

Institutional Blockholders and Voluntary Disclosure

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Abstract

We study how institutional blockholdings affect firm voluntary disclosure. We document that concentrated ownership reduces firm voluntary disclosure measured by the propensity to issue management forecasts, comprehensiveness of guidance, propensity to engage in conference calls, and the number of 8-K filings. We identify two channels through which blockholders affect firms' voluntary disclosure. First, blockholders have easier access to managers and substitute private for public information acquisition. Second, a higher proportion of non-monitoring blockholders with low demand for voluntary disclosure, such as passive blockholders, reduces the firm's incentive to provide voluntary disclosure. The results are robust to endogeneity and reverse causality concerns. Our study identifies an important effect that concentrated ownership has on firm corporate disclosure.

Key words: passive ownership, Institutional investors, blockholder, voluntary disclosure

JEL Classifications: G23, G32, G34, G12, G14

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1. Introduction

Previous studies document a positive relation between institutional ownership and firm voluntary disclosure (Healy, Hutton and Palepu 1999, Bushee and Noe 2001, Bushee, Matsumoto and Miller 2003, Ajinkya, Bhojraj and Sengupta 2005, Karamanou and Vafeas 2005, Bonne and White 2015, Basu, Pierce and Stephan 2018, and Abramova, Core and Sutherland 2017). They attribute this result to the monitoring role of institutional investors—institutional investors demand more public disclosure to facilitate managerial monitoring as private information acquisition is costly. One would naturally assume a similar positive association for concentrated institutional holdings as blockholders face similar monitoring concerns.¹ Further, the benefits of monitoring increase with ownership concentration as idiosyncratic shocks have a larger effect on concentrated holdings (Almazan, Hartzell, and Starks 2005).

However, there are two reasons for a potentially negative association between blockholdings and voluntary disclosure. First, blockholders have more direct access to firms' management (Agrawal and Mandelker 1990, Porter 1992), which can provide them with more timely and tailored information that substitutes public information acquisition (the *private for public information substitution* hypothesis). This substitution lowers blockholder demand for public disclosure, which in turn reduces managerial incentive to provide costly public disclosure.²

Second, previous studies document that not all institutional investors actively monitor firm management because of differences in monitoring costs. Almazan et al. (2005) argue that monitoring costs vary with the skills and resources an institution can devote to collect and analyse information. They find that for these reasons, bank trusts and insurance companies face higher

1. In empirical tests, we define institutional blockholders as institutional investors who hold at least 5% of the firm's outstanding common shares.

2. Public voluntary disclosure, such as earnings guidance, is costly because it increases litigation risk (Kaszniak 1999, Soffer, Thiagarajan and Walther 2000), and associates with reputational costs and negative stock price effects of not meeting analyst expectations (Graham, Harvey and Rajgopal 2005, Feng 2006, Feng and Koch 2010).

monitoring costs compared to investment advisers and investment companies. Thus, as the fraction of shares held by non-monitoring blockholding institutions increases, such as by passive index funds, managers face less pressure to engage in costly public disclosure (the *inactive monitoring* hypothesis). Non-monitoring blockholders may also encourage less public disclosure as they bear a disproportionately high cost of voluntary disclosure (Shleifer and Vishny 1986). Lower public disclosure can lower stock liquidity, however, lower marginal return due to higher trading cost is offset by blockholders' large volume of trades (Maug 1998, Edmans 2014). This effect contrasts with non-monitoring non-blockholders who prefer more transparency that promotes higher stock liquidity (Heflin and Shaw 2000, Bonne and White 2015). This study empirically examines the effect institutional blockholdings have on voluntary disclosure and tests the two channels through which blockholdings can affect corporate communication.

We focus on blockholders as previous studies suggest they can exert substantial pressure on managers. Blockholders can influence managerial behaviour through direct intervention within a firm, for example, they can submit a public shareholder proposal suggesting a desired course of action, and privately pressure managers (Admati et al. 1994, Grossman and Hart 1980, Kahn and Winton 1998, Shleifer and Vishny 1986, