.028	-0.026	0.012	0.013	-0.013	-0.015	0.004	0.003
	(-2.50)	(-2.50)	(0.15)	(0.21)	(-0.26)	(-0.24)	(0.85)	(0.86)	(-0.27)	(-0.30)	(0.22)	(0.18)
Log (Fund Age)	-0.050	-0.053	0.046**	0.044**	-0.053	-0.057	0.027	0.028	-0.029	-0.032	0.080	0.078
	(-0.79)	(-0.83)	(2.21)	(2.16)	(-0.29)	(-0.31)	(0.61)	(0.61)	(-0.11)	(-0.12)	(1.62)	(1.60)
Obs	45,112	45,112	45,112	45,112	11,924	11,924	11,924	11,924	25,609	25,609	25,609	25,609
R-squared	0.635	0.635	0.010	0.010	0.654	0.655	0.013	0.014	0.613	0.613	0.030	0.030

Table 4: Mutual Fund Returns Sorted by Analyst Rating and Tone

Mutual funds are sorted into 15 (i.e., 5×3) portfolios according to the analyst rating (rounded to the nearest integer) and positive tone in the full analyst report at the end of month t. We report the month $t+1$ value-weighted net-of-fee style-adjusted return for each portfolio, as well as the differences between the best-rated and the worst-rated funds ("Gold − Negative"), and between the top and the bottom tercile of positive tone ("HML"). We also report similar statistics when the positive tone is replaced with the negative tone. Appendix A provides detailed definitions of each variable. Newey-West adjusted t-statistics are shown in parentheses. Numbers with "*", "**", and "***" are significant at the 10%, 5%, and 1% level, respectively.

Rank	PosTone				NegTone			
	Low	Med	High	HML	Low	Med	High	HML
Negative	-0.548**	-0.071	-0.080	0.467*	-0.063	-0.143	-0.487**	-0.424*
	(-2.35)	(-0.64)	(-1.47)	(1.90)	(-0.82)	(-1.33)	(-2.06)	(-1.69)
Neutral	-0.016	0.010	0.044	0.061*	0.008	-0.005	0.024	0.016
	(-0.62)	(0.33)	(1.30)	(1.78)	(0.39)	(-0.16)	(0.91)	(0.66)
Bronze	-0.017	0.021	0.057**	0.074*	0.013	0.041*	0.018	0.005
	(-0.55)	(0.94)	(2.00)	(1.86)	(0.49)	(1.74)	(0.71)	(0.16)
Silver	0.012	0.048*	0.039	0.028	0.044**	0.036	0.029	-0.016
	(0.49)	(1.88)	(1.28)	(0.71)	(2.40)	(1.48)	(1.06)	(-0.50)
Gold	0.140	0.038*	0.083***	-0.057	0.156***	0.082***	0.014	-0.143***
	(1.57)	(1.86)	(3.02)	(-0.61)	(3.87)	(3.30)	(0.48)	(-2.66)
Gold − Negative	0.688**	0.109	0.163***	-0.524*	0.219**	0.225**	0.500**	0.281
	(2.56)	(0.91)	(2.69)	(-1.88)	(2.50)	(2.07)	(2.10)	(1.11)
All	0.007	0.029**	0.057***	0.050*	0.047***	0.041***	0.023	-0.024
	(0.32)	(2.11)	(3.34)	(1.82)	(3.26)	(2.90)	(1.51)	(-1.11)

Value-weighted Net-of-fee Fund Style-adjusted Return Sorted by Analyst Rating and Tone

Table 5: Analyst Rating, Tone, and Mutual Fund Performance

This table presents the results of the following monthly panel regressions with month fixed effects and their corresponding t-statistics with standard errors clustered by fund and month,

$$Perf_{f,t} = \alpha + \beta_1 Rating_{f,t-1} + \beta_2 Tone_{f,t-1} + \beta_3 Rating_{f,t-1} \times Tone_{f,t-1} + cM_{f,t-1} + e_{f,t},$$

where $Perf_{f,t}$ refers to the monthly performance of fund f in month t, and $Rating_{f,t-1}$ refers to the analyst rating. $Rating_{f,t-1}$ is further replaced with four dummy variables indicating Negative, Bronze, Silver, and Gold ratings. $Tone_{f,t-1}$ refers to the positive and negative tones in the full analyst report. Vector M stacks all other control variables, including the Star Rating, 1M Return, 1M Flow, Log(Fund TNA), Expense Ratio, Turnover, Log(Fund Age), Active Share, TR^2, ICI, and Return Gap. The dependent variable $Perf_{f,t}$ is measured by net-of-fee return (models 1 to 4) and style-adjusted return (models 5 to 8). Appendix A provides detailed definitions of each variable. Numbers with "*", "**", and "***" are significant at the 10%, 5%, and 1% levels, respectively.

	Net-of-fee Fund Return Regressed on Lagged Fund Characteristics							
	Return				Style-adjusted Return			
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Analyst Rating	-0.013				-0.001			
	(-0.66)				(-0.10)			
Negative		-0.424**	-1.598***	-2.942*		-0.123	-0.256	-1.074
		(-2.21)	(-3.33)	(-1.99)		(-1.00)	(-1.29)	(-1.15)
Bronze		-0.086**	-0.086**	-0.076**		-0.019	-0.019	-0.021
		(-2.38)	(-2.34)	(-2.22)		(-0.90)	(-0.92)	(-0.86)
Silver		-0.084*	-0.083	-0.102**		-0.028	-0.029	-0.051
		(-1.68)	(-1.63)	(-2.05)		(-0.86)	(-0.88)	(-1.35)
Gold		-0.045	0.564***	0.717***		0.000	0.284***	0.390***
		(-0.72)	(2.97)	(3.80)		(0.01)	(3.18)	(2.99)
PosTone	0.131**	0.137**	0.143**	0.114***	0.034**	0.036**	0.043***	0.044*
	(2.21)	(2.31)	(2.22)	(2.83)	(2.46)	(2.54)	(2.78)	(1.92)
NegTone	-0.078*	-0.069	-0.026	0.055*	-0.020	-0.017	-0.001	0.016
	(-1.67)	(-1.55)	(-0.70)	(1.68)	(-1.11)	(-0.98)	(-0.03)	(0.59)
Negative × PosTone			0.569***	1.347***			0.180**	0.580**
			(3.09)	(3.27)			(2.10)	(2.09)
Negative × NegTone			0.166	0.023			-0.056	-0.169
			(1.26)	(0.08)			(-0.80)	(-0.82)
Gold × PosTone			-0.044	-0.113*			-0.063*	-0.108**
			(-0.63)	(-1.78)			(-1.70)	(-2.42)
Gold × NegTone			-0.365***	-0.350***			-0.116***	-0.126**
			(-3.94)	(-3.67)			(-3.82)	(-2.13)
Star Rating	0.010	0.009	0.012	0.028	0.020	0.020	0.020	0.008
	(0.37)	(0.32)	(0.43)	(1.03)	(1.06)	(1.04)	(1.07)	(0.33)
1M Return	-0.041	-0.042	-0.043	-0.041	0.005	0.005	0.004	0.013
	(-1.00)	(-1.02)	(-1.05)	(-1.03)	(0.49)	(0.46)	(0.42)	(0.61)
1M Flow	-0.003	-0.002	-0.003	-0.018*	-0.003	-0.003	-0.003	-0.007
	(-0.20)	(-0.16)	(-0.24)	(-1.69)	(-0.71)	(-0.67)	(-0.74)	(-1.16)
Log (Fund TNA)	-0.008	-0.008	-0.011	-0.030	0.012	0.012	0.011	0.007
	(-0.33)	(-0.34)	(-0.45)	(-1.21)	(1.45)	(1.44)	(1.35)	(0.55)
Expense Ratio	0.192	0.202	0.204	0.043	-0.005	-0.002	-0.002	-0.033
	(1.15)	(1.20)	(1.22)	(0.48)	(-0.20)	(-0.09)	(-0.09)	(-0.63)
Turnover	-0.118**	-0.118**	-0.120**	-0.113***	0.002	0.002	0.001	-0.004
	(-2.50)	(-2.50)	(-2.52)	(-2.77)	(0.23)	(0.24)	(0.18)	(-0.23)
Log (Fund Age)	-0.043	-0.047	-0.040	-0.040	0.048**	0.046**	0.048**	0.022
	(-0.71)	(-0.76)	(-0.67)	(-1.46)	(2.26)	(2.21)	(2.32)	(0.73)
Active Share				-0.342				-0.262
				(-0.89)				(-1.64)
TR^2				0.077*				0.015
				(1.91)				(0.79)
ICI				-0.161				0.121
				(-0.57)				(1.32)
Return Gap				-0.019				-0.009
				(-0.82)				(-1.20)
Obs	45,112	45,112	45,112	21,346	45,112	45,112	45,112	21,346
R-squared	0.635	0.636	0.636	0.731	0.010	0.011	0.011	0.017

Table 6: Morningstar Ratings and Mutual Fund Flow

This table presents the results of the following monthly panel regressions with month fixed effects and their corresponding t-statistics with standard errors clustered by fund and month,

$$Flow_{f,t} = \alpha + \beta_1 Rating_{f,t-1} + cM_{f,t-1} + e_{f,t},$$

where $Flow_{f,t}$ refers to the monthly flow of fund f in month t, and $Rating_{f,t-1}$ refers to the analyst rating (models 1 to 6) or quantitative rating (models 7 to 9). $Rating_{f,t-1}$ is further replaced with four dummy variables indicating Negative, Bronze, Silver, and Gold ratings. Vector M stacks all other control variables, including the Star Rating, 1M Return, 1M Flow, Log(Fund TNA), Expense Ratio, Turnover, and Log(Fund Age). Models 1 to 3 focus on the full sample period, while models 4 to 9 focus on the subperiod after July 2017. Appendix A provides detailed definitions of each variable. Numbers with "*", "**", and "***" are significant at the 10%, 5%, and 1% levels, respectively.

	Fund Flow Regressed on Lagged Fund Characteristics								
Rating =	Analyst Rating			Analyst Rating (Post July 2017)			Quantitative Rating		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Rating	0.104***	-0.012		0.058**	-0.014		0.242***	0.063**	
	(6.13)	(-0.65)		(2.75)	(-0.64)		(8.49)	(2.64)	
Negative			0.137			-0.011			-0.004
			(1.08)			(-0.06)			(-0.07)
Bronze			0.064*			0.048			0.044
			(1.67)			(0.88)			(0.72)
Silver			0.012			-0.018			0.145**
			(0.23)			(-0.32)			(2.41)
Gold			-0.052			-0.063			0.264*
			(-0.86)			(-0.85)			(1.89)
Star Rating		0.395***	0.394***		0.368***	0.369***		0.314***	0.320***
		(15.88)	(15.69)		(10.04)	(9.98)		(9.54)	(9.38)
1M Return	0.078***	0.071***	0.071***	0.064***	0.055***	0.055***	0.057***	0.051***	0.051***
	(7.27)	(6.46)	(6.48)	(5.69)	(4.57)	(4.58)	(4.04)	(3.67)	(3.66)
1M Flow	0.519***	0.470***	0.470***	0.592***	0.537***	0.536***	0.311***	0.297***	0.297***
	(28.78)	(26.67)	(26.64)	(18.38)	(17.13)	(17.12)	(11.44)	(11.26)	(11.23)
Log (Fund TNA)	-0.014	-0.068***	-0.067***	-0.019	-0.061**	-0.061**	-0.023	-0.049	-0.051*
	(-0.83)	(-3.88)	(-3.81)	(-0.82)	(-2.62)	(-2.62)	(-0.81)	(-1.68)	(-1.74)
Expense Ratio	-0.325***	-0.294***	-0.301***	-0.219	-0.160	-0.158	-0.051	0.028	0.016
	(-5.23)	(-4.59)	(-4.71)	(-1.45)	(-1.05)	(-1.04)	(-0.43)	(0.23)	(0.13)
Turnover	-0.023	-0.040*	-0.040*	0.048*	0.025	0.027	0.038	0.047	0.046
	(-1.13)	(-1.72)	(-1.68)	(1.91)	(0.95)	(1.01)	(1.21)	(1.46)	(1.45)
Log (Fund Age)	-0.122***	-0.033	-0.031	-0.040	0.041	0.049	-0.153**	-0.143**	-0.145**
	(-3.07)	(-0.84)	(-0.78)	(-0.59)	(0.56)	(0.65)	(-2.48)	(-2.37)	(-2.39)
Obs	45,216	45,216	45,216	11,986	11,986	11,986	25,265	25,265	25,265
R-squared	0.317	0.339	0.339	0.364	0.384	0.384	0.211	0.218	0.219

Table 7: Analyst Rating, Tone, and Mutual Fund Flow

This table presents the results of the following monthly panel regressions with month fixed effects and their corresponding t-statistics with standard errors clustered by fund and month,

$$Flow_{f,t} = \alpha + \beta_1 Rating_{f,t-1} + \beta_2 Tone_{f,t-1} + \beta_3 Rating_{f,t-1} \times Tone_{f,t-1} + \beta_4 Tone_{f,t-1} \times INST_{f,t-1} + \beta_5 Rating_{f,t-1} \times Tone_{f,t-1} \times INST_{f,t-1} + \beta_6 INST_{f,t-1} + cM_{f,t-1} + e_{f,t},$$

where $Flow_{f,t}$ refers to the monthly flow of fund f in month t, and $Rating_{f,t-1}$ refers to the analyst rating. $Rating_{f,t-1}$ is further replaced with four dummy variables indicating Negative, Bronze, Silver, and Gold ratings. $Tone_{f,t-1}$ refers to the positive and negative tones in the full analyst report. $INST_{f,t-1}$ ($INDV_{f,t-1}$) refers to a dummy variable that equals 1 if the primary share class in the fund is an institutional (retail) share class and 0 otherwise. Vector M stacks all other control variables, including the Star Rating, 1M Return, 1M Flow, Log(Fund TNA), Expense Ratio, Turnover, and Log(Fund Age). Appendix A provides detailed definitions of each variable. Numbers with "*", "**", and "***" are significant at the 10%, 5%, and 1% levels, respectively.

Table 7—Continued

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
			Fund Flow Regressed on Lagged Fund Characteristics			
Analyst Rating	-0.012					
	(-0.66)					
Negative		0.176	-0.441	0.171	0.163	-0.433
		(1.39)	(-0.89)	(1.35)	(1.27)	(-0.87)
Bronze		0.061	0.058	0.065	0.062	0.061
		(1.54)	(1.45)	(1.64)	(1.57)	(1.54)
Silver		0.011	0.007	0.014	0.012	0.011
		(0.21)	(0.14)	(0.27)	(0.24)	(0.22)
Gold		-0.047	0.332*	-0.046	0.329*	0.321*
		(-0.77)	(1.80)	(-0.76)	(1.80)	(1.68)
PosTone	0.015	0.009	0.023	-0.007	0.022	0.023
	(0.58)	(0.33)	(0.81)	(-0.24)	(0.78)	(0.75)
NegTone	-0.058**	-0.059**	-0.045	-0.049	-0.039	-0.046
	(-2.07)	(-2.10)	(-1.52)	(-1.64)	(-1.34)	(-1.47)
Negative × PosTone			-0.080			
			(-0.48)			
Negative × NegTone			0.325*			
			(1.84)			
Gold × PosTone			-0.087			
			(-1.26)			
Gold × NegTone			-0.153*			
			(-1.87)			
PosTone × INST				0.065		
				(1.08)		
NegTone × INST				-0.046		
				(-0.73)		
Negative × PosTone × INST						0.029
						(0.15)
Negative × NegTone × INST						0.207
						(1.19)
Negative × PosTone × INDV						-0.107
						(-0.56)
Negative × NegTone × INDV						0.344*
						(1.88)
Gold × PosTone × INST					0.013	0.012
					(0.15)	(0.13)
Gold × NegTone × INST					-0.239**	-0.232**
					(-2.47)	(-2.06)
Gold × PosTone × INDV					-0.125*	-0.126
					(-1.71)	(-1.51)
Gold × NegTone × INDV					-0.117	-0.110
					(-1.26)	(-1.17)
INST				-0.085	-0.044	-0.044
				(-0.58)	(-0.93)	(-0.91)
Star Rating	0.391***	0.391***	0.393***	0.393***	0.395***	0.396***
	(15.64)	(15.52)	(15.50)	(15.44)	(15.36)	(14.83)
1M Return	0.070***	0.071***	0.070***	0.071***	0.070***	0.070***
	(6.43)	(6.47)	(6.45)	(6.48)	(6.44)	(5.74)
1M Flow	0.470***	0.469***	0.469***	0.469***	0.469***	0.468***
	(26.63)	(26.61)	(26.50)	(26.63)	(26.50)	(26.15)
Log (Fund TNA)	-0.068***	-0.067***	-0.069***	-0.067***	-0.068***	-0.069***
	(-3.89)	(-3.82)	(-3.93)	(-3.80)	(-3.87)	(-3.87)
Expense Ratio	-0.285***	-0.292***	-0.291***	-0.295***	-0.299***	-0.297***
	(-4.46)	(-4.57)	(-4.53)	(-4.58)	(-4.59)	(-4.46)
Turnover	-0.038	-0.038	-0.038	-0.034	-0.036	-0.036
	(-1.62)	(-1.60)	(-1.60)	(-1.41)	(-1.50)	(-1.35)
Log (Fund Age)	-0.030	-0.028	-0.023	-0.038	-0.036	-0.035
	(-0.76)	(-0.71)	(-0.59)	(-0.99)	(-0.96)	(-0.89)
Obs	45,216	45,216	45,216	45,216	45,216	45,216
R-squared	0.339	0.339	0.340	0.339	0.340	0.340

