The Influence of Passive Institutional Ownership on Analyst Optimism

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Abstract: This paper investigates how passive institutional ownership affects the optimistic bias in analyst forecasts. Using Russell index reconstitution as an exogenous shock to passive ownership, we find that passive ownership reduces analyst optimism. We also document stronger market reactions to forecast revisions for firms with higher passive ownership, consistent with less optimistic opinions conveying more credible information. Further tests show that the effect of passive institutional ownership holds before and after the Global Settlement and the self-regulatory organization rules, however, the effect is more significant before the regulations than after. Overall, our results suggest that passive investment can curb analyst optimism.

Keywords: passive institutional ownership; analyst optimism; Russell index; causal effect.
JEL Classifications: G23, G24, G32

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1. Introduction

Passively managed funds have grown significantly and gained popularity among investors recently. From 2008 through 2017, index domestic mutual funds and exchange traded funds (ETFs) received $1.6 trillion in net new cash and reinvested dividends, while actively managed domestic equity mutual funds experienced a net outflow of $1.3 trillion (Investment Company Institute 2018). In 2024, total assets in US passive strategies surpassed active ones for the first time. According to Morningstar fund flow data, passive funds have attracted more inflows than active funds for the past nine years (Morningstar, 2024). Since passive funds are constrained from trading on firms' earnings or other news, the fear is that firms' earnings or fundamental information become less value-relevant, and the stock market is less efficient. Sell-side analysts serve as an important information intermediary in the capital market because they communicate firms' financial information to investors. Prior literature establishes that annual analyst earnings forecasts are optimistically biased on average (e.g., Hong and Kubik, 2003). In this paper, we focus on the potential impact of passive institutional investors on analyst optimism.[1]

The impact of passive ownership on analyst optimism is unclear ex ante. Although early studies show that institutional investors encourage unbiased analyst research (Cowen, Groysberg, and Healy, 2006; Frankel, Kothari, and Weber, 2006; Ljungqvist, Marston, Starks, Wei, and Yan, 2007), this evidence is more likely for active institutional investors as they demand informative analyst reports for making investment decisions. Such active institutional investors are only a subgroup of institutional investors and a large number of institutions are passively managed—they

[1] In this paper, we refer to passively managed equity mutual funds, i.e., equity index funds and exchange traded funds (ETFs), as passive institutional investors. Recently, a growing literature has devoted attention to examining passive institutional investors' impact on corporate policies, such as firm disclosure, corporate governance, and tax planning (Boone and White 2015; Appel, Gormley, and Keim 2016; Crane, Michenaud, and Weston 2016; Khan, Srinivisan, and Tan 2017; Schoenfeld 2017; Schmidt and Fahlenbrach 2017; Chen, Huang, Li, and Shevlin 2019; Hillegeist and Weng 2021).

seek to track the returns of an index (e.g., Russell 1000) and provide broad market exposure, low portfolio turnover, and low expenses. These passive investors do not depend on analyst research for active stock picking. More recent evidence indicates that institutions' preference for unbiased analyst research may change after they invest in those stocks. The Securities and Exchange Commission (SEC) and the Financial Industry Regulatory Authority (FINRA) indicate that analysts are compelled to issue favorable opinions for stocks that are in their institutional clients' portfolios for fear of losing brokerage business (Unger 2001; FINRA 2009). In a survey, more than half of investment professionals think that analysts are under pressure from institutional investors not to downgrade stocks these investors hold (Boni and Womack 2003). Similarly, Gu, Li, and Yang (2013) and Firth, Lin, Liu, and Xuan (2013) find empirical evidence that institutional investors "prey upon" affiliated analysts to obtain favorable forecasts for stocks in which they take large positions through the discretion in allocating trading commissions. Thus, both active and passive funds may prefer optimistically biased forecasts for stocks in their portfolios because higher stock prices induced by biased forecasts can improve fund performance and increase assets under management.

Higher passive ownership, however, may be associated with less analyst optimism in that analysts may lack incentives to issue optimistic forecasts when retail investors migrate away from the underlying stocks to passive funds. Retail investors are less likely to respond literally to analysts' reports after migrating to passive funds because passive fund investors earn little from trading on firm-specific information due to passive funds' diverse holdings and tracking strategies (Glosten, Nallareddy, and Zou 2021). Passive funds are attractive to retail investors due to low expenses and broad diversification. An increase in passive ownership implies that some retail investors who previously traded component securities migrate to index funds (Israeli, Lee, and

Sridharan 2017). Theory suggests that this migration would lower the value of being informed about the individual firm's payoff or information production and, therefore, reduce the incentives to issue biased forecasts (Lundholm 2021). Compared to institutional investors, who are able to discount analyst optimism accordingly, retail investors do not appear to sufficiently debias optimism and, therefore, are more responsive to analysts' biased research (Malmendier and Shanthikumar 2007; Mikhail, Walther, and Wills 2007; So 2013). The entities with which analysts are affiliated likely benefit from optimistic forecasts at the expense of retail investors (De Franco, Lu, and Vasvari 2007; Dambra, Field, Gustafson, and Pisciotta 2018). After retail investors migrated to passive funds, the entities with which analysts are affiliated derive fewer benefits from optimism and, as a result, analysts gain less from issuing biased reports since their compensation is linked to their contribution to brokerage and investment-banking revenues (Groysberg, Healy, and Maber 2011). Faced with the reputation costs and reduced benefits from optimism, analysts should be less likely to issue optimistically biased forecasts.

We test the relation between passive ownership and analyst optimism by utilizing the Russell index reconstitution setting, which generates a large discontinuity in passive ownership around the Russell 1000/2000 threshold. Each year, Russell ranks stocks according to the market capitalization on the last trading day in May. The 1,000 largest firms constitute the Russell 1000 index, and the following 2,000 firms constitute the Russell 2000 index. Russell assigns a firm's weight in the index based on the float-adjusted market capitalization at the end of June. Firms near the Russell 1000/2000 threshold on either side are very similar in size and other firm characteristics. However, due to the value-weighted nature of the Russell index, firms at the top of the Russell

2000 receive significantly higher weights than those at the bottom of the Russell 1000.[2] Furthermore, the percentage of the market cap of the Russell 2000 being passively tracked is greater than that of the Russell 1000 (Chang, Hong, and Liskovich 2015). Therefore, passive funds that benchmark against the Russell indexes mechanically hold larger positions in stocks at the top of the Russell 2000 and smaller positions in stocks at the bottom of the Russell 1000, resulting in a significant jump in passive ownership at the cutoff point.

We begin by investigating the effect of passive ownership on analyst optimism using an instrumental variable approach. We find that firms with higher passive ownership have lower analyst signed forecast error.[3,4] For economic significance, a 1% increase in passive ownership decreases signed forecast error by about 10%. Our results are robust to using an alternative definition of passive institutional investors, including firm-level controls, using different bandwidths, using S&P 500 inclusion events as an alternative setting, controlling for firms that switch indexes, ruling out confounding factors (i.e., disclosure, information asymmetry, and stock returns), and using stock recommendation bias as an alternative measure of optimism.

We proceed to test the information content of analyst forecast revisions. It is unclear whether forecast revisions for firms with higher passive ownership would elicit stronger or weaker market reactions. On the one hand, price reactions of retail investors that migrate toward passive funds should be weaker due to the reduced impact of analyst forecasts on them. On the other hand, price

[2] Since weights assigned to each stock within a Russell index are value-weighted, stocks at the bottom of the Russell 1000 index receive small weights, as they are the smallest firms in the Russell 1000, and stocks at the top of the Russell 2000 index receive large weights, as they are the largest firms in the Russell 2000.

[3] As shown in our sample (see table 1), annual forecasts are optimistically biased on average which is consistent with prior literature. The lower signed forecast error indicates less optimistically biased forecasts.

[4] One concern is that the lower signed forecast error may result from the pessimistic forecasts being more pessimistic. However, in untabluated tests, we find that our main findings only hold for positive forecast error and there is no significant effect on negative forecast error, largely alleviating this concern.

reactions of other market participants (e.g., active funds) could be stronger due to the improved quality of analyst estimates. Lower optimistic bias in analyst forecasts implies more credible and objective forecasts, which convey more value-relevant information about firms' prospects. If other market participants understand the credibility of analyst research for firms with higher passive ownership, we expect them to react more strongly to it. We examine cumulative abnormal returns around each forecast revision and find that revisions issued by analysts on firms with higher passive ownership are associated with stronger market reactions.

We further investigate whether the effect of passive institutional ownership persists after the Global Settlement and the self-regulatory organization rules. Prior research shows that analyst optimism decreases following the Global Settlement and the self-regulatory organization rules (Kadan, Madureira, Wang, and Zach 2009), suggesting that the regulations effectively discipline analysts and reduce bias in their research. Our sample period includes both the pre-regulation and post-regulation periods. To corroborate the main finding, we repeat our analysis in each sub-sample to see if the effect of passive institutional ownership is at work following the regulations. We find significant results in both periods, while the effect is larger before the regulations than after the regulations.

We conduct a set of additional tests to enrich our analyses. Prior research finds that managers are motivated to meet or beat analysts' expectations by managing earnings (Degeorge, Patel, and Zeckhauser 1999), because the capital market provides a valuation premium to firms meeting the threshold (Bartov, Givoly, and Hayn 2002; Kasznik and McNichols 2002; An, Lee, and Zhang 2014; Kirk, Reppenhagen, and Tucker 2014). Given that firms held by more passive investors have less optimistic forecasts, we expect that these firms can meet analysts' expectations more easily and thus have less earnings management. Consistent with this prediction, we show that higher

passive ownership is associated with smaller positive discretionary accruals and a lower likelihood of restatement.[5]

This paper extends the literature that studies the impact of institutional investors on analyst forecasts. The existing studies suggest that institutional investors may pressure analysts to issue optimistic forecasts for stocks that are important in their portfolios (Mola and Guidolin 2009; Firth et al. 2013; Gu et al. 2013). However, the index-tracking strategy of passive investors makes influencing analysts costly. By exploiting the exogenous variation of passive institutional ownership due to the Russell index reconstitution, we find that the presence of passive institutional investors is associated with less optimistically biased analyst forecasts. Our results indicate that the ownership effect on the quality of analyst research is heterogenous across different types of institutional investors.

This study adds to the literature exploring factors that reduce analyst optimism. Prior studies find that the Global Settlement reduces the magnitude of optimism (Kadan et al. 2009; Guan, Lu, and Wong 2012; Corwin, Larocque, and Stegemoller 2017; Call, Sharp, and Wong 2019), and analyst competition disciplines analyst incentive distortions (Hong and Kacperczyk 2010; Merkley, Michaely, and Pacelli 2017). Our findings indicate that ownership structure, particularly passive institutional ownership, plays a role in curbing analyst optimism. Further, reduced analyst optimism is accompanied by less upward earnings management.

Finally, this paper extends a growing empirical literature on the evaluation of passive institutional investors. Recent studies have examined the economic effects on disclosure and firm

[5] Rawson and Rowe (2024) find greater index fund ownership is associated with fewer abnormal accruals but more restatements. However, the differences in our research design limit our ability to draw comparisons. For example, unlike Rawson and Rowe (2024), we adopt the regression discontinuity approach to address the concern of endogeneity.

information environment (Boone and White 2015; Schoenfeld 2017), governance (Appel et al. 2016; Schmidt and Fahlenbrach 2017; Hillegeist and Weng 2021), and tax planning (Khan et al. 2017; Chen et al. 2019). These studies provide both positive and negative views on the role of passive investors in the capital market. Our evidence of lower analyst optimism for firms with more passive investors shows a positive role of passive investors. Contrary to the existing literature, which explores whether passive investors are engaged owners, we form predictions based on the characteristics of passive institutions arising from their index-tracking strategy.

The rest of the paper is organized as follows. Section 2 discusses prior studies. Section 3 proposes our hypotheses. Section 4 describes our research design. Section 5 reports our main results. Section 6 concludes.

2. Literature Review

2.1. Analyst Optimism

Several conflicts of interest analysts face have been identified to be associated with their optimism. First, the incentive to generate trading commissions could bias analysts' forecasts. Jackson (2005) and Niehaus and Zhang (2010) show that optimistic analysts generate higher trading volume for their brokerage firms. Second, analysts' incentive to maintain the investment banking relationship may also lead to biased forecasts. Lin and McNichols (1998) and Michaely and Womack (1999) find that affiliated analysts issue more buy recommendations than unaffiliated analysts after IPO or SEO, but stocks recommended by affiliated analysts have lower returns. O'Brien, McNichols, and Lin (2005) show that the underwriting relationship makes analysts reluctant to reveal negative information. More recently, Chan, Jiang, Wu, Xu, and Zeng (2020) find that recommendations by analysts affiliated with prior underwriters of firms are more optimistic when firms' large shareholders plan to sell their restricted shares. Mao and Song (2021)

show that reciprocal pressure from the network of underwriter syndicates leads to biased analysts' research. Third, analysts are likely to make optimistic forecasts to gain access to covered firms' information. Das, Levine, and Sivaramakrishnan (1998) and Lim (2001) document that analysts issue more optimistic forecasts for firms whose earnings are difficult to predict and whose information environment is weak, consistent with analysts trading off positive bias to gain access to management. Finally, Hong and Kubik (2003) document that analysts' forecast optimism is also motivated by their career concerns and that, after controlling for accuracy, analysts who are optimistic relative to the consensus are more likely to experience favorable job separations.

A stream of literature investigates factors that can attenuate analyst optimism. The research on the evaluation of the Global Settlement and the self-regulatory organization rules generally concludes that analysts, especially those at the sanctioned brokerages, issue less optimistically biased forecasts following the regulation (Kadan et al. 2009; Guan et al. 2012; Corwin et al. 2017; Call et al. 2019). In addition to regulations, analyst competition is found to be negatively correlated with analyst optimism (Hong and Kacperczyk 2010; Merkley et al. 2017).

Regarding the question of who is harmed by analyst optimism, prior literature finds that individual investors cannot fully debias optimistic forecasts. Taking advantage of the Global Settlement to identify a cleaner set of events in which analysts act misleadingly, De Franco et al. (2007) find that analysts' biased forecasts lead to a wealth transfer from individual investors to institutional investors. Similarly, Malmendier and Shanthikumar (2007) and Mikhail et al. (2007) find that retail investors respond to analysts' recommendations literally, while large traders discount recommendations accordingly. They show that small traders' trading generates negative abnormal returns. Dambra et al. (2018) find that affiliated analysts' initiations following IPO tend

to be more optimistic, and investors who purchase shares following those initiations lose 3% of their investment.

2.2. Institutional Investors and Analyst Forecasts

Early studies argue that institutional investors prefer high-quality analyst forecasts because sell-side research provides value-added information for buy-side research. As institutional investors cast votes for All-star analysts in the annual survey conducted by *Institutional Investor* magazine, analysts may consider institutions' preference for high-quality research and issue unbiased estimates. Consistent with this view, Frankel et al. (2006) show that analysts' reports are more informative for firms with high institutional ownership. Ljungqvist et al. (2007) document that analysts' recommendations are overly optimistic in the presence of investment banking ties and brokerage pressures, but these effects are largely attenuated when firms have more institutional investors.

However, more recent studies argue that institutional investors' preference for high-quality forecasts could change after their investment. Using a dataset that discloses funds' allocation of trading commission to brokerages, Gu et al. (2013) show that analysts issue optimistic recommendations for stocks that are important in a fund's portfolio. They also find that the market reacts less favorably to the affiliated analysts' strong buy recommendations when the fee pressure is higher. Similarly, Firth et al. (2013) find that analysts issue optimistic recommendations on stocks held by mutual fund clients of their brokerage firms. Mola and Guidolin (2009) find that analysts issue favorable recommendations to a stock after the analysts' affiliated mutual funds hold that stock, and the optimism increases with the weight of a stock in a fund family's portfolio. A recent study by Gu, Li, Yang, and Li (2019) indicates that social ties between analysts and mutual fund managers bias analysts' forecasts.

3. Hypotheses

It is unclear how passive ownership could affect analyst optimism. Given that higher stock prices can improve fund performance and attract fund inflows, passive funds may prefer optimistic forecasts for stocks in their portfolios. Analysts are likely to respond to passive investors' preferences since passive funds can take their business elsewhere if analysts' forecasts are not in favor of their stock positions (Unger 2001; Boni and Womack 2003; FINRA 2009; Gu et al. 2013; Firth et al. 2013).

A|ternatively, analyst optimism could be lower in the presence of passive investors. Compared to active institutional investors, who could exert significant influence on analysts or brokerages, passive institutional investors might lack such ability. The large and diverse holdings of passive institutions make pressuring analysts to issue favorable forecasts for individual stocks very costly.

More importantly, analysts might lack incentives to issue optimistic forecasts when retail investors migrate away from the underlying stocks to passive funds. The entities with which analysts are affiliated benefit from the biased forecasts at the expense of retail investors because retail investors appear not to fully unravel analyst optimism (Malmendier and Shanthikumar 2007; Mikhail et al. 2007; Dambra et al. 2018). For example, De Franco et al. (2007) and Dambra et al. (2018) suggest a wealth transfer from retail investors to institutional investors due to analysts' misleading forecasts. Passive mutual funds seem to offer retail investors a safe haven. Because passive mutual funds provide several benefits such as low expenses and broad diversification, they become an attractive investment option for retail investors. An increase in a firm's passive institutional ownership implies that retail investors who previously traded component securities

migrate to index funds (Israeli et al. 2017). Due to passive funds' diverse holdings and tracking strategies, investors get little benefit from trading on firm-specific information by buying passive fund shares (Glosten et al. 2021). Thus, retail investors who migrate to passive funds are less likely to rely on analyst reports to form their investment decisions. The reduced influence of analysts' forecasts on retail investors implies that the entities with which analysts are affiliated benefit less from analyst bias and, as a result, analysts gain less from issuing biased reports as their compensation is tied to brokerage and investment banking transactions (Groysberg et al. 2011). Given the reputation costs faced by analysts and the lower benefits of optimism, they are less likely to issue biased forecasts.

Similarly, prior literature shows that passive institutional ownership is positively associated with price comovement (Wurgler, 2010; Israeli, Lee, and Sridharan, 2017; Glosten, Nallareddy, and Zou, 2021). When prices of individual stocks comove with the market and incorporate less firm-specific information, analysts' ability to influence stock prices is limited. Based on the above arguments, we state the hypothesis in the null form:

H1: Passive ownership is not associated with analyst optimism.

If higher passive ownership is associated with lower analyst optimism, forecast revisions for firms held by more passive institutional investors could be associated with weaker market reactions because of the reduced impact of analyst research on retail investors that migrate toward passive funds. However, other market participants (e.g., active funds) may react more strongly to forecast revisions for these firms due to the improved quality of analyst estimates. Lower analyst optimism implies more credible and objective forecasts, which convey more value-relevant information about firms' future prospects. If other market participants perceive the higher credibility of analyst

research for these firms, we expect them to update their valuation accordingly and react more strongly to it. Given the above arguments, we state the second hypothesis in the null form:

H2: Passive ownership is not associated with market reactions to forecast revisions.

4. Research Design

4.1. Russell Index Reconstitution

We intend to estimate the impact of passive ownership on analyst optimism. However, establishing a causal link between these two variables poses an empirical challenge. Passive ownership could be correlated with omitted variables that directly drive analyst optimism. To overcome this challenge, we utilize annual Russell index reconstitutions as exogenous shocks to passive ownership to test the causal impact on analyst optimism. Russell ranks all U.S. common stocks according to their market capitalization on the last trading day in May each year. The 1,000 largest firms comprise the Russell 1000 index, and the next 2,000 firms comprise the Russell 2000 index. Index weights are based on the float-adjusted market capitalization on the last Friday of June. As the Russell 1000/2000 threshold varies according to the distribution of all firms' market capitalization each year, it is unlikely that firms could precisely control their market capitalization relative to other firms' market capitalization. Therefore, Russell index inclusion can be perceived as quasi-random.

There are reasons to believe that firms at the top of the Russell 2000 have higher passive ownership relative to those at the bottom of the Russell 1000. First, as the Russell index is value-weighted, firms at the top of the Russell 2000 receive significantly higher weights than those at the bottom of the Russell 1000. Second, the percentage of the market cap of the Russell 2000 being passively tracked is greater than that of the Russell 1000 (Chang et al. 2015). Third, funds tracking

Russell indexes are very likely to hold stocks at the top of the indexes and exclude those at the bottom of the indexes because firms at the bottom of the indexes have trivial weights.

Following Boone and White (2015) and Crane et al. (2016), we estimate the following two-stage least squares (2SLS) regressions:

$$Passive_{it} = \alpha_0 + \alpha_1 R2000_{it} + \alpha_2 (Rank_{it} - 1000) + \alpha_3 R2000_{it} \times (Rank_{it} - 1000) + \alpha_4 Floatadj_{it} + \alpha_5 Inst_{it} + \varepsilon_{it} \quad (1)$$

$$Optimism_{it} = \beta_0 + \beta_1 \widehat{Passive}_{it} + \beta_2 (Rank_{it} - 1000) + \beta_3 R2000_{it} \times (Rank_{it} - 1000) + \beta_4 Floatadj_{it} + \beta_5 Inst_{it} + \varepsilon_{it} \quad (2)$$

The first-stage regression (equation (1)) is comparable to a sharp regression discontinuity design. $Passive_{it}$ is the passive mutual fund ownership at the end of the first quarter of the reconstitution year t (i.e., the end of September). $R2000_{it}$ equals 1 if firm i is in the Russell 2000 in year t and 0 if it is in the Russell 1000. We include the distance to the cutoff, $(Rank_{it} - 1000)$ and $R2000_{it} \times (Rank_{it} - 1000)$, where $Rank_{it}$ is the end-of-May CRSP market capitalization ranking, to control for the mechanical relation with market capitalization ranking on either side of the cutoff (Crane et al. 2016). We also control for the float-adjusted market capitalization ($Floatadj_{it}$), which is the difference between firm i's actual rank assigned by Russell and the rank based on its end-of-May CRSP market capitalization.

In the second-stage regression (equation (2)), we regress analyst forecast optimism ($Optimism_{it}$) on the predicted passive ownership ($\widehat{Passive}_{it}$) from the first-stage regression. We include total institutional ownership ($Inst_{it}$) at the end of September in the second stage to control its effect on analyst optimism (Frankel et al. 2006; Gu et al. 2013).[6] We also include year fixed effects.

[6] We also include total institutional ownership (*Inst*) in the first-stage regression since the control variables in the second-stage regression should be included in the first-stage regression to ensure consistent estimates (Baltagi, 2011).

4.2. Analyst Optimism

We use one-year-ahead analyst consensus EPS forecasts to measure analyst optimism. First, we calculate the monthly signed analyst consensus forecast error for a firm. Specifically, signed forecast error is defined as the difference between the consensus analyst EPS forecast and actual EPS scaled by the absolute value of actual EPS. Analyst consensus forecast is the mean of individual analysts' most recent forecasts. Higher signed forecast error represents higher analyst optimism. We exclude analyst forecasts from the consensus forecasts calculation if they have not been updated for 120 days to ensure the calculation does not include stale forecasts. Second, we calculate the mean of the monthly signed forecast errors over a one-year period after index reconstitution ($SignedErr_{it}$), and we also use signed forecast error in December ($SignedErrDec_{it}$) as a robustness check.[7] We require that a firm have at least three analysts issuing earnings forecasts each month. The Appendix provides all variable definitions.

4.3. Passive Institutional Ownership

We closely follow Busse and Tong (2012) and Appel et al. (2016) to identify passive funds. We focus on domestic equity funds because they are most affected by the index reconstitution. We use two steps to identify passive mutual funds. First, we obtain fund names from the CRSP Mutual Fund database and classify funds as passively managed if they are identified by CRSP as index funds or ETFs. Second, we classify the fund as passively managed if its name includes a string

[7] We use signed forecast error in December as a robustness check because December is the midpoint of two consecutive Russell index reconstitutions.

that identifies it as an index fund or an ETF.[8] Thus, passive institutional investors in our sample include those identified by CRSP and those identified through a keyword search. We obtain passive institutional ownership data by merging the CRSP mutual fund database with the Thomson Reuters S12 via the MFLINKS table.

4.4. Market Reactions to Analysts' Forecast Revisions

Next, we test whether the informativeness of forecast revisions differs for firms with different levels of passive ownership. Specifically, we examine the market reactions to analysts' forecast revisions by estimating the following regression:

$$CAR(0,1)_{ijt} = \beta_0 + \beta_1 \widehat{Passive}_{it} + \beta_2 Revision_{ijt} + \beta_3 Revision_{ijt} \times \widehat{Passive}_{it} + \beta_4 (Rank_{it} - 1000) + \beta_5 R2000_{it} \times (Rank_{it} - 1000) + \beta_6 Floatadj_{it} + \beta_7 Inst_{it} + AnalystCharacteristics + \varepsilon_{ijt} \quad (3)$$

where $CAR(0,1)_{ijt}$ is the two-day cumulative abnormal returns around analyst *j*'s forecast revision date (day 0) for firm *i* over trading days (0,1). Abnormal returns are calculated as the difference between firm *i*'s raw return and the return of a size and book-to-market matching portfolio (Hirshleifer, Lim, and Teoh 2009; Chi and Shanthikumar 2017).[9] $\widehat{Passive}_{it}$ is the predicted passive institutional ownership from the first-stage regression. $Revision_{ijt}$ is measured as the difference between the new forecast and the prior forecast, scaled by the absolute value of the prior

[8] We use the following strings to identify passive institutional investors: *Index*, *Idx*, *Indx*, *Ind_* (where _ indicates a space), *Russell*, *S & P*, *S and P*, *S&P*, *SandP*, *SP*, *ETF*, *DOW*, *Dow*, *DJ*, *MSCI*, *Bloomberg*, *KBW*, *NASDAQ*, *NYSE*, *STOXX*, *FTSE*, *Wilshire*, *Morningstar*, *100*, *400*, *500*, *600*, *900*, *1000*, *1500*, *2000*, and *5000*. To exclude bond funds and balanced funds, following Qin and Singal (2015), we remove funds contains the following strings: *Bond*, *Inflation*, *Treasury*, *Bd*, *Lehman*, *Barclay*.

[9] Each stock is matched with 1 of 25 size-BM portfolios. The daily returns of size-BM portfolios are obtained from Kenneth French's website.

forecast. $Revision_{ijt} \times \widehat{Passive}_{it}$ captures the incremental market reactions to revisions for higher passive institutional ownership.

We control for a set of analyst characteristics that may relate to market reactions to forecasts (Clement and Tse 2003; Liang, Reidl and Venkataraman 2008; Jung, Shane, and Yang 2012; Chan, Lin, Yu, and Zhao 2018).[10] First, we control for analysts' general and firm-specific experiences ($Genexp_{jt}$ and $Firmexp_{ijt}$). $Genexp_{jt}$ is the number of years analyst *j* issued at least one annual earnings forecast for any firm through year *t*. $Firmexp_{ijt}$ is the number of years analyst *j* issued at least one annual earnings forecast for firm *i* through year *t*. Second, we control for brokerage size ($Bsize_{jt}$), defined as the number of analysts employed by analyst *j*'s broker in year *t*, and forecast frequency ($Freq_{ijt}$), defined as analyst *j*'s annual earnings forecast frequency for firm *i* in year *t*. Third, we control for portfolio complexity ($Firmcov_{jt}$ and $Indcov_{jt}$). $Firmcov_{jt}$ and $Indcov_{jt}$ are defined as the number of firms and two-digit SICs that analyst *j* covers in year *t*, respectively. Lastly, we include analyst forecast accuracy (AFE_{ijt}) to control for analysts' research ability. AFE_{ijt} is the absolute difference between firm *i*'s actual EPS and analyst *j*'s most recent EPS forecast for firm *i*. We standardize analyst-level variables to fall between 0 and 1 to eliminate the differences across firm-year following Clement and Tse (2003):

$$R\_Variable_{ijt} = \frac{Variable_{ijt} - Min(Variable_{it})}{Max(Variable_{it}) - Min(Variable_{it})} \quad (4)$$

where $Max(Variable_{it})$ and $Min(Variable_{it})$ are the maximum and minimum values of an analyst characteristic for all analysts covering firm *i* in year *t*, respectively. We add "*R_*" prior to analyst-level variables to indicate the standardized analyst variables. A high value of *R_Variable* indicates that an analyst is ranked high based on an analyst characteristic relative to other analysts following

[10] In the Russell index setting, firms close to the Russell 1000/2000 threshold on either side are very similar in firm characteristics, but analysts that follow these firms may have different characteristics. Therefore, we include several analyst-level variables as controls.

the same firm in that year. We also control for brokerage house fixed effects and year fixed effects. We exclude revisions that fall in the three-day window around earnings announcements and dates on which multiple analysts issue revisions for the same firm.

5. Results

5.1. Data and Sample

We obtain the members of the Russell 1000 and 2000 indexes and their June portfolio weights over the period 1996-2006 from Russell investments. As in Boone and White (2015), our sample period ends in 2006 because Russell has implemented the banding policy since 2006.[11] We obtain mutual fund ownership and institutional ownership data from Thomson Reuters S12 and S34, respectively, financial data from Compustat, stock returns from CRSP, analyst recommendations and forecasts from I/B/E/S, and restatement data from Audit Analytics. The number of observations in each regression varies according to data availability.

Figure 1 plots firms' weights assigned by Russell at the end of June around the Russell 1000/2000 threshold over the period 1996-2006. It shows a large discontinuity in weights for firms around the threshold. For example, on average, the 50 largest firms in the Russell 2000 index receive weights 30 times larger than the 50 smallest firms in the Russell 1000 index. Figure 1 provides preliminary evidence that we can use the Russell index reconstitution setting as the exogenous shock to firms' ownership structure.

5.2. Descriptive Analysis

[11] The banding policy allows an existing member to stay in the index if its market capitalization falls within ±2.5% range of the 1,000th firm's market capitalization. Thus, the index assignment after 2006 is not solely determined by market capitalization.

Table 1 displays descriptive statistics of key variables for firms in the bandwidth of 300 around the cutoff. The mean of passive mutual fund ownership is 2.498%. The mean of signed analyst consensus EPS forecast error (*SignedErr*) is 0.199, consistent with the systematic optimism in analyst research documented in the prior literature. For the analyst-level variables, on average, analysts have 4 years of firm-specific experience and 10 years of general experience. On average, analysts cover roughly 19 firms and 4 industries each year.

5.3. Passive Ownership Around the Russell 1000/2000 Index Threshold

Since Russell indexes are value-weighted, firms at the top of the Russell 2000 receive significantly higher weights relative to those at the bottom of the Russell 1000. Thus, firms at the top of the Russell 2000 should have higher passive ownership than those at the bottom of the Russell 1000 index. In Figure 2, we present average passive ownership around the Russell 1000/2000 threshold. Passive ownership is averaged over 10 bins of 50 Russell ranks. The x-axis is the end-of-June rank, and the y-axis shows the average passive ownership. There is a large discontinuity in passive ownership for firms around the threshold: firms immediately to the right of the threshold receive significantly higher passive ownership than those immediately to the left of the threshold.

While Figure 2 shows the large difference in passive ownership around the cutoff point, we also run regressions to analyze the effect of index inclusion on passive ownership. Table 2 shows the results for the first-stage regression. We use a small bandwidth of 150 in Column (1) and a large bandwidth of 300 in Column (2).[12] The coefficients on *R2000* are positive and statistically significant (p-value < 0.01) in both columns, suggesting that firms at the top of the Russell 2000

[12] Our choice of bandwidth is based on the optimal bandwidth selection procedure for Regression Discontinuity by Calonico, Cattaneo, and Titiunik (2014). The optimal bandwidth is 155.

index have significantly higher passive ownership. For example, in Column (1), passive ownership is roughly 1.85 percentage points higher for firms at the top of the Russell 2000 index than for firms at the bottom of the Russell 1000 index. Cragg-Donald F-statistics show that our instrument variable *R2000* meets the relevance requirement.

5.4. Passive Ownership and Analyst Optimism

Figure 3 presents the signed forecast error around the Russell 1000/2000 threshold. The signed forecast error is averaged over 10 bins of 50 Russell ranks. It illustrates that firms at the top of the Russell 2000 receive less optimistic forecasts (i.e., lower signed forecast error) than those at the bottom of the Russell 1000, providing preliminary evidence for reduced optimism.

Next, we explore the effects of passive ownership on analyst optimism using 2SLS regressions. In Columns (1) and (2) of Table 3, we use the mean of monthly signed forecast error (*SignedErr*) as the dependent variable. We find that the coefficients on passive institutional ownership are negative and statistically significant in Column (1) (coeff. = −0.135, *t*-stat = −2.85) and Column (2) (coeff. = −0.109, *t*-stat = −2.96). For economic significance, a 1% increase in passive ownership decreases signed forecast error by about 10%. Our results indicate that firms with higher passive ownership receive less optimistic analyst consensus EPS forecasts. As a robustness check, we re-estimate the effect using the signed analyst consensus forecast error in December (*SignedErrDec*) as the dependent variable in Columns (3) and (4) and obtain similar results.

For control variables, we find that the coefficient of *Inst* is positive and significant in three out of four columns. Holding *Passive* constant, the coefficient of *Inst* mainly captures the effect of active institutional ownership. This result suggests that firms with higher active institutional

ownership tend to have more optimistic analyst forecasts, consistent with Firth et al. (2013) and Gu et al. (2013), who find that institutional investors pressure analysts to issue optimistic opinions to support their stock positions.

5.5. Robustness Tests

Quasi-indexer

Although the instrumental variable approach mitigates the concern of potential measurement error in passive ownership in the above tests, we use quasi-indexer (Bushee, 2001) as an alternative categorization of passive institutional investors to further corroborate our results.[13] Quasi-indexer is a coarser classification of passive institutional investors, including mutual funds, banks, pension funds, and insurance companies. As the classification is based on the whole fund family level, it might add noise to the measurement of passive ownership (Schmidt and Fahlenbrach 2017). Table 4 shows the regression results when we use quasi-indexer ownership as the alternative measure. We continue to find that firms with higher quasi-indexer ownership have less optimistic consensus forecasts.

Additional Control Variables

We do not control for firm characteristics in the main analyses because firms close to the Russell 1000/2000 threshold on either side are very similar. For sensitivity tests, we re-estimate the regression after controlling for firm-level characteristics. Specifically, we include firm-level variables that could affect analysts' forecasts: market capitalization (*MKTCAP*), book-to-market

[13] Quasi-indexer data is obtained from Brian Bushee's website https://accounting-faculty.wharton.upenn.edu/bushee/. Bushee (2001) classifies institutional investors into three categories: transient institutions that have high portfolio turnover and diversified holdings; quasi-indexers that have low turnover and diversified portfolio holdings; and dedicated institutions that have low turnover and concentrated portfolio holdings.

ratio (*BM*), leverage (*LEV*), return on assets (*ROA*), earnings volatility (*Evol*), return volatility (*Retvol*), and the number of analysts issuing earnings forecasts (*Follow*) in the regression. As Table 5 shows, our inferences are not affected when we include additional controls.

Alternative Bandwidths

In the main regression, we choose a small bandwidth of 150 and a large bandwidth of 300 to test our hypotheses. To ensure the robustness of our inferences, we repeat the regression using different bandwidths. In Figure 4, we plot the point estimates and 90th percentile confidence intervals using the bandwidths from 100 to 500. The results are similar when we choose different bandwidths. Thus, our estimates are robust to the different bandwidth choices around the Russell 1000/2000 threshold.

S&P 500 Addition Event

Another widely used index inclusion setting that generates large variations in passive ownership is the S&P 500 addition event. To further corroborate our results, we conduct a difference-in-difference analysis using the S&P 500 addition events from 1996 to 2015. We use the propensity score matching method (PSM) to match each addition firm with a control firm that has never been included in the S&P 500 index. The matching variables include various firm characteristics in the year before addition: firm size, return on assets, leverage, firm age, capital expenditure, book-to-market ratio, bid-ask spread, intangible assets, total assets, a dividend indicator, and analyst following.

The dependent variable, Δ*SignedErr*, is the change in monthly average signed forecast error around the addition events. The pre-addition period is one year before the addition and the

post-addition period is one year after the addition. *S&P500* equals 1 for firms included in the S&P 500 index, and 0 for control firms. The coefficient on *S&P500* captures differential changes in signed forecast error between S&P 500 addition firms and control firms. Table 6 shows the regression results. We find that the coefficient on *S&P500* is significantly negative (coeff. = −0.148, *t*-stat = −1.89), consistent with the results in our main regressions.

Controlling for Switchers

Our sample includes firms that switch indexes around Russell index reconstitution. If switchers and non-switchers have differences in some dimensions, our results could be affected. Thus, we rerun our regressions by adding controls to account for firms that switch indexes. We define two dummy variables: *R1toR2*, which equals one if a firm switches from the Russell 1000 to the Russell 2000 and zero otherwise, and *R2toR1*, which equals one if a firm switches from the Russell 2000 to the Russell 1000 and zero otherwise. In Table 7, our results are qualitatively similar when controlling for the switching effect.

Ruling out Potential Confounding Factors

Prior research reports evidence of changes in firm disclosure, information asymmetry, and stock price performance around the Russell index cutoff (Boone and White 2015; Chang et al. 2015). Given that changes in information environment may affect analysts' forecasting behavior, we further control the frequency of 8-K fillings (*8K*), management forecast bias (*MF*), bid-ask spreads (*Bidask*), probability of informed trade (*PIN*), and stock returns in June (*Ret*). Results are shown in Table 8 and our inferences are unchanged when including these additional variables.[14]

[14] For brevity, in Table 8 we only report results using the bandwidth of 150. Our results still hold when using the bandwidth of 300.

5.6. Market Reactions

Next, we test market reactions to forecast revisions. The price reactions could be weaker due to the migration of retail investors toward passive funds. However, if other market participants understand that higher passive ownership is related to more credible and objective analyst forecasts, they should react strongly to forecast revisions for firms with more passive investors. In Columns (1) and (2) of Table 9, the coefficient on *Revision*×*Passive* is 0.245 and significant at the 5% level when using a small bandwidth and is 0.209 and significant at the 5% level when using a large bandwidth. The economic significance seems large; the coefficient of *Revision* is around 0.6 without including the interaction term (untabulated), and thus, the coefficient of the interaction term is about one-third of the coefficient of *Revision*. The results suggest that higher passive ownership is related to stronger overall market reactions to forecast revisions.

In addition, we also test the market reactions over a long window (i.e., *CAR* (2, 63)) to alleviate the concern that the stronger reactions over the two-day window are driven by investors' overreaction. The results show that passive ownership is not related to any subsequent return reversal or drift (untabulated). In sum, our results indicate that investors perceive the higher quality of forecast revisions for firms with higher passive ownership and react strongly to revisions.

5.8. Additional Tests

Passive Ownership and Earnings Management

The variation in passive institutional ownership may also affect earnings management through reduced analyst optimism. The capital market appears to reward (penalize) firms for beating (missing) analysts' expectations with higher (lower) stock returns (Bartov et al. 2002; Kasznik and McNichols 2002; Brown and Caylor 2005). As managers' compensation and job

promotion opportunities are directly tied to stock prices and earnings, they have a strong incentive to manage earnings to avoid missing analysts' expectations (Burgstahler and Dichev 1997; Degeorge et al. 1999). If analysts' forecasts are less optimistic for firms with higher passive ownership, we expect that these firms can meet analysts' expectations more easily and thus have less upward earnings management.

We use two measures to proxy for earnings management. The first measure is the performance-adjusted discretionary accruals (Kothari, Leone, and Wasley 2005).[15] Discretionary accruals are calculated as the difference between the total accruals and the expected accruals. The performance-adjusted discretionary accruals (*DA*) are defined as firm-specific discretionary accruals minus discretionary accruals of the matched firm. Our second measure for earnings management is whether a firm-year's financial statement has been restated.

Table 10 reports the results for the relationship between passive ownership and earnings management. In Columns (1) and (2) of Panel A, we use the absolute value of discretionary accruals, *Abs(DA)*, as the dependent variable to test the impact on earnings management in both directions. We find that the coefficients on *Passive* are negative and significant, suggesting that higher passive ownership is related to a smaller magnitude of discretionary accruals. As our argument concerns income-increasing earnings management, we distinguish between positive (*DA* > 0) and negative discretionary accruals (*DA* < 0). Columns (3) and (4) present the regression

[15] To estimate the discretionary accruals, we first estimate the following model each year using all firm-year observations in the same two-digit SIC code:

$$\frac{TACC_{it}}{TA_{it-1}} = \beta_0 + \beta_1 \frac{1}{TA_{it-1}} + \beta_2 \frac{\Delta Rev_{it}}{TA_{it-1}} + \beta_3 \frac{PPE_{it}}{TA_{it-1}} + \beta_4 \frac{NI_{it}}{TA_{it-1}} + \varepsilon_{it} \quad (5)$$

where *TACC* is total accruals in year *t*, calculated as earnings before extraordinary items and discontinued operations minus operating cash flows; *TA* is total assets in year *t*-1; ΔRev is the change in sales revenue from year *t*-1 to *t*; *PPE* is gross property, plant, and equipment in year *t*; *NI* is net income in year *t.* We require at least 15 observations to estimate each cross-section regression. We adjust the estimated discretionary accruals for performance. Each fiscal year, we match each firm with the firm in the same two-digit SIC industry and that has the closest return on assets.

results for positive *DA*. The coefficients on *Passive* are significantly negative (*p*-value < 0.01), implying that firms with higher passive ownership have lower positive discretionary accruals. In Columns (5) and (6), we report the results for the subsample of negative *DA*, and we find that the coefficients on *Passive* are insignificant in both columns. Overall, the results in the subsamples of positive and negative *DA* indicate that the negative effect of passive ownership on the absolute discretionary accruals stems from the effect on income-increasing discretionary accruals.

Panel B shows the results for the restatement. *Restated* equals 1 if the restatement is classified by Audit Analytics as fraud or under SEC investigation (Lo, Ramos, and Rogo 2017), and 0 otherwise. As *Restated* is an indicator variable, we use the IV Probit model to estimate the effect. When we use a bandwidth of 150 in Column (1), the coefficients on *Passive* are negative but insignificant. When using a bandwidth of 300 in Column (2), we find a negative and statistically significant relationship (coeff. = −0.270, *z*-stat = −2.49) between *Passive* and *Restated*. In sum, our results are consistent with the notion that firms with higher passive ownership have a lower likelihood of restatement.

The Effect of Global Settlement

Our sample period includes several regulation changes around 2002 aiming to separate the interdependence between investment banking and analyst research, such as the Global Settlement involving the 10 largest U.S. investment banks and the self-regulatory organization rules (hereafter, the SRO rules). The extant literature generally finds that, following these regulations, analyst research becomes less optimistic and less informative, and the reduced bias is more pronounced for the sanctioned banks (Kadan et al. 2009; Guan et al. 2012; Corwin et al. 2017). We thus investigate whether the effect of passive ownership on optimism holds after the enactment of these

regulations by repeating our analyses in the pre-regulation period (1996-2001) and the post-regulation period (2002-2006).

The results are displayed in Table 11. We find negative effects of passive ownership on signed forecast error in both the pre- and post-regulation periods. The effect is weaker in the post-regulation period than in the pre-regulation period, in line with the reduced analyst optimism following the regulation. The coefficient of *Passive* is approximately 10 times larger before the regulation than that after the regulation. In sum, our results suggest that although analysts' forecasts are less optimistic following the regulations in 2002, the presence of passive ownership still significantly reduces analyst optimism.

Whether the Effect on Optimism Lasts for Longer Periods

Next, we investigate whether the negative impact of passive ownership on analyst optimism persists for longer periods. Specifically, we look at firms' membership in the Russell index for two consecutive years. We choose firms as a control group if they stay at the bottom of the Russell 1000 (bandwidth of 150 or 300) in year *t* and *t*+1, and firms as a switching group if they are at the top of the Russell 2000 in year t and move to the bottom of the Russell 1000 in year *t*+1. These two groups of firms should have little difference in passive ownership in year *t*+1 because they are all at the bottom of the Russell 1000, but they differ in passive ownership significantly in year *t*. If we can still observe lower analyst optimism for the switching group in year *t*+1, then this result is attributable to the impact of passive ownership in year *t*. Figure 5 shows the construction of the sample. The control group consists of firms like Firm A, and the switching group consists of firms like Firm B. Table 12 shows the regression results. Columns (1) and (2) display the effect of passive ownership in year *t* on signed forecast error in year *t*+1. The coefficients on *Passive* are

negative and statistically significant in Column (1) (coeff. = −0.120, *t*-stat = −2.17) and in Column (2) (coeff. = −0.076, *t*-stat = −1.76).