Table 8: Mutual Fund Performance and Flow: Tone in Full Report, Summary, and Title

This table presents the results of the following monthly panel regressions with month fixed effects and their corresponding t-statistics with standard errors clustered by fund and month,

$$Perf_{f,t} = \alpha + \beta_1 Rating_{f,t-1} + \beta_2 Tone_{f,t-1} + \beta_3 Tone\_Summary_{f,t-1} + \beta_4 Tone\_Title_{f,t-1} + cM_{f,t-1} + e_{f,t},$$
$$Flow_{f,t} = \alpha + \beta_1 Rating_{f,t-1} + \beta_2 Tone_{f,t-1} + \beta_3 Tone\_Summary_{f,t-1} + \beta_4 Tone\_Title_{f,t-1} + cM_{f,t-1} + e_{f,t},$$

where $Perf_{f,t}$ refers to the monthly net-of-fee return (models 1 and 2) and style-adjusted return (models 3 and 4) of fund f in month t, $Flow_{f,t}$ refers to the monthly flow of fund f in month t (models 5 and 6), and $Rating_{f,t-1}$ refers to the analyst rating. $Rating_{f,t-1}$ is further replaced with four dummy variables indicating Negative, Bronze, Silver, and Gold ratings. $Tone_{f,t-1}$, $Tone\_Summary_{f,t-1}$, and $Tone\_Title_{f,t-1}$ refer to the positive and negative tones in the full analyst report, the summary section, and the title of the analyst report, respectively. Vector M stacks all other control variables, including the Star Rating, 1M Return, 1M Flow, Log(Fund TNA), Expense Ratio, Turnover, and Log(Fund Age). Appendix A provides detailed definitions of each variable. Numbers with "*", "**", and "***" are significant at the 10%, 5%, and 1% levels, respectively.

	Net-of-fee Fund Return and Fund Flow Regressed on Lagged Fund Characteristics					
	Return		Style-adjusted Return		Flow	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Analyst Rating	-0.014		-0.002		-0.012	
	(-0.72)		(-0.15)		(-0.65)	
Negative		-0.422**		-0.124		0.185
		(-2.16)		(-1.01)		(1.47)
Bronze		-0.088**		-0.020		0.057
		(-2.40)		(-0.96)		(1.43)
Silver		-0.088*		-0.030		0.009
		(-1.75)		(-0.91)		(0.17)
Gold		-0.048		-0.002		-0.045
		(-0.76)		(-0.05)		(-0.73)
PosTone	0.120**	0.125**	0.036*	0.037*	-0.030	-0.035
	(2.13)	(2.20)	(1.90)	(1.95)	(-0.89)	(-1.00)
NegTone	-0.130*	-0.121*	-0.026	-0.023	0.038	0.036
	(-1.98)	(-1.91)	(-1.21)	(-1.07)	(0.92)	(0.89)
PosTone_Summary	0.012	0.013	-0.002	-0.002	0.032*	0.031*
	(0.61)	(0.66)	(-0.21)	(-0.17)	(1.80)	(1.73)
NegTone_Summary	0.038	0.038*	0.004	0.005	-0.061***	-0.061***
	(1.64)	(1.70)	(0.41)	(0.45)	(-3.25)	(-3.25)
PosTone_Title	-0.000	-0.000	0.001	0.001	0.001	0.001
	(-0.46)	(-0.29)	(1.11)	(1.22)	(1.38)	(1.28)
NegTone_Title	-0.000	-0.000	0.000	0.000	-0.004**	-0.004**
	(-0.17)	(-0.11)	(0.07)	(0.09)	(-2.28)	(-2.29)
Star Rating	0.011	0.009	0.020	0.020	0.389***	0.390***
	(0.39)	(0.34)	(1.07)	(1.05)	(15.67)	(15.55)
1M Return	-0.041	-0.042	0.005	0.005	0.071***	0.071***
	(-1.01)	(-1.03)	(0.48)	(0.46)	(6.48)	(6.51)
1M Flow	-0.002	-0.002	-0.003	-0.003	0.468***	0.468***
	(-0.18)	(-0.14)	(-0.69)	(-0.65)	(26.49)	(26.46)
Log (Fund TNA)	-0.008	-0.008	0.012	0.012	-0.067***	-0.066***
	(-0.31)	(-0.33)	(1.42)	(1.40)	(-3.88)	(-3.82)
Expense Ratio	0.191	0.200	-0.005	-0.002	-0.291***	-0.298***
	(1.16)	(1.21)	(-0.20)	(-0.09)	(-4.59)	(-4.69)
Turnover	-0.117**	-0.117**	0.002	0.002	-0.037	-0.036
	(-2.53)	(-2.52)	(0.21)	(0.23)	(-1.56)	(-1.53)
Log (Fund Age)	-0.038	-0.042	0.048**	0.047**	-0.037	-0.035
	(-0.66)	(-0.71)	(2.31)	(2.26)	(-0.94)	(-0.90)
Obs	45,112	45,112	45,112	45,112	45,216	45,216
R-squared	0.636	0.636	0.010	0.011	0.340	0.340

Table 9: Mutual Fund Returns around Rating Switch

Mutual funds are sorted into two portfolios according to the change in analyst coverage at the end of month t, i.e., funds newly covered by analysts (Analyst Initiation, i.e., switch from quantitative rating to analyst rating) and funds no longer covered by analysts (Analyst Termination, i.e., switch from analyst rating to quantitative rating). We report the average monthly value-weighted return for each portfolio, as well as the difference between them ("Termination − Initiation") from month $t - 12$ to $t - 1$ and month $t + 1$ to $t + 12$. The net-of-fee fund returns are further adjusted by the style return of funds. Appendix A provides detailed definitions of each variable. Newey-West adjusted t-statistics are shown in parentheses. Numbers with "*", "**", and "***" are significant at the 10%, 5%, and 1% level, respectively.

Value-weighted Net-of-fee Fund Return around Rating Switch				
Rank	[−12, −1]		[+1, +12]	
	Return	Style-adj	Return	Style-adj
Analyst Initiation	0.837**	0.065	-0.022	0.034
	(2.65)	(1.52)	(-0.03)	(0.92)
Analyst Termination	0.418	-0.094	-0.887	-0.873**
	(1.08)	(-0.28)	(-1.21)	(-2.54)
Termination − Initiation	-0.419*	-0.159	-0.865***	-0.907**
	(-1.92)	(-0.49)	(-2.99)	(-2.64)

Table 10: Mutual Fund Performance and Flow: Five Pillars

This table presents the results of the following monthly panel regressions with month fixed effects and their corresponding t-statistics with standard errors clustered by fund and month,

$$Perf_{f,t} = \alpha + \beta_1 Pillar\ Rating_{f,t-1} + \beta_2 Pillar\ Tone_{f,t-1} + \beta_3 Rating_{f,t-1} + \beta_4 Tone_{f,t-1} + cM_{f,t-1} + e_{f,t},$$

$$Flow_{f,t} = \alpha + \beta_1 Pillar\ Rating_{f,t-1} + \beta_2 Pillar\ Tone_{f,t-1} + \beta_3 Rating_{f,t-1} + \beta_4 Tone_{f,t-1} + cM_{f,t-1} + e_{f,t},$$

where $Perf_{f,t}$ refers to the monthly net-of-fee return (models 1 to 4) and style-adjusted return (models 5 to 8) of fund f in month t, and $Flow_{f,t}$ refers to the monthly flow of fund f in month t (models 9 to 12). $Pillar\ Rating_{f,t-1}$ refers to the rating on each of the five key pillars in determining the Morningstar analyst rating, including People, Process, Parent, Performance, and Price. $Pillar\ Tone_{f,t-1}$ refers to the positive and negative tones for each of the five pillars. $Rating_{f,t-1}$ refers to the analyst rating, and $Tone_{f,t-1}$ refers to the positive and negative tones in the full analyst report. Vector M stacks all other control variables, including the Star Rating, 1M Return, 1M Flow, Log(Fund TNA), Expense Ratio, Turnover, and Log(Fund Age). Appendix A provides detailed definitions of each variable. Only the main variables are tabulated for brevity. Numbers with "*", "**", and "***" are significant at the 10%, 5%, and 1% levels, respectively.

Table 10—Continued

	Return				Style-adjusted Return				Flow			
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12
People	0.036	0.039	0.045	0.045	-0.000	0.003	-0.002	-0.002	-0.015	0.036	0.017	0.015
	(0.96)	(1.04)	(1.10)	(1.11)	(-0.01)	(0.13)	(-0.08)	(-0.08)	(-0.44)	(0.94)	(0.42)	(0.36)
Process	-0.034	-0.034	-0.043	-0.041	-0.013	-0.016	-0.010	-0.010	-0.090***	-0.114***	-0.096**	-0.086**
	(-0.91)	(-0.94)	(-1.00)	(-1.00)	(-0.59)	(-0.78)	(-0.41)	(-0.48)	(-2.71)	(-2.97)	(-2.37)	(-2.04)
Parent	0.038	0.041	0.027	0.030	-0.003	-0.003	-0.012	-0.013	0.079**	0.098***	0.121***	0.127***
	(1.07)	(1.12)	(0.82)	(0.85)	(-0.13)	(-0.18)	(-0.54)	(-0.63)	(2.53)	(3.25)	(3.92)	(4.09)
Performance	0.003	-0.012	-0.029	-0.023	0.025*	0.004	0.015	0.013	0.286***	0.009	0.021	0.041
	(0.10)	(-0.42)	(-0.70)	(-0.62)	(1.85)	(0.33)	(0.89)	(0.87)	(10.40)	(0.30)	(0.64)	(1.15)
Price	0.020	0.020	-0.008	-0.011	0.023*	0.023*	0.019	0.019	0.054**	0.051**	0.022	0.023
	(0.73)	(0.74)	(-0.25)	(-0.35)	(1.84)	(1.86)	(1.29)	(1.33)	(2.02)	(2.01)	(0.77)	(0.81)
People PosTone			-0.011	-0.030			0.018*	0.017			-0.061***	-0.078***
			(-0.74)	(-1.43)			(1.83)	(1.36)			(-3.26)	(-3.71)
People NegTone			0.004	0.010			-0.008	-0.005			-0.036	0.006
			(0.24)	(0.50)			(-0.67)	(-0.46)			(-1.61)	(0.25)
Process PosTone			0.092**	0.052			0.018*	0.019			0.004	-0.031
			(2.48)	(1.51)			(1.75)	(1.09)			(0.18)	(-1.00)
Process NegTone			-0.080***	-0.068**			-0.037***	-0.033*			-0.090***	0.004
			(-2.69)	(-2.12)			(-3.37)	(-1.81)			(-3.76)	(0.15)
Parent PosTone			0.019	0.001			0.008	0.008			0.010	-0.007
			(1.59)	(0.06)			(1.19)	(0.79)			(0.73)	(-0.47)
Parent NegTone			-0.034*	-0.029			-0.004	-0.002			0.045***	0.083***
			(-1.86)	(-1.33)			(-0.43)	(-0.17)			(2.79)	(4.34)
Performance PosTone			0.008	-0.014			-0.002	-0.002			0.003	-0.015
			(0.47)	(-0.98)			(-0.23)	(-0.18)			(0.26)	(-0.90)
Performance NegTone			-0.001	0.004			0.003	0.005			0.026**	0.072***
			(-0.07)	(0.30)			(0.61)	(0.66)			(2.56)	(4.84)
Price PosTone			0.001	-0.005			-0.007	-0.007			0.026*	0.020
			(0.08)	(-0.32)			(-1.05)	(-1.06)			(1.83)	(1.41)
Price NegTone			-0.000	0.001			0.007	0.008			-0.004	0.013
			(-0.02)	(0.05)			(0.81)	(0.88)			(-0.25)	(0.74)
Analyst Rating		-0.005		-0.009		0.004		0.003		-0.004		-0.022
		(-0.26)		(-0.47)		(0.34)		(0.19)		(-0.20)		(-0.96)
PosTone				0.120				-0.001				0.102
				(1.26)				(-0.02)				(1.61)
NegTone				-0.027				-0.013				-0.248***
				(-0.34)				(-0.30)				(-4.10)
Star Rating		0.029	0.037	0.037		0.023	0.029	0.028		0.404***	0.388***	0.386***
		(1.12)	(1.39)	(1.36)		(1.18)	(1.47)	(1.41)		(16.15)	(15.07)	(14.79)
Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Obs	46,264	46,264	40,223	40,223	46,264	46,264	40,223	40,223	46,339	46,339	40,306	40,306
R-squared	0.638	0.638	0.643	0.643	0.010	0.011	0.012	0.012	0.325	0.345	0.343	0.344

Internet Appendix

What Should Investors Care About?

Mutual Fund Ratings by Analysts vs. Machine Learning Technique

In this Internet Appendix, we first present additional tables for our analysis (Part I). We then tabulate the full specification of the tables reported in the main text (Part II).

I. Additional Tables

Table IA1: Mutual Fund Returns Sorted by Morningstar Star Rating

Mutual funds are sorted into five portfolios according to the star rating (rounded to the nearest integer) at the end of month t. We report the month $t+1$ value-weighted return for each portfolio, as well as the difference between the best-rated and the worst-rated funds ("5-Star − 1-Star"). We also report portfolio returns for funds receiving a negative rating (i.e., rated as 1-Star or 2-Star), and funds receiving a positive rating (i.e., rated as 3-Star, 4-Star, or 5-Star), as well as the difference between them ("Positive − Negative"). The net-of-fee fund returns are further adjusted by the style return of funds. We also report the monthly portfolio returns over a one-year holding period. We report results in the full sample between November 2011 and December 2018, as well as in the subperiod after July 2017. Appendix A provides detailed definitions of each variable. Newey-West adjusted t-statistics are shown in parentheses. Numbers with "*", "**", and "***" are significant at the 10%, 5%, and 1% level, respectively.

	Value-weighted Net-of-fee Fund Return Sorted by Star Rating							
	Full Sample				Post July 2017			
Rank	1-Month		1-Year		1-Month		1-Year	
	Return	Style-adj	Return	Style-adj	Return	Style-adj	Return	Style-adj
1-Star	0.609**	-0.164***	0.641**	-0.133**	-0.084	-0.405***	-0.098	-0.395***
	(2.18)	(-2.95)	(2.25)	(-2.58)	(-0.11)	(-7.08)	(-0.12)	(-6.50)
2-Star	0.658***	-0.028	0.640**	-0.033	0.051	-0.065	-0.019	-0.116**
	(2.66)	(-1.18)	(2.56)	(-1.40)	(0.07)	(-1.62)	(-0.03)	(-2.84)
3-Star	0.695***	0.011	0.703***	0.011	0.093	-0.019	0.105	-0.039
	(2.80)	(0.71)	(2.90)	(0.87)	(0.12)	(-0.47)	(0.15)	(-1.09)
4-Star	0.700***	0.025**	0.702***	0.024**	0.174	-0.005	0.176	0.019
	(2.96)	(2.06)	(2.97)	(2.28)	(0.24)	(-0.15)	(0.24)	(0.65)
5-Star	0.670***	0.038*	0.648***	0.044**	0.248	0.094**	0.210	0.073*
	(3.01)	(1.73)	(2.92)	(2.23)	(0.35)	(2.84)	(0.30)	(2.08)
Negative (≤ 2-Star)	0.657**	-0.039	0.644**	-0.043*	0.038	-0.094**	-0.025	-0.140***
	(2.62)	(-1.54)	(2.54)	(-1.69)	(0.05)	(-2.42)	(-0.03)	(-3.55)
Positive (≥ 3-Star)	0.692***	0.025***	0.691***	0.024***	0.165	0.016	0.162	0.015
	(2.92)	(3.02)	(2.95)	(3.17)	(0.23)	(0.52)	(0.23)	(0.52)
5-Star − 1-Star	0.061	0.202***	0.007	0.177***	0.333**	0.499***	0.308**	0.468***
	(0.63)	(2.76)	(0.07)	(2.70)	(2.85)	(6.72)	(2.11)	(5.60)
Positive − Negative	0.036	0.064**	0.047	0.067***	0.126***	0.110**	0.188***	0.155***
	(1.15)	(2.49)	(1.40)	(2.78)	(2.94)	(2.76)	(3.78)	(5.44)

Table IA2: Mutual Fund Returns Sorted by Morningstar Ratings: Propensity-Matched Sample

We first construct a propensity-matched mutual fund sample. Specifically, we match funds covered by Morningstar analysts with those covered by a quantitative rating based on style and other fund characteristics, including 1M Return, 1M Flow, Log(Fund TNA), Expense Ratio, Turnover, and Log(Fund Age). Next, all matched funds are sorted into five portfolios according to the analyst rating or quantitative rating (both rounded to the nearest integer) at the end of month t. We report the month $t + 1$ value-weighted return for each portfolio, as well as the difference between the best-rated and the worst-rated funds ("Gold − Negative"). We also report portfolio returns for funds receiving a nonrecommended rating (i.e., rated as Negative or Neutral), and funds receiving a recommended rating (i.e., rated as Bronze, Silver, or Gold), as well as the difference between them ("REC – Non-REC"). The net-of-fee fund returns are further adjusted by the style return of funds. We also report the monthly portfolio returns over a one-year holding period. We report results in the subperiod after July 2017. Appendix A provides detailed definitions of each variable. Newey-West adjusted t-statistics are shown in parentheses. Numbers with "*", "**", and "***" are significant at the 10%, 5%, and 1% level, respectively.