We then examine whether the negative effect on optimism lasts for three years. Using the same method, we choose firms that stay at the bottom of the Russell 1000 in three consecutive years as a control group (e.g., Firm A in Figure 5), and firms that are at the top of the Russell 2000 in year t and move to the bottom of the Russell 1000 in year *t*+1 and stay there in year *t*+2 as a switching group (e.g., Firm B in Figure 5). If the negative effect exists in year *t*+2, we should observe a negative relation between passive ownership in year *t* and analyst optimism in year *t*+2. In Columns (3) and (4) of Table 12, we find that the coefficients on passive ownership are all insignificant.

In sum, compared to the results of the concurrent relationship, the magnitude and significance level of the coefficients of *Passive* decrease when we test the impact on optimism in years *t*+1 and *t*+2. Our results suggest that the negative impact on analyst optimism decays over time and analysts' forecasts tend to be optimistic in the long run after a decrease in ownership by passive institutional investors.

Passive Ownership and Recommendation Bias

We also test whether the variation in passive ownership affects analyst recommendations to ensure our results are not sensitive to different analyst outputs. We calculate $FavorPct_{it}$, the average monthly percentage of favorable (i.e., buy) recommendations over July, *t* through June, *t*+1 following Russell index reconstitution.[16] To obtain a more complete picture, we also examine

[16] Most leading investment banks switched from a five-tier rating system to a three-tier rating system after a series of regulations in 2002 (Kadan et al. 2009). Following Chan et al. (2018), we convert the five-tier rating system to the three-tier system by coding "strong buy" as "buy" and "underperform" as "sell". Thus, analysts' recommendations

the impact on the percentage of sell recommendations ($SellPct_{it}$) and the percentage of hold recommendations ($HoldPct_{it}$) over the one-year period following reconstitution. We obtain the monthly percentage data from the I/B/E/S recommendation summary file.

Table 13 reports the regression results on the relationship between passive ownership and optimism in recommendations. In Columns (1) and (2), the dependent variable is the percentage of favorable recommendations (*FavorPct*) over a one-year period after the index reconstitution. In Column (1), when we use a bandwidth of 150 firms, we find a statistically significant and negative coefficient on *Passive*. In Column (2), we still find a significantly negative relation (coeff. = −0.045, *t*-stat = −3.72) when using a bandwidth of 300 firms. For economic significance, the result in Column (2) suggests that a 1% increase in passive ownership decreases the percentage of favorable recommendations by 4.5%. To corroborate our findings, we further test the impact on the percentage of sell and hold recommendations. Columns (3) and (4) show the results for sell recommendations. We find a positive and significant coefficient on *Passive* in Column (3) but an insignificant coefficient in Column (4). Thus, we find weak evidence that an increase in passive ownership is related to an increase in the percentage of sell recommendations. In Columns (5) and (6), we report the results for the percentage of hold recommendations. The coefficients on passive ownership are positive and statistically significant in both columns, suggesting that more hold recommendations are issued after an increase in passive institutional ownership.

Table 14 reports the results for market reactions to analyst recommendations. *Favorable* equals 1 for favorable recommendations, and 0 otherwise. In columns (1) and (2), the coefficients on *Favorable* are positive, suggesting that the market reactions are stronger (i.e., more positive) to favorable recommendations. The positive and significant coefficients on the interaction term

are categorized "buy", "hold", and "sell". We define buy recommendations as favorable recommendations, and hold or sell recommendations as unfavorable recommendations.

Favorable×*Passive* indicate that market reactions to favorable recommendations are stronger for firms with higher passive ownership, consistent with the prediction that market participants perceive the favorable recommendations for firms with higher passive ownership as more reliable and informative. We also find that passive ownership is not associated with cumulative abnormal returns over the (2, 63) window (untabulated).

6. Conclusion

Analysts' forecasts have been shown to be systematically optimistic. Analyst optimism could be attributable to the incentives to maintain underwriting relationships, generate trading commissions for their brokerages, obtain better career outcomes, gain access to firms' private information, and please institutional investor clients. As retail investors do not seem to fully debias analyst optimism, they could be harmed by biased forecasts. Passive funds may offer retail investors a safe haven by reducing the influence of analysts' forecasts. Retail investors that migrate to passive funds are less likely to respond to analysts' forecasts literally. The decreased influence of forecasts reduces the benefits analysts can accrue, so they are less likely to issue optimistically biased reports.

Utilizing the Russell index reconstitution setting, we find strong evidence that firms with higher passive ownership have less optimistic analyst earnings forecasts. We then find stronger market reactions to forecast revisions when passive ownership is higher. Further tests show that firms have less upward earnings management after an increase in passive ownership, suggesting that the reduced analyst optimism weakens managers' incentive to manage earnings upward.

This paper complements the literature exploring the impact of institutional investors on analyst forecasts. We show that the presence of passive institutional investors can curtail analyst

optimism by reducing the influence of analyst reports. This study adds to the literature exploring factors that can reduce analyst optimism by showing that ownership structure plays a role in curbing analyst optimism. Our paper also contributes to the growing literature on the economic consequences of passive institutional investors. Existing research explores the effect of passive investors on corporate governance, disclosure, and pricing efficiency, and we extend this strand of literature by investigating their influence on analyst optimism.

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Appendix

Variable Definitions

Variable	Description
Key variables	
SignedErr	The average monthly signed analyst consensus forecast error from July of year t to June of year t+1. The monthly signed analyst consensus forecast error is calculated as the difference between analysts' consensus EPS forecasts and actual EPS scaled by the absolute value of actual EPS.
SignedErrDec	Signed analyst consensus forecast error in December.
CAR(0,1)	The two-day cumulative abnormal returns around forecast revision date. Abnormal returns are computed as the difference between a stock's daily raw return and the return of a size-BM portfolio to which this stock belongs. Each stock is matched with 1 of 25 size-BM portfolios. The daily returns of size-BM portfolios are obtained from Kenneth French's website.
DA	The performance-adjusted discretionary accruals following Kothari et al. (2005).
Restated	1 if the restatement is classified by Audit Analytics as fraud or under SEC investigation, and 0 if there is no restatement identified.
Passive (%)	Passive institutional ownership at the end of September. We identify a fund as passively managed if (1) it is identified as an index fund or an ETF fund by CRSP; (2) its name includes a particular string that identifies it as an index fund or an ETF.
Inst (%)	Institutional ownership at the end of September.
Rank	The CRSP end-of-May market capitalization ranking.
R2000	1 if the firm is in the Russell 2000, and 0 if the firm is in the Russell 1000 index.
Floatadj	The difference between a firm's actual rank assigned by Russell and the rank based on its end-of-May market capitalization.
Revision	The difference between the new forecast and the prior forecast, scaled by the absolute value of the prior forecast.
Quasi (%)	The quasi-indexer ownership at the end of September.
Transient (%)	The transient institutional ownership at the end of September.
Dedicated (%)	The dedicated institutional ownership at the end of September.
FavorPct	The average monthly percentage of favorable recommendations (i.e., buy recommendations) from July of year t to June of year t+1.
HoldPct	The average monthly percentage of hold recommendations over July through June after index reconstitution.
SellPct	The average monthly percentage of sell recommendations over July through June after index reconstitution.
Analyst characteristics	
AFE	The absolute difference between the firm's actual EPS and an analyst's most recent forecast of EPS.
Bsize	The number of analysts employed by an analyst's broker.
Firmcov	The number of firms covered by an analyst.
Firmexp	The number of years an analyst issued at least one annual earnings forecast for a firm through year t.

Freq	An analyst's annual earnings forecast frequency for a firm.
Genexp	The number of years an analyst issued at least one annual earnings forecast for any firm through year t.
Indcov	The number of two-digit SICs covered by an analyst.
Firm characteristics	
BM	A firm's book value of equity divided by the market value of equity.
Evol	The standard deviation of quarterly earnings over 16 quarters prior to index reconstitution.
Follow	The natural logarithm of the number of analysts issuing earnings forecasts.
Lev	The long-term debt divided by lagged total assets.
MKTCAP	The CRSP market capitalization at the end of May divided by 10^5.
Retvol	The standard deviation of daily stock returns over July through June prior to reconstitution.
ROA	Operating income divided by lagged total assets.

Table 1
Descriptive Statistics

This table presents descriptive statistics for key variables in this paper using firms in the bandwidth of 300 around Russell index 1000/2000 cutoff over the period 1996-2006. All variables are defined in the Appendix.

Variables	Obs.	Mean	Std. Dev.	Q1	Median	Q3
Firm-level variables						
Passive (%)	5,495	2.498	2.070	0.742	1.937	3.820
SignedErr	5,495	0.199	0.738	-0.045	0.005	0.129
DA	5,104	-0.023	0.270	-0.097	-0.011	0.056
Restated	5,972	0.028	0.165	0.000	0.000	0.000
Analyst-level variables						
CAR(0,1)	60,429	-0.052	3.925	-1.973	-0.106	1.831
Revision	60,429	-0.055	0.306	-0.071	-0.011	0.029
Firmexp	60,429	4.107	3.571	2.000	3.000	5.000
Genexp	60,429	10.083	6.311	4.000	9.000	15.000
Bsize	60,429	81.195	84.091	20.000	54.000	119.000
Firmcov	60,429	18.774	12.81	12.000	16.000	22.000
Indcov	60,429	4.282	3.048	2.000	4.000	6.000
Freq	60,429	5.760	2.964	4.000	5.000	7.000
AFE	60,429	0.131	0.343	0.020	0.070	0.150

Table 2
First-stage Regression: The Effect of Russell 2000 Index Inclusion on Passive Ownership

This table presents the results of the effect of Russell 2000 index inclusion on passive institutional ownership. *R2000* equals 1 if a firm is in the Russell 2000, and 0 if a firm is in the Russell 1000 index. *Passive* is the passive equity mutual funds ownership at the end of September. *Rank* is the end-of-May market capitalization ranking. *Floatadj* is the difference between a firm's actual rank assigned by Russell and the rank based on its end-of-May market capitalization. *Inst* is the total institutional ownership at the end of September. Rank variable coefficients are reported per 100 ranks. The *t*-statistics are reported in parentheses and are based on standard errors that are clustered by firm. ***, **, * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Variables	(1) *Passive*	(2) *Passive*
R2000	**1.846*** **	**1.447*** **
	(14.29)	**(16.35)**
(Rank-1000)	-0.418***	-0.144***
	(-6.22)	(-5.13)
R2000×(Rank-1000)	0.049	0.055**
	(1.59)	(2.44)
Floatadj	0.483***	0.219***
	(7.12)	(8.01)
Inst	0.010***	0.010***
	(6.52)	(8.18)
Bandwidth	150	300
Year FE	Yes	Yes
N	2,735	5,495
Cragg-Donald F-statistics	357.57	477.57

Table 3
The Impact of Passive Institutional Ownership on the Signed Analyst Forecast Error