	Value-weighted Net-of-fee Fund Return Sorted by Analyst Rating and Quantitative Rating							
	Analyst Rating				Quantitative Rating			
Rank	1-Month		1-Year		1-Month		1-Year	
	Return	Style-adj	Return	Style-adj	Return	Style-adj	Return	Style-adj
Negative	-0.781	-0.394	-0.991*	-0.763*	0.120	-0.068	0.046	-0.082*
	(-1.31)	(-0.79)	(-1.84)	(-1.77)	(0.14)	(-1.14)	(0.06)	(-1.83)
Neutral	0.186	-0.076	0.193	-0.062	0.109	-0.108*	0.145	-0.098
	(0.22)	(-1.68)	(0.23)	(-1.61)	(0.13)	(-2.00)	(0.18)	(-1.65)
Bronze	0.099	-0.045	0.171	-0.030	0.077	-0.144**	0.128	-0.101*
	(0.11)	(-0.75)	(0.20)	(-0.57)	(0.09)	(-2.57)	(0.16)	(-2.01)
Silver	0.157	-0.011	0.112	-0.024	0.231	-0.045	0.217	-0.020
	(0.19)	(-0.14)	(0.14)	(-0.36)	(0.26)	(-0.73)	(0.24)	(-0.40)
Gold	0.014	-0.085	0.355	-0.092	0.091	0.032	0.190	0.017
	(0.02)	(-0.65)	(0.49)	(-0.94)	(0.11)	(0.50)	(0.22)	(0.31)
Non-REC (≤ Neutral)	0.181	-0.079*	0.191	-0.063	0.111	-0.100*	0.128	-0.095
	(0.22)	(-1.83)	(0.23)	(-1.69)	(0.13)	(-1.87)	(0.16)	(-1.72)
REC (≥ Bronze)	0.104	-0.047	0.175	-0.040	0.153	-0.067	0.176	-0.046
	(0.12)	(-0.73)	(0.22)	(-0.81)	(0.18)	(-1.31)	(0.21)	(-1.03)
Gold − Negative	0.795	0.308	1.346**	0.671	-0.028	0.100	0.144	0.099*
	(1.41)	(0.57)	(2.90)	(1.51)	(-0.15)	(1.52)	(1.06)	(1.76)
REC − Non-REC	-0.077	0.031	-0.016	0.022	0.041	0.033	0.048	0.048
	(-1.70)	(0.53)	(-0.39)	(0.53)	(0.43)	(1.07)	(0.61)	(1.66)

Table IA3: Robustness Checks on Mutual Fund Performance: Predicted Analyst Rating and Score

This table presents the results of the following monthly panel regressions with month fixed effects and their corresponding t-statistics with standard errors clustered by fund and month,

$$Perf_{f,t} = \alpha + \beta_1 \widehat{Rating}_{f,t-1} + \beta_2 Tone_{f,t-1} + cM_{f,t-1} + e_{f,t},$$

where $Perf_{f,t}$ refers to the monthly net-of-fee style-adjusted return of fund f in month t, and $\widehat{Rating}_{f,t-1}$ refers to the predicted analyst rating or predicted analyst score. $\widehat{Rating}_{f,t-1}$ is further replaced with four dummy variables indicating Negative, Bronze, Silver, and Gold ratings based on predicted analyst rating. $Tone_{f,t-1}$ refers to the positive and negative tones in the full analyst report. Vector M stacks all other control variables, including the Star Rating, 1M Return, 1M Flow, Log(Fund TNA), Expense Ratio, Turnover, and Log(Fund Age). Models 1 to 6 focus on analyst covered funds, while models 7 to 9 focus on noncovered funds (i.e., funds not covered by Morningstar analysts). We report results in the subperiod after 2014. Appendix A provides detailed definitions of each variable. Numbers with "*", "**", and "***" are significant at the 10%, 5%, and 1% levels, respectively.

	Net-of-fee Style-adjusted Fund Return Regressed on Lagged Fund Characteristics								
	Analyst Covered Funds						Noncovered Funds		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Predicted Analyst Rating	0.009			0.004			0.004		
	(0.61)			(0.28)			(0.41)		
Predicted Analyst Score		0.003			-0.006			0.003	
		(0.12)			(-0.23)			(0.20)	
Predicted Negative			-0.256			-0.232			-0.020
			(-1.25)			(-1.16)			(-0.90)
Predicted Bronze			-0.001			-0.009			-0.006
			(-0.04)			(-0.36)			(-0.27)
Predicted Silver			-0.004			-0.013			-0.013
			(-0.11)			(-0.33)			(-0.46)
Predicted Gold			0.036			0.022			0.024
			(0.91)			(0.53)			(0.71)
PosTone				0.034*	0.039*	0.034*			
				(1.84)	(1.93)	(1.81)			
NegTone				-0.025	-0.025	-0.021			
				(-1.05)	(-1.04)	(-0.91)			
Star Rating	0.039	0.041*	0.037	0.036	0.039	0.035	0.049**	0.050**	0.050**
	(1.65)	(1.70)	(1.58)	(1.60)	(1.66)	(1.54)	(2.47)	(2.59)	(2.50)
1M Return	0.004	0.004	0.004	0.004	0.004	0.004	-0.005	-0.005	-0.005
	(0.31)	(0.30)	(0.29)	(0.29)	(0.28)	(0.27)	(-0.31)	(-0.31)	(-0.31)
1M Flow	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005	0.004	0.004	0.004
	(-0.69)	(-0.70)	(-0.69)	(-0.76)	(-0.79)	(-0.77)	(0.77)	(0.75)	(0.77)
Log (Fund TNA)	0.014	0.016	0.014	0.014	0.015	0.013	-0.001	-0.001	-0.002
	(1.34)	(1.50)	(1.29)	(1.28)	(1.43)	(1.22)	(-0.17)	(-0.13)	(-0.26)
Expense Ratio	0.011	0.009	0.016	0.012	0.009	0.017	-0.058	-0.058	-0.056
	(0.39)	(0.30)	(0.57)	(0.41)	(0.30)	(0.57)	(-1.18)	(-1.17)	(-1.12)
Turnover	0.006	0.005	0.006	0.006	0.005	0.007	0.004	0.004	0.004
	(0.56)	(0.50)	(0.61)	(0.60)	(0.54)	(0.65)	(0.33)	(0.33)	(0.32)
Log (Fund Age)	0.042	0.042*	0.039	0.044*	0.044*	0.041	0.078*	0.078*	0.078*
	(1.65)	(1.68)	(1.57)	(1.70)	(1.72)	(1.61)	(1.87)	(1.87)	(1.88)
Obs	31,759	31,759	31,759	31,759	31,759	31,759	37,952	37,986	37,952
R-squared	0.011	0.011	0.011	0.011	0.011	0.011	0.028	0.028	0.028

Table IA4: Mutual Fund Returns Sorted by Morningstar Ratings: Full Sample

Mutual funds are sorted into five portfolios according to the analyst rating (rounded to the nearest integer) at the end of month t. We report the month $t + 1$ value-weighted return for each portfolio, as well as the difference between the best-rated and the worst-rated funds ("Gold − Negative"). We also report portfolio returns for funds receiving a nonrecommended rating (i.e., rated as Negative or Neutral), and funds receiving a recommended rating (i.e., rated as Bronze, Silver, or Gold), as well as the difference between them ("REC – Non-REC"). We report the net-of-fee fund returns in the full sample (including equity, bond, and hybrid funds), and fund returns are further adjusted by the style return of funds. We also report the monthly portfolio returns over a one-year holding period. We report similar statistics when portfolios are sorted by the quantitative rating (rounded to the nearest integer). Appendix A provides detailed definitions of each variable. Newey-West adjusted t-statistics are shown in parentheses. Numbers with "*", "**", and "***" are significant at the 10%, 5%, and 1% level, respectively.

	Value-weighted Net-of-fee Fund Return Sorted by Analyst Rating and Quantitative Rating (Full Sample)							
	Analyst Rating				Quantitative Rating			
Rank	1-Month		1-Year		1-Month		1-Year	
	Return	Style-adj	Return	Style-adj	Return	Style-adj	Return	Style-adj
Negative	0.407*	-0.078*	0.417*	-0.066*	-0.034	-0.106***	-0.074	-0.115***
	(1.86)	(-1.73)	(1.97)	(-1.71)	(-0.05)	(-3.97)	(-0.11)	(-5.00)
Neutral	0.571***	-0.005	0.588***	-0.001	0.051	-0.045**	0.038	-0.044**
	(2.75)	(-0.28)	(2.81)	(-0.08)	(0.10)	(-2.63)	(0.07)	(-2.35)
Bronze	0.630***	0.017	0.623***	0.019	-0.043	-0.028	0.012	-0.014
	(2.91)	(1.22)	(2.91)	(1.41)	(-0.09)	(-1.05)	(0.03)	(-0.59)
Silver	0.621***	0.034**	0.640***	0.036***	0.200	-0.002	0.100	-0.020
	(3.00)	(2.47)	(3.08)	(2.87)	(0.36)	(-0.06)	(0.17)	(-0.64)
Gold	0.601***	0.065***	0.584***	0.060***	0.052	0.034	0.117	0.038
	(2.74)	(5.28)	(2.66)	(5.07)	(0.09)	(0.86)	(0.20)	(1.05)
Non-REC (≤ Neutral)	0.568***	-0.007	0.583***	-0.004	0.038	-0.054***	0.019	-0.055***
	(2.74)	(-0.40)	(2.79)	(-0.22)	(0.07)	(-3.15)	(0.04)	(-2.99)
REC (≥ Bronze)	0.609***	0.038***	0.609***	0.037***	0.052	-0.007	0.058	-0.007
	(2.88)	(7.27)	(2.89)	(7.21)	(0.10)	(-0.29)	(0.11)	(-0.32)
Gold − Negative	0.194*	0.144***	0.167*	0.126***	0.086	0.140**	0.191	0.153***
	(1.98)	(3.28)	(1.87)	(3.32)	(0.82)	(2.71)	(1.66)	(3.12)
REC − Non-REC	0.042	0.044**	0.026	0.041**	0.014	0.047**	0.039	0.047**
	(1.46)	(2.43)	(0.84)	(2.20)	(0.37)	(2.42)	(1.41)	(2.23)

Table IA5: Gross-of-fee Mutual Fund Returns Sorted by Morningstar Ratings

In Panel A, mutual funds are sorted into five portfolios according to the analyst rating (rounded to the nearest integer) at the end of month t. We report the month $t + 1$ value-weighted return for each portfolio, as well as the difference between the best-rated and the worst-rated funds ("Gold − Negative"). We also report portfolio returns for funds receiving a nonrecommended rating (i.e., rated as Negative or Neutral), and funds receiving a recommended rating (i.e., rated as Bronze, Silver, or Gold), as well as the difference between them ("REC – Non-REC"). The gross-of-fee fund returns are further adjusted by the style return of funds. We also report the monthly portfolio returns over a one-year holding period. Panel B reports similar statistics when portfolios are sorted by star rating (rounded to the nearest integer). Appendix A provides detailed definitions of each variable. Newey-West adjusted t-statistics are shown in parentheses. Numbers with "*", "**", and "***" are significant at the 10%, 5%, and 1% level, respectively.

Rank	1-Month		1-Year	
	Return	Style-adj	Return	Style-adj
Panel A: Value-weighted Gross-of-fee Fund Return Sorted by Analyst Rating				
Negative	-0.107	-0.540**	-0.111	-0.553***
	(-0.35)	(-2.31)	(-0.41)	(-2.72)
Neutral	0.758***	0.017	0.755***	0.018
	(3.06)	(0.79)	(3.04)	(0.79)
Bronze	0.774***	0.036*	0.769***	0.035*
	(3.17)	(1.97)	(3.24)	(1.90)
Silver	0.823***	0.045***	0.844***	0.047***
	(3.24)	(3.20)	(3.34)	(3.60)
Gold	0.754***	0.082***	0.731***	0.075***
	(3.30)	(4.93)	(3.19)	(4.73)
Non-REC (≤ Neutral)	0.753***	0.014	0.749***	0.015
	(3.05)	(0.68)	(3.02)	(0.68)
REC (≥ Bronze)	0.771***	0.052***	0.769***	0.051***
	(3.23)	(6.30)	(3.26)	(5.84)
Gold − Negative	0.861***	0.622**	0.842***	0.628***
	(3.20)	(2.62)	(3.46)	(3.03)
REC − Non-REC	0.018	0.038**	0.021	0.036*
	(0.72)	(2.02)	(0.68)	(1.81)
Panel B: Value-weighted Gross-of-fee Fund Return Sorted by Star Rating				
1-Star	0.696**	-0.135**	0.728**	-0.105**
	(2.50)	(-2.45)	(2.56)	(-2.05)
2-Star	0.735***	-0.006	0.717***	-0.012
	(2.97)	(-0.26)	(2.87)	(-0.49)
3-Star	0.760***	0.022	0.768***	0.022*
	(3.06)	(1.43)	(3.17)	(1.70)
4-Star	0.763***	0.033***	0.765***	0.033***
	(3.22)	(2.81)	(3.23)	(3.13)
5-Star	0.732***	0.045**	0.711***	0.052***
	(3.29)	(2.08)	(3.20)	(2.64)
Negative (≤ 2-Star)	0.735***	-0.016	0.722***	-0.021
	(2.93)	(-0.65)	(2.85)	(-0.81)
Positive (≥ 3-Star)	0.756***	0.034***	0.755***	0.033***
	(3.19)	(4.16)	(3.22)	(4.42)
5-Star − 1-Star	0.035	0.181**	-0.018	0.157**
	(0.37)	(2.48)	(-0.18)	(2.41)
Positive − Negative	0.021	0.051*	0.032	0.054**
	(0.67)	(1.96)	(0.96)	(2.24)

Table IA6: Analyst Rating, Tone, and Mutual Fund Performance

This table presents the results of the following monthly panel regressions with month fixed effects and their corresponding t-statistics with standard errors clustered by fund and month,

$$Perf_{f,t} = \alpha + \beta_1 Rating_{f,t-1} + \beta_2 NetTone_{f,t-1} + \beta_3 Rating_{f,t-1} \times NetTone_{f,t-1} + cM_{f,t-1} + e_{f,t},$$

where $Perf_{f,t}$ refers to the monthly performance of fund f in month t, and $Rating_{f,t-1}$ refers to the analyst rating. $Rating_{f,t-1}$ is further replaced with four dummy variables indicating Negative, Bronze, Silver, and Gold ratings. $NetTone_{f,t-1}$ refers to the difference between positive and negative tones in the full analyst report. Vector M stacks all other control variables, including the Star Rating, 1M Return, 1M Flow, Log(Fund TNA), Expense Ratio, Turnover, and Log(Fund Age). The dependent variable $Perf_{f,t}$ is measured by net-of-fee return (models 1 to 4) and style-adjusted return (models 5 to 8). Appendix A provides detailed definitions of each variable. Numbers with "*", "**", and "***" are significant at the 10%, 5%, and 1% levels, respectively.