This table presents the second-stage regression of the signed analyst consensus EPS forecast error on the predicted passive mutual fund ownership. *SignedErr* is the average of monthly signed analyst consensus forecast error from July *t* through June *t*+1. *SignedErrDec* is the signed analyst consensus forecast error in December. *Passive* is the passive equity mutual funds ownership at the end of September. *Rank* is the end-of-May market capitalization ranking. *Floatadj* is the difference between a firm's actual rank assigned by Russell and the rank based on its end-of-May market capitalization. *Inst* is the total institutional ownership at the end of September. Rank variable coefficients are reported per 100 ranks. The *t*-statistics are reported in parentheses and are based on standard errors that are clustered by firm. ***, **, * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)
Variables	*SignedErr*	*SignedErr*	*SignedErrDec*	*SignedErrDec*
Passive	**-0.135*** **	**-0.109*** **	**-0.080*** **	**-0.052** **
	(-2.85)	**(-2.96)**	**(-2.72)**	**(-2.40)**
(Rank-1000)	0.048*	0.031***	0.030*	0.010*
	(1.76)	(2.66)	(1.77)	(1.66)
R2000×(Rank-1000)	0.001	0.008	0.007	0.012
	(0.06)	(0.68)	(0.66)	(1.53)
Floatadj	-0.058**	-0.041***	-0.039**	-0.017**
	(-2.06)	(-3.36)	(-2.21)	(-2.55)
Inst	0.003**	0.002**	0.002**	0.001
	(2.28)	(2.24)	(2.28)	(1.26)
Bandwidth	150	300	150	300
Year FE	Yes	Yes	Yes	Yes
N	2,735	5,495	2,410	4,839

Table 4
Robustness Test: Alternative Measure of Passive Institutional Ownership

This table presents the second-stage regression of signed forecast error on the predicted quasi-indexers ownership. *SignedErr* is the average of monthly signed analyst consensus forecast error from July *t* through June *t*+1. *Quasi*/*Dedicated*/*Transient* is the quasi-indexer ownership/dedicated institutional ownership/transient institutional ownership at the end of September. *Rank* is the end-of-May market capitalization ranking. *Floatadj* is the difference between a firm's actual rank assigned by Russell and the rank based on its end-of-May market capitalization. Rank variable coefficients are reported per 100 ranks. The *t*-statistics are reported in parentheses and are based on standard errors that are clustered by firm. ***, **, * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)
Variables	*SignedErr*	*SignedErr*
Quasi	**-0.012*** **	**-0.011** **
	(-2.60)	**(-2.53)**
(Rank-1000)	0.029	0.013
	(1.21)	(1.29)
R2000×(Rank-1000)	-0.015	0.004
	(-0.89)	(0.28)
Floatadj	-0.030	-0.018*
	(-1.33)	(-1.84)
Dedicated	0.004	0.004**
	(1.49)	(2.15)
Transient	0.002	0.001
	(0.88)	(0.81)
Bandwidth	150	300
Year FE	Yes	Yes
N	2,297	4,609

Table 5
Robustness Test: Additional Controls

This table presents the second-stage regression of signed forecast error on the predicted passive ownership, controlling for additional firm-level characteristics. *SignedErr* is the average of monthly signed analyst consensus forecast error from July *t* through June *t*+1. *Passive* is the passive equity mutual funds ownership at the end of September. Rank variable coefficients are reported per 100 ranks. All variables are defined in the Appendix. The *t*-statistics are reported in parentheses and are based on standard errors that are clustered by firm. ***, **, * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)
Variables	*SignedErr*	*SignedErr*
Passive	**-0.109****	**-0.071****
	(-2.50)	**(-2.02)**
(Rank-1000)	0.053*	0.027
	(1.84)	(1.48)
R2000×(Rank-1000)	-0.005	0.006
	(-0.28)	(0.48)
Floatadj	-0.065**	-0.042***
	(-2.42)	(-3.30)
Inst	0.003**	0.001
	(2.08)	(1.46)
MKTCAP	0.003	0.003
	(0.41)	(0.48)
BM	0.155***	0.187***
	(3.23)	(3.96)
Lev	-0.022	-0.020
	(-0.34)	(-0.43)
ROA	0.229***	0.247***
	(2.73)	(3.91)
Evol	0.041	0.042**
	(1.53)	(2.17)
Retvol	5.321***	6.440***
	(3.22)	(4.43)
Follow	-0.056	-0.039
	(-1.43)	(-1.39)
Bandwidth	150	300
Year FE	Yes	Yes
N	2,574	5,258

Table 6
Robustness Test: The S&P 500 Index Addition Sample

This table presents the difference-in-difference analysis using the S&P 500 index addition sample. Δ*SignedErr* is the change of monthly average signed forecast error around the addition events. The pre-addition period is one year before the addition and the post-addition period is one year after the addition. *S&P500* equals 1 for firms included in the S&P 500 index, and 0 for control firms. The propensity score matching method is employed to construct matched firm pairs. Each addition firm is matched with a control firm that has never been included in the S&P 500 index. All variables are defined in the Appendix. The *t*-statistics are reported in parentheses and are based on standard errors that are clustered by firm. ***, **, * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	Δ*SignedErr*
S&P500	**-0.148***
	(-1.89)
Inst	0.003
	(1.18)
MKTCAP	-0.226**
	(-2.28)
BM	0.004
	(0.03)
Lev	-0.027
	(-0.23)
Roa	0.599*
	(1.86)
Evol	0.066
	(0.67)
Retvol	5.003
	(1.41)
Follow	-0.013
	(-0.22)
Year FE	Yes
Industry FE	Yes
N	595

Table 7
Robustness Test: Including Controls to Account for Firms that Switch Indexes

This table presents the second-stage regression of signed forecast error on the predicted passive ownership, including controls to account for firms that switch indexes. *SignedErr* is the average of monthly signed analyst consensus forecast error from July *t* through June *t*+1. *Passive* is the passive equity mutual funds ownership at the end of September. *R1toR2* equals one if a firm switches from the Russell 1000 to the Russell 2000 and zero otherwise. *R2toR1* equals one if a firm switches from the Russell 2000 to the Russell 1000 and zero otherwise. The *t*-statistics are reported in parentheses and are based on standard errors that are clustered by firm. ***, **, * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)
Variables	*SignedErr*	*SignedErr*
Passive	**-0.162*** **	**-0.143*** **
	(-3.27)	**(-3.59)**
(Rank-1000)	0.003**	0.002***
	(2.54)	(2.65)
R2000×(Rank-1000)	0.040	0.029**
	(1.42)	(2.51)
Floatadj	0.007	0.014
	(0.42)	(1.11)
Inst	-0.049*	-0.037***
	(-1.71)	(-3.04)
R1toR2	0.192***	0.138***
	(3.47)	(3.08)
R2toR1	-0.006	-0.044
	(-0.12)	(-1.32)
Bandwidth	150	300
Year FE	Yes	Yes
N	2,735	5,495

Table 8
Robustness Test: Ruling out Potential Confounding Factors

This table presents the second-stage regression of signed forecast error on the predicted passive ownership, controlling for potential confounding factors. *SignedErr* is the average of monthly signed analyst consensus forecast error from July *t* through June *t*+1. *Passive* is the passive equity mutual funds ownership at the end of September. *8K* is the number of 8-K fillings from July *t* through June *t*+1. *MF* is the mean difference between management earnings forecast and reported earnings deflated by the absolute value of reported earnings from July *t* through June *t*+1. *Bidask* is the average ratio of the closing ask price minus the closing bid price to the midpoint of the closing ask and closing bid prices from July *t* through June *t*+1. *PIN* is the probability of an informed trade, which is downloaded from Stephen Brown's website. *Ret* is stock returns in June. The *t*-statistics are reported in parentheses and are based on standard errors that are clustered by firm. ***, **, * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Variables	*SignedErr*	*SignedErr*	*SignedErr*	*SignedErr*	*SignedErr*	*SignedErr*
Passive	**-0.136*** **	**-0.113*** **	**-0.123*** **	**-0.146*** **	**-0.092** **	**-0.108** **
	(-2.85)	**(-2.65)**	**(-2.63)**	**(-3.11)**	**(-2.18)**	**(-2.48)**
(Rank-1000)	0.048*	0.092**	0.039	0.056*	0.039	0.092**
	(1.75)	(2.36)	(1.44)	(1.95)	(1.45)	(2.14)
R2000×(Rank-1000)	-0.000	-0.015	0.005	0.001	0.008	-0.006
	(-0.01)	(-0.60)	(0.29)	(0.05)	(0.49)	(-0.24)
Floatadj	-0.057**	-0.080**	-0.052*	-0.062**	-0.048*	-0.074*
	(-2.05)	(-2.20)	(-1.88)	(-2.23)	(-1.78)	(-1.93)
Inst	0.003**	0.002	0.003**	0.003**	0.002*	0.001
	(2.32)	(1.11)	(2.33)	(2.01)	(1.85)	(0.76)
8K	-0.017					-0.006
	(-0.72)					(-0.19)
MF		0.051***				0.051***
		(3.27)				(3.26)
Bidask			0.100***			0.043
			(3.72)			(1.04)
PIN				-0.707		-1.205
				(-1.29)		(-1.59)
Ret					-0.418***	-0.233
					(-3.03)	(-1.19)
Bandwidth	150	150	150	150	150	150
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N	2,730	1,031	2,730	2,730	2,730	1,031

Table 9
Passive Institutional Ownership and Market Reactions to Earnings Forecast Revisions

This table presents the results of testing the market reactions to analysts' forecast revisions. *CAR*(0,1) is the cumulative abnormal returns over the announcement window. *Passive* is the passive equity mutual funds ownership at the end of September. *Revision* is measured as the difference between the new forecast and the prior forecast, scaled by the absolute value of the prior forecast. Other variables are defined in the Appendix. Rank variable coefficients are reported per 100 ranks. The *t*-statistics are reported in parentheses and are based on standard errors that are clustered by firm and brokerage. ***, **, * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)
Variables	*CAR*(0,1)	*CAR*(0,1)
Passive	0.044	-0.013
	(0.67)	(-0.24)
Revision	0.004	0.110
	(0.01)	(0.45)
Revision*×*Passive	**0.245****	**0.209****
	(1.99)	**(2.07)**
(Rank-1000)	0.004	0.015
	(0.09)	(0.74)
R2000×(Rank-1000)	-0.025	0.005
	(-0.72)	(0.22)
Floatadj	-0.006	-0.011
	(-0.13)	(-0.57)
Inst	0.002	0.002*
	(0.96)	(1.75)
R_Firmexp	-0.070	-0.116*
	(-0.71)	(-1.81)
R_Genexp	0.037	0.025
	(0.42)	(0.40)
R_Bsize	-0.159	-0.133*
	(-1.48)	(-1.86)
R_Firmcov	0.024	-0.055
	(0.28)	(-0.82)
R_Indcov	-0.095	0.027
	(-1.23)	(0.40)
R_Freq	0.048	0.075
	(0.62)	(1.19)
R_AFE	-0.010	0.012
	(-0.12)	(0.18)
Bandwidth	150	300
Brokerage FE	Yes	Yes
Year FE	Yes	Yes
N	29,734	60,429