	Net-of-fee Fund Return Regressed on Lagged Fund Characteristics							
	Return				Style-adjusted Return			
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Analyst Rating	-0.009				-0.000			
	(-0.49)				(-0.03)			
Negative		-0.406**	-0.326	-0.325		-0.118	-0.036	-0.038
		(-2.12)	(-1.62)	(-1.61)		(-0.95)	(-0.37)	(-0.39)
Bronze		-0.078**	-0.072**	-0.049		-0.016	-0.015	-0.012
		(-2.15)	(-2.03)	(-1.35)		(-0.77)	(-0.69)	(-0.54)
Silver		-0.073	-0.067	-0.083*		-0.025	-0.023	-0.035
		(-1.56)	(-1.42)	(-1.70)		(-0.76)	(-0.70)	(-1.02)
Gold		-0.028	-0.100	-0.097		0.005	-0.008	-0.009
		(-0.47)	(-1.50)	(-1.47)		(0.12)	(-0.20)	(-0.23)
NetTone	0.103**	0.102**	0.082*	0.098*	0.027**	0.026*	0.021	0.015
	(2.28)	(2.30)	(1.99)	(1.79)	(2.04)	(1.98)	(1.54)	(1.04)
Negative × NetTone			0.118	0.102			0.102**	0.107**
			(1.08)	(0.96)			(2.38)	(2.44)
Bronze × NetTone				-0.059				-0.002
				(-1.44)				(-0.14)
Silver × NetTone				0.025				0.028
				(0.57)				(1.26)
Gold × NetTone			0.176***	0.160***			0.033*	0.040*
			(3.18)	(2.64)			(1.77)	(1.84)
Star Rating	0.010	0.008	0.009	0.009	0.020	0.020	0.019	0.020
	(0.35)	(0.30)	(0.34)	(0.32)	(1.06)	(1.03)	(1.02)	(1.03)
1M Return	-0.041	-0.041	-0.042	-0.042	0.005	0.005	0.005	0.005
	(-1.00)	(-1.01)	(-1.02)	(-1.03)	(0.49)	(0.47)	(0.46)	(0.45)
1M Flow	-0.003	-0.002	-0.002	-0.002	-0.003	-0.003	-0.003	-0.003
	(-0.21)	(-0.17)	(-0.17)	(-0.16)	(-0.71)	(-0.67)	(-0.66)	(-0.66)
Log (Fund TNA)	-0.007	-0.007	-0.008	-0.008	0.012	0.012	0.012	0.013
	(-0.29)	(-0.30)	(-0.32)	(-0.31)	(1.49)	(1.48)	(1.48)	(1.51)
Expense Ratio	0.200	0.211	0.213	0.214	-0.003	0.000	0.001	0.002
	(1.18)	(1.24)	(1.25)	(1.26)	(-0.12)	(0.02)	(0.02)	(0.07)
Turnover	-0.117**	-0.117**	-0.117**	-0.116**	0.002	0.002	0.002	0.003
	(-2.50)	(-2.49)	(-2.50)	(-2.47)	(0.26)	(0.29)	(0.27)	(0.34)
Log (Fund Age)	-0.043	-0.046	-0.044	-0.043	0.048**	0.046**	0.046**	0.046**
	(-0.71)	(-0.76)	(-0.73)	(-0.72)	(2.27)	(2.23)	(2.23)	(2.24)
Obs	45,112	45,112	45,112	45,112	45,112	45,112	45,112	45,112
R-squared	0.635	0.636	0.636	0.636	0.010	0.011	0.011	0.011

Table IA7: Analyst Rating, Tone, and Mutual Fund Flow

This table presents the results of the following monthly panel regressions with month fixed effects and their corresponding t-statistics with standard errors clustered by fund and month,

$$Flow_{f,t} = \alpha + \beta_1 Rating_{f,t-1} + \beta_2 NetTone_{f,t-1} + \beta_3 Rating_{f,t-1} \times NetTone_{f,t-1} +$$
$$\beta_4 NetTone_{f,t-1} \times INST_{f,t-1} + \beta_5 Rating_{f,t-1} \times NetTone_{f,t-1} \times INST_{f,t-1} + \beta_6 INST_{f,t-1} +$$
$$cM_{f,t-1} + e_{f,t},$$

where $Flow_{f,t}$ refers to the monthly flow of fund f in month t, and $Rating_{f,t-1}$ refers to the analyst rating. $Rating_{f,t-1}$ is further replaced with four dummy variables indicating Negative, Bronze, Silver, and Gold ratings. $NetTone_{f,t-1}$ refers to the difference between positive and negative tones in the full analyst report. $INST_{f,t-1}$ ($INDV_{f,t-1}$) refers to a dummy variable that equals 1 if the primary share class in the fund is an institutional (retail) share class and 0 otherwise. Vector M stacks all other control variables, including the Star Rating, 1M Return, 1M Flow, Log(Fund TNA), Expense Ratio, Turnover, and Log(Fund Age). Appendix A provides detailed definitions of each variable. Numbers with "*", "**", and "***" are significant at the 10%, 5%, and 1% levels, respectively.

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
				Fund Flow Regressed on Lagged Fund Characteristics				
Analyst Rating	-0.015							
	(-0.83)							
Negative		0.163	-0.026	-0.036	0.157	0.159	-0.030	-0.042
		(1.28)	(-0.20)	(-0.27)	(1.24)	(1.25)	(-0.23)	(-0.32)
Bronze		0.054	0.054	0.029	0.058	0.059	0.057	0.033
		(1.39)	(1.39)	(0.70)	(1.49)	(1.52)	(1.47)	(0.80)
Silver		0.003	0.002	-0.016	0.006	0.008	0.006	-0.014
		(0.05)	(0.05)	(-0.30)	(0.11)	(0.16)	(0.12)	(-0.27)
Gold		-0.060	-0.080	-0.089	-0.059	-0.080	-0.080	-0.089
		(-0.97)	(-1.27)	(-1.41)	(-0.97)	(-1.27)	(-1.28)	(-1.41)
NetTone	0.038**	0.035*	0.034*	-0.015	0.022	0.031	0.035	-0.013
	(2.04)	(1.86)	(1.73)	(-0.48)	(1.07)	(1.56)	(1.43)	(-0.38)
Negative × NetTone			-0.224*	-0.175				
			(-1.95)	(-1.52)				
Bronze × NetTone				0.088**				
				(2.14)				
Silver × NetTone				0.071				
				(1.25)				
Gold × NetTone			0.045	0.094				
			(0.89)	(1.64)				
NetTone × INST					0.056			
					(1.34)			
Negative × NetTone × INST							-0.098	-0.060
							(-1.08)	(-0.67)
Negative × NetTone × INDV							-0.248**	-0.201
							(-2.00)	(-1.61)
Bronze × NetTone × INST								0.132**
								(2.04)
Bronze × NetTone × INDV								0.069
								(1.64)
Silver × NetTone × INST								0.127
								(1.46)
Silver × NetTone × INDV								0.047
								(0.79)
Gold × NetTone × INST						0.158**	0.154**	0.216***
						(2.14)	(2.09)	(2.71)
Gold × NetTone × INDV						-0.000	-0.004	0.041
						(-0.00)	(-0.07)	(0.60)
INST					-0.055	-0.041	-0.041	-0.063
					(-1.18)	(-0.91)	(-0.90)	(-1.32)
Star Rating	0.391***	0.391***	0.392***	0.393***	0.394***	0.394***	0.395***	0.397***
	(15.65)	(15.52)	(15.48)	(15.50)	(15.43)	(15.36)	(15.28)	(15.41)
1M Return	0.070***	0.070***	0.070***	0.071***	0.071***	0.070***	0.070***	0.071***
	(6.43)	(6.46)	(6.46)	(6.46)	(6.47)	(6.45)	(5.68)	(5.81)
1M Flow	0.470***	0.469***	0.469***	0.469***	0.469***	0.469***	0.469***	0.468***
	(26.64)	(26.62)	(26.58)	(26.55)	(26.62)	(26.57)	(26.53)	(26.50)
Log (Fund TNA)	-0.069***	-0.068***	-0.068***	-0.068***	-0.068***	-0.067***	-0.068***	-0.068***
	(-3.91)	(-3.85)	(-3.88)	(-3.86)	(-3.82)	(-3.83)	(-3.84)	(-3.84)
Expense Ratio	-0.291***	-0.299***	-0.298***	-0.295***	-0.302***	-0.304***	-0.304***	-0.303***
	(-4.54)	(-4.66)	(-4.64)	(-4.62)	(-4.67)	(-4.67)	(-4.65)	(-4.66)
Turnover	-0.039	-0.039	-0.039	-0.038	-0.035	-0.036	-0.036	-0.034
	(-1.66)	(-1.63)	(-1.62)	(-1.60)	(-1.44)	(-1.52)	(-1.49)	(-1.39)
Log (Fund Age)	-0.030	-0.029	-0.026	-0.027	-0.038	-0.039	-0.038	-0.039
	(-0.77)	(-0.72)	(-0.67)	(-0.69)	(-0.99)	(-1.02)	(-0.99)	(-1.02)
Obs	45,216	45,216	45,216	45,216	45,216	45,216	45,216	45,216
R-squared	0.339	0.339	0.339	0.339	0.339	0.339	0.339	0.340