Table 10
The Effect of Passive Institutional Ownership on Earnings Management

This table presents the results on the impact of passive institutional ownership on earnings management. *DA* (Panel A) and *Restated* (Panel B) are the dependent variables. *DA* is the discretionary accruals estimated using the performance-adjusted model of Kothari et al. (2005). *Restated* equals 1 if the restatement is classified by Audit Analytics as fraud or under SEC investigation, and 0 if no restatement is identified. We use the IV Probit regression in Panel B. Other variables are defined in the Appendix. Rank variable coefficients are reported per 100 ranks. The *t*-statistics or *z*-statistics are reported in parentheses and are based on standard errors that are clustered by firm. ***, **, * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A Discretionary accruals

	(1)	(2)	(3)	(4)	(5)	(6)
Variables	*Abs(DA)*	*Abs(DA)*	*DA*>0	*DA*>0	*DA*<0	*DA*<0
Passive	**-0.023****	**-0.019****	**-0.034*****	**-0.035*****	**0.017**	**0.008**
	(-1.98)	**(-2.06)**	**(-2.64)**	**(-3.01)**	**(0.94)**	**(0.64)**
(Rank-1000)	0.012	0.005	0.011	0.005	-0.013	-0.007
	(1.53)	(1.63)	(0.96)	(1.04)	(-1.14)	(-1.50)
R2000×(Rank-1000)	0.007	0.004	0.009	0.009*	-0.005	0.001
	(1.57)	(1.21)	(1.33)	(1.80)	(-0.78)	(0.21)
Floatadj	-0.012	-0.004	-0.010	-0.003	0.013	0.005
	(-1.59)	(-1.23)	(-0.92)	(-0.71)	(1.27)	(1.24)
Inst	0.000	0.000	0.000	0.001***	0.000	0.000
	(0.21)	(1.03)	(0.88)	(2.59)	(0.21)	(0.44)
Bandwidth	150	300	150	300	150	300
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N	2,547	5,104	1,141	2,304	1,406	2,800

Panel B Financial restatement

	(1)	(2)
Variables	*Restated*	*Restated*
Passive	**-0.180**	**-0.270****
	(-1.27)	**(-2.49)**
(Rank-1000)	0.008	0.058
	(0.09)	(1.45)
R2000×(Rank-1000)	-0.045	-0.013
	(-0.65)	(-0.33)
Floatadj	-0.000	-0.040
	(-0.00)	(-1.07)
Inst	0.001	0.005*
	(0.39)	(1.76)
Bandwidth	150	300
Year FE	Yes	Yes
N	2,973	5,972

Table 11
The Impact of the Global Settlement and the SRO Rules

This table presents the results of regressing the effect of passive ownership on signed forecast error in the pre-regulation period and the post-regulation period. The Global Settlement and the SRO rules were enacted around 2002. *SignedErr* is the average of monthly signed analyst consensus forecast error from July *t* to June *t*+1. *Passive* is the passive equity mutual funds ownership at the end of September. Other variables are defined in the Appendix. Rank variable coefficients are reported per 100 ranks. The *t*-statistics are reported in parentheses and are based on standard errors that are clustered by firm. ***, **, * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Dependent Variable	(1)	(2)	(3)	(4)
SignedErr	Pre-regulation (1996-2001)		Post-regulation (2002-2006)	
Passive	**-0.549****	**-0.424****	**-0.061****	**-0.040***
	(-1.99)	**(-2.42)**	**(-2.40)**	**(-1.77)**
(Rank-1000)	0.094	0.051**	0.023	0.011
	(1.44)	(2.21)	(0.71)	(0.80)
R2000×(Rank-1000)	-0.001	-0.004	0.046	0.041**
	(-0.05)	(-0.25)	(1.53)	(2.17)
Floatadj	-0.089	-0.049**	-0.038	-0.027*
	(-1.47)	(-2.50)	(-1.35)	(-1.81)
Inst	0.005*	0.004**	0.003**	0.001
	(1.71)	(2.18)	(2.08)	(1.39)
Bandwidth	150	300	150	300
Year FE	Yes	Yes	Yes	Yes
N	1,480	2,965	1,255	2,530

Table 12
The Impact of Passive Institutional Ownership on Subsequent Signed Forecast Error

This table presents the results of regressing the impact of passive ownership in year *t* on signed forecast error in year *t*+1 (columns (1) and (2)) and in year *t*+2 (columns (3) and (4)). *SignedErr* is the average of monthly signed analyst consensus forecast error from July *t* to June *t*+1. *Passive* is the passive equity mutual funds ownership at the end of September. Other variables are defined in the Appendix. Rank variable coefficients are reported per 100 ranks. The *t*-statistics are reported in parentheses and are based on standard errors that are clustered by firm. ***, **, * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Variables	(1) $SignedErr_{t+1}$	(2) $SignedErr_{t+1}$	(3) $SignedErr_{t+2}$	(4) $SignedErr_{t+2}$
Passive	**-0.120****	**-0.076***	**-0.105**	**-0.074**
	(-2.17)	**(-1.76)**	**(-1.57)**	**(-1.59)**
(Rank-1000)	0.070	-0.014	0.102	-0.016
	(1.49)	(-0.85)	(1.62)	(-0.91)
R2000×(Rank-1000)	-0.028	0.000	-0.077**	0.015
	(-0.98)	(0.00)	(-2.04)	(0.62)
Floatadj	-0.099*	-0.021	-0.115*	-0.006
	(-1.88)	(-1.18)	(-1.70)	(-0.33)
Inst	0.004	0.003**	0.004*	0.004**
	(1.59)	(2.19)	(1.94)	(2.28)
Bandwidth	150	300	150	300
Year FE	Yes	Yes	Yes	Yes
N	584	1,662	252	791

Table 13
The Impact of Passive Institutional Ownership on Recommendation Bias

This table presents the second-stage regression of the recommendation bias on the predicted passive mutual fund ownership. *FavorPct* is the average of the percentage of favorable recommendations from July *t* through June *t*+1. *SellPct* is the average of the percentage of sell recommendations from July *t* through June *t*+1. *HoldPct* is the average of the percentage of hold recommendations from July *t* through June *t*+1. *Passive* is the passive equity mutual funds ownership at the end of September. *Rank* is the end-of-May market capitalization ranking. *Floatadj* is the difference between a firm's actual rank assigned by Russell and the rank based on its end-of-May market capitalization. *Inst* is the total institutional ownership at the end of September. Rank variable coefficients are reported per 100 ranks. The *t*-statistics are reported in parentheses and are based on standard errors that are clustered by firm. ***, **, * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Variables	*FavorPct*	*FavorPct*	*SellPct*	*SellPct*	*HoldPct*	*HoldPct*
Passive	**-0.050*** **	**-0.045*** **	**0.011** **	**0.005**	**0.039*** **	**0.041*** **
	(-3.25)	**(-3.72)**	**(2.46)**	**(1.24)**	**(3.00)**	**(3.87)**
(Rank-1000)	0.008	0.006*	-0.007***	-0.002	-0.002	-0.005
	(1.03)	(1.76)	(-2.63)	(-1.40)	(-0.22)	(-1.64)
R2000×(Rank-1000)	0.017***	0.014***	-0.000	0.000	-0.016***	-0.013***
	(2.85)	(3.56)	(-0.23)	(0.01)	(-3.03)	(-3.95)
Floatadj	-0.016*	-0.014***	0.006**	0.001	0.010	0.013***
	(-1.84)	(-3.44)	(2.39)	(1.20)	(1.23)	(3.59)
Inst	0.004***	0.004***	-0.001***	-0.000***	-0.003***	-0.003***
	(7.62)	(11.58)	(-4.03)	(-4.74)	(-7.67)	(-11.64)
Bandwidth	150	300	150	300	150	300
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N	2,826	5,709	2,826	5,709	2,826	5,709

Table 14
Passive Institutional Ownership and Market Reactions to Recommendations

This table presents the results of testing the market reactions to analysts' recommendations. *CAR*(0,1) is the cumulative abnormal returns over the announcement window. *Passive* is the passive equity mutual funds ownership at the end of September. *Favorable* equals 1 for buy recommendations, and 0 for hold or sell recommendations. A detailed definition of analyst-level variables is reported in the Appendix. Rank variable coefficients are reported per 100 ranks. The *t*-statistics are reported in parentheses and are based on standard errors that are clustered by firm and brokerage. ***, **, * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)
Variables	*CAR*(0,1)	*CAR*(0,1)
Passive	0.027	0.092
	(0.30)	(1.20)
Favorable	1.829***	1.539***
	(5.48)	(5.95)
Favorable*×*Passive	**0.224***	**0.289****
	(1.85)	**(3.14)**
(Rank-1000)	-0.032	-0.040
	(-0.45)	(-1.49)
R2000×(Rank-1000)	0.041	-0.026
	(0.88)	(-0.84)
Floatadj	0.048	0.045*
	(0.74)	(1.74)
Inst	-0.002	-0.006***
	(-1.15)	(-3.45)
R_Firmexp	-0.254**	-0.129
	(-2.17)	(-1.41)
R_Genexp	0.165	0.030
	(1.24)	(0.31)
R_Bsize	-0.072	-0.035
	(-0.52)	(-0.35)
R_Firmcov	0.106	0.081
	(0.83)	(0.78)
R_Indcov	-0.222	-0.244***
	(-1.55)	(-2.60)
R_Freq	-0.085	-0.104
	(-0.76)	(-1.44)
R_AFE	-0.102	-0.062
	(-1.16)	(-1.12)
Bandwidth	150	300
Brokerage FE	Yes	Yes
Year FE	Yes	Yes
N	19,259	38,128

Figure 1
End-of-June Index Weights Around the Russell 1000/2000 Threshold

This figure displays the average end-of-June index weights around the threshold over the period 1996-2006. Index weights are determined by Russell using the float-adjusted market capitalization within each index at the end of June.

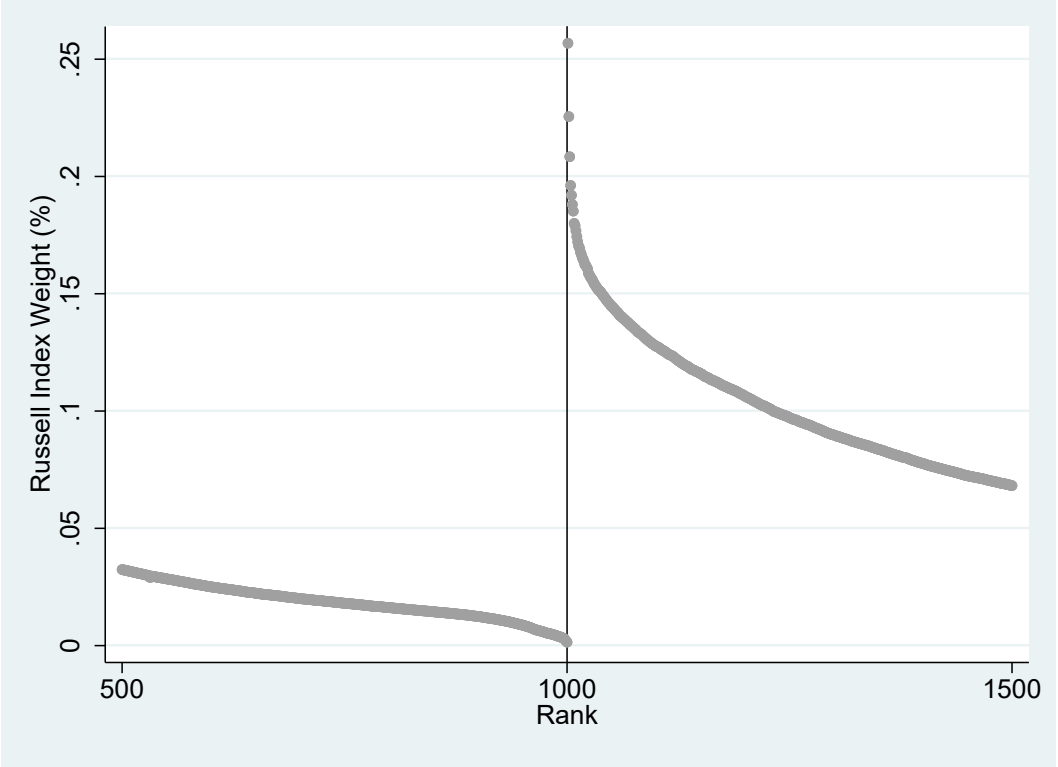

Figure 2
Passive Institutional Ownership Around the Russell 1000/2000 Threshold

This figure displays passive institutional ownership at the end of September (i.e., the first quarter after index reconstitution) around the threshold over the period 1996-2006. The x-axis is the firm's rank based on index weights assigned by Russell. This figure draws the average of passive institutional ownership using 10 non-overlapping bins of 50 Russell ranks on each side of the threshold and a fitted regression curve across the sample period.