II: Full Version of Reported Tables

Table 10: Mutual Fund Performance and Flow: Five Pillars

This table presents the results of the following monthly panel regressions with month fixed effects and their corresponding t-statistics with standard errors clustered by fund and month,

$$Perf_{f,t} = \alpha + \beta_1 Pillar\ Rating_{f,t-1} + \beta_2 Pillar\ Tone_{f,t-1} + \beta_3 Rating_{f,t-1} + \beta_4 Tone_{f,t-1} + cM_{f,t-1} + e_{f,t},$$

$$Flow_{f,t} = \alpha + \beta_1 Pillar\ Rating_{f,t-1} + \beta_2 Pillar\ Tone_{f,t-1} + \beta_3 Rating_{f,t-1} + \beta_4 Tone_{f,t-1} + cM_{f,t-1} + e_{f,t},$$

where $Perf_{f,t}$ refers to the monthly net-of-fee return (models 1 to 4) and style-adjusted return (models 5 to 8) of fund f in month t, and $Flow_{f,t}$ refers to the monthly flow of fund f in month t (models 9 to 12). $Pillar\ Rating_{f,t-1}$ refers to the rating on each of the five key pillars in determining the Morningstar analyst rating, including People, Process, Parent, Performance, and Price. $Pillar\ Tone_{f,t-1}$ refers to the positive and negative tones for each of the five pillars. $Rating_{f,t-1}$ refers to the analyst rating, and $Tone_{f,t-1}$ refers to the positive and negative tones in the full analyst report. Vector M stacks all other control variables, including the Star Rating, 1M Return, 1M Flow, Log(Fund TNA), Expense Ratio, Turnover, and Log(Fund Age). Appendix A provides detailed definitions of each variable. Numbers with "*", "**", and "***" are significant at the 10%, 5%, and 1% levels, respectively.

Table 10—Continued

	Return				Style-adjusted Return				Flow			
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12
People	0.036	0.039	0.045	0.045	-0.000	0.003	-0.002	-0.002	-0.015	0.036	0.017	0.015
	(0.96)	(1.04)	(1.10)	(1.11)	(-0.01)	(0.13)	(-0.08)	(-0.08)	(-0.44)	(0.94)	(0.42)	(0.36)
Process	-0.034	-0.034	-0.043	-0.041	-0.013	-0.016	-0.010	-0.010	-0.090***	-0.114***	-0.096**	-0.086**
	(-0.91)	(-0.94)	(-1.00)	(-1.00)	(-0.59)	(-0.78)	(-0.41)	(-0.48)	(-2.71)	(-2.97)	(-2.37)	(-2.04)
Parent	0.038	0.041	0.027	0.030	-0.003	-0.003	-0.012	-0.013	0.079**	0.098***	0.121***	0.127***
	(1.07)	(1.12)	(0.82)	(0.85)	(-0.13)	(-0.18)	(-0.54)	(-0.63)	(2.53)	(3.25)	(3.92)	(4.09)
Performance	0.003	-0.012	-0.029	-0.023	0.025*	0.004	0.015	0.013	0.286***	0.009	0.021	0.041
	(0.10)	(-0.42)	(-0.70)	(-0.62)	(1.85)	(0.33)	(0.89)	(0.87)	(10.40)	(0.30)	(0.64)	(1.15)
Price	0.020	0.020	-0.008	-0.011	0.023*	0.023*	0.019	0.019	0.054**	0.051**	0.022	0.023
	(0.73)	(0.74)	(-0.25)	(-0.35)	(1.84)	(1.86)	(1.29)	(1.33)	(2.02)	(2.01)	(0.77)	(0.81)
People PosTone			-0.011	-0.030			0.018*	0.017			-0.061***	-0.078***
			(-0.74)	(-1.43)			(1.83)	(1.36)			(-3.26)	(-3.71)
People NegTone			0.004	0.010			-0.008	-0.005			-0.036	0.006
			(0.24)	(0.50)			(-0.67)	(-0.46)			(-1.61)	(0.25)
Process PosTone			0.092**	0.052			0.018*	0.019			0.004	-0.031
			(2.48)	(1.51)			(1.75)	(1.09)			(0.18)	(-1.00)
Process NegTone			-0.080***	-0.068**			-0.037***	-0.033*			-0.090***	0.004
			(-2.69)	(-2.12)			(-3.37)	(-1.81)			(-3.76)	(0.15)
Parent PosTone			0.019	0.001			0.008	0.008			0.010	-0.007
			(1.59)	(0.06)			(1.19)	(0.79)			(0.73)	(-0.47)
Parent NegTone			-0.034*	-0.029			-0.004	-0.002			0.045***	0.083***
			(-1.86)	(-1.33)			(-0.43)	(-0.17)			(2.79)	(4.34)
Performance PosTone			0.008	-0.014			-0.002	-0.002			0.003	-0.015
			(0.47)	(-0.98)			(-0.23)	(-0.18)			(0.26)	(-0.90)
Performance NegTone			-0.001	0.004			0.003	0.005			0.026**	0.072***
			(-0.07)	(0.30)			(0.61)	(0.66)			(2.56)	(4.84)
Price PosTone			0.001	-0.005			-0.007	-0.007			0.026*	0.020
			(0.08)	(-0.32)			(-1.05)	(-1.06)			(1.83)	(1.41)

Net-of-fee Fund Return and Fund Flow Regressed on Lagged Fund Characteristics

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Price NegTone			-0.000	0.001			0.007	0.008			-0.004	0.013
			(-0.02)	(0.05)			(0.81)	(0.88)			(-0.25)	(0.74)
Analyst Rating		-0.005		-0.009		0.004		0.003		-0.004		-0.022
		(-0.26)		(-0.47)		(0.34)		(0.19)		(-0.20)		(-0.96)
PosTone				0.120				-0.001				0.102
				(1.26)				(-0.02)				(1.61)
NegTone				-0.027				-0.013				-0.248***
				(-0.34)				(-0.30)				(-4.10)
Star Rating		0.029	0.037	0.037		0.023	0.029	0.028		0.404***	0.388***	0.386***
		(1.12)	(1.39)	(1.36)		(1.18)	(1.47)	(1.41)		(16.15)	(15.07)	(14.79)
1M Return	-0.039	-0.040	-0.047	-0.047	0.005	0.005	0.006	0.006	0.079***	0.070***	0.071***	0.071***
	(-0.97)	(-0.98)	(-1.16)	(-1.16)	(0.50)	(0.45)	(0.57)	(0.57)	(7.21)	(6.34)	(6.15)	(6.13)
1M Flow	0.001	-0.002	-0.002	-0.003	0.000	-0.002	-0.003	-0.004	0.513***	0.468***	0.466***	0.464***
	(0.07)	(-0.16)	(-0.15)	(-0.19)	(0.07)	(-0.50)	(-0.65)	(-0.66)	(29.91)	(27.68)	(24.39)	(24.30)
Log (Fund TNA)	-0.004	-0.008	-0.004	-0.004	0.015*	0.012	0.014	0.014	-0.001	-0.058***	-0.063***	-0.062***
	(-0.17)	(-0.31)	(-0.16)	(-0.14)	(1.69)	(1.39)	(1.54)	(1.52)	(-0.07)	(-3.16)	(-3.39)	(-3.34)
Expense Ratio	0.225	0.233	0.206	0.196	0.002	0.010	0.008	0.008	-0.307***	-0.183**	-0.179**	-0.187**
	(1.14)	(1.19)	(1.09)	(1.06)	(0.06)	(0.36)	(0.27)	(0.31)	(-4.62)	(-2.59)	(-2.42)	(-2.55)
Turnover	-0.120**	-0.120**	-0.114**	-0.112**	-0.004	-0.004	0.005	0.005	-0.042*	-0.050**	-0.037	-0.034
	(-2.56)	(-2.58)	(-2.17)	(-2.18)	(-0.46)	(-0.54)	(0.59)	(0.63)	(-1.88)	(-2.01)	(-1.50)	(-1.37)
Log (Fund Age)	-0.051	-0.047	-0.032	-0.032	0.045**	0.049**	0.053**	0.053**	-0.098**	-0.035	-0.035	-0.041
	(-0.75)	(-0.69)	(-0.46)	(-0.46)	(2.16)	(2.33)	(2.24)	(2.27)	(-2.30)	(-0.85)	(-0.84)	(-0.96)
Obs	46,264	46,264	40,223	40,223	46,264	46,264	40,223	40,223	46,339	46,339	40,306	40,306
R-squared	0.638	0.638	0.643	0.643	0.010	0.011	0.012	0.012	0.325	0.345	0.343	0.344