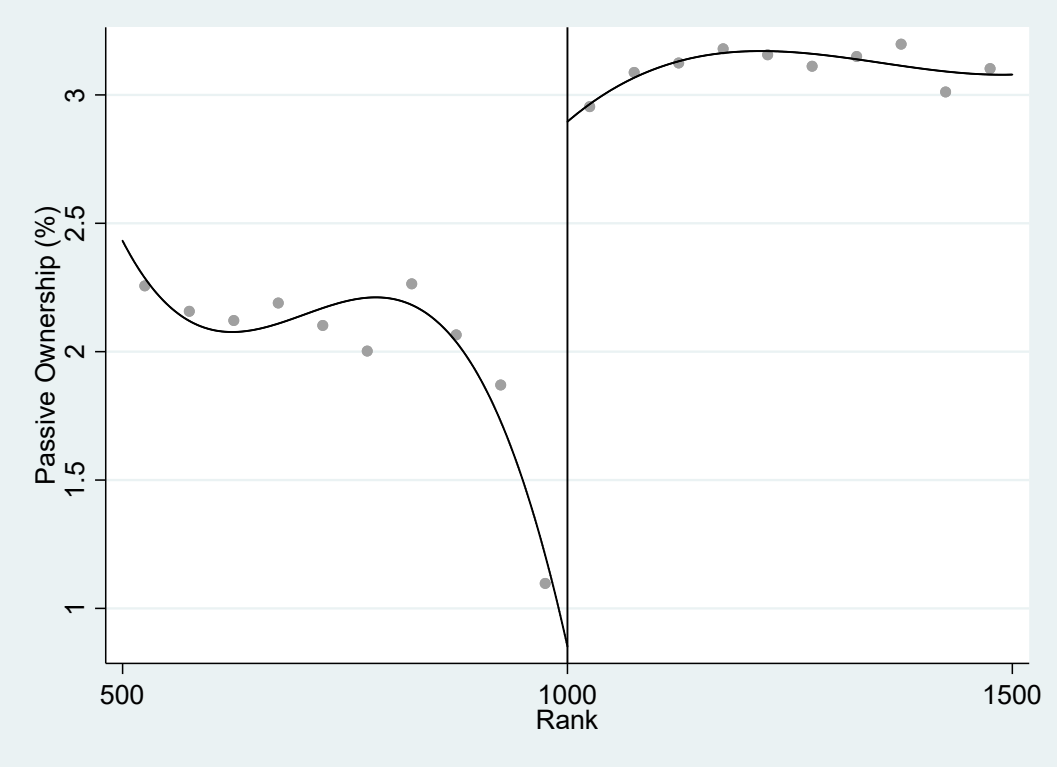

Figure 3
Signed Forecast Error around the Russell 1000/2000 Threshold

This figure displays signed forecast error (*SignedErr*) around the threshold over the period 1996-2006. The x-axis is the firm's rank based on index weights assigned by Russell. This figure draws the average of *SignedErr* using 10 non-overlapping bins of 50 Russell ranks on each side of the threshold and a fitted regression curve across the sample period.

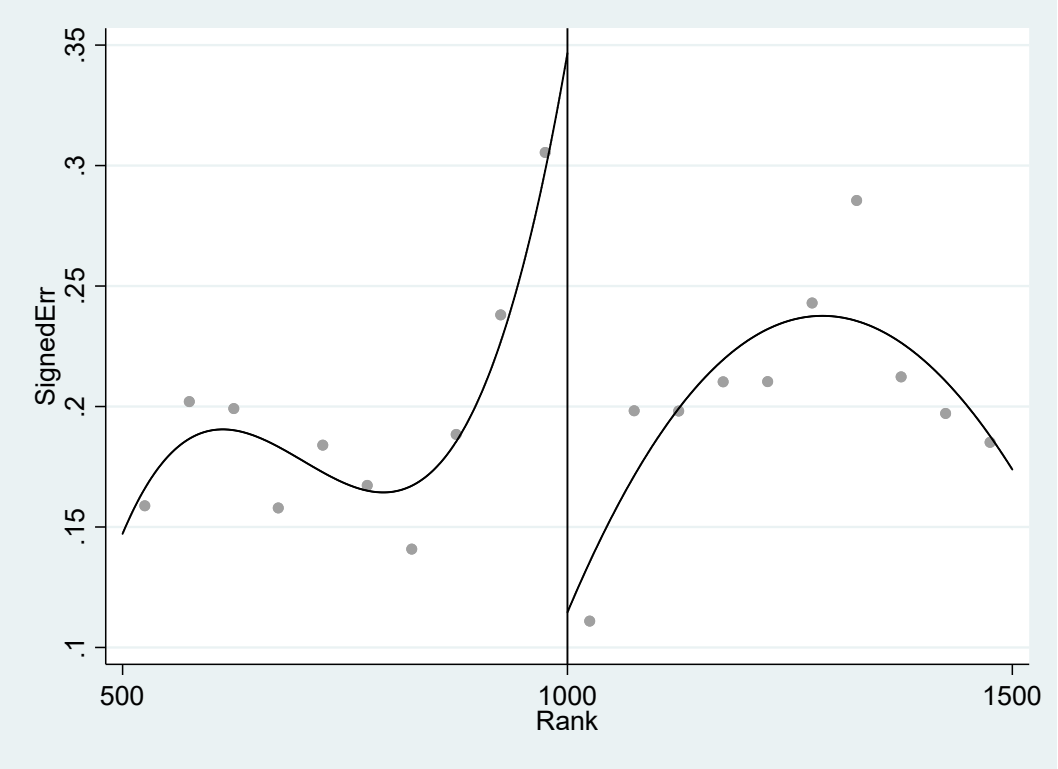

Figure 4
Point Estimates of the Effect of Passive Institutional Ownership on Signed Forecast Error

This figure plots point estimates and 90th percentile confidence intervals of the effect of passive institutional ownership on signed forecast error in the bandwidth of 100 through 500. Variable definitions are given in the Appendix.

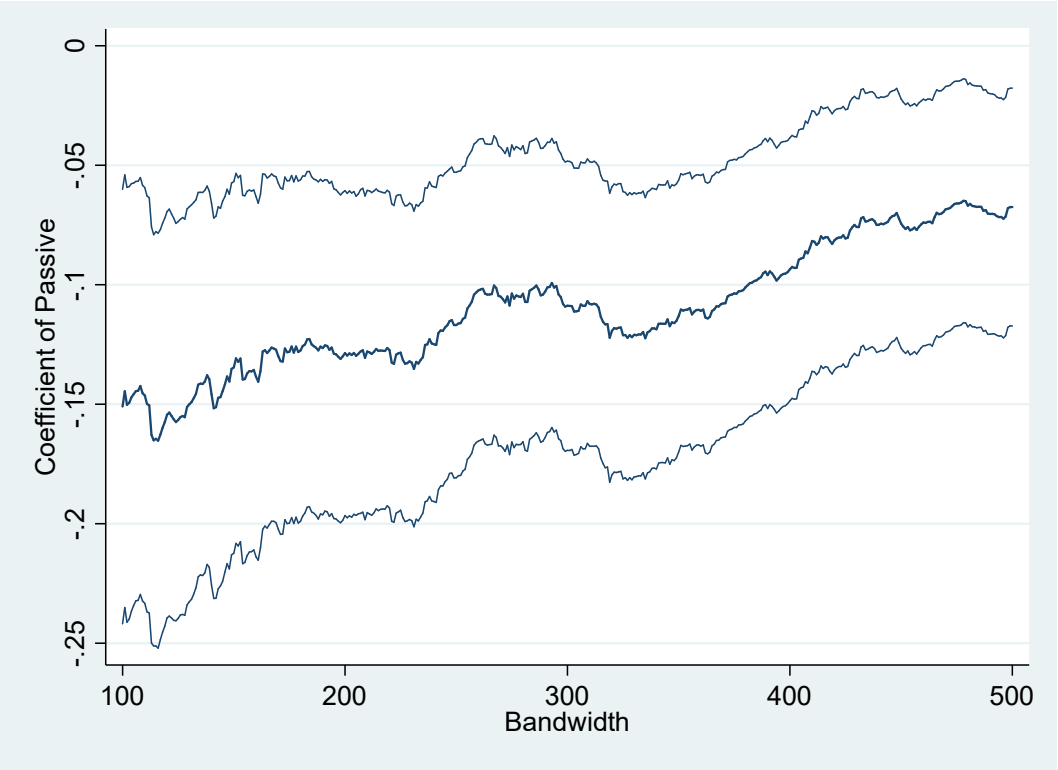

Figure 5
The Construction of the Sample to Test the Impact for Longer Periods

This figure shows the sample construction to test whether the impact of passive ownership on optimism persists for the next year and the third year. Firms A and B are two hypothetical firms. When we test the effect of passive ownership in year *t* on analyst optimism in year *t*+1, we look at firms' membership in the Russell index for two consecutive years (i.e., years *t* and *t*+1). We choose firms as a control group if they stay at the bottom of the Russell 1000 in years *t* and *t*+1 (e.g., Firm A), and firms as a switching group if they are at the top of the Russell 2000 in year *t* and move to the bottom of the Russell 1000 in year *t*+1 (e.g., Firm B). These two groups of firms should have little difference in passive ownership in year *t*+1 because they are all at the bottom of the Russell 1000, but they differ in passive ownership significantly in year *t*. If we can still observe lower analyst optimism for the switching group in year *t*+1, then this result is attributable to the effect of passive ownership in year *t*. When we test the impact of passive ownership in year *t* on analyst optimism in year *t*+2, we look at firms' membership in the Russell index for three consecutive years (i.e., years *t*, *t*+1, and *t*+2). We choose firms as a control group if they stay at the bottom of the Russell 1000 in years *t*, *t*+1, and *t*+2 (e.g., Firm A), and firms as a switching group if they are at the top of the Russell 2000 in year *t* and move to the bottom of the Russell 1000 in year *t*+1 and stay there in year *t*+2 (e.g., Firm B).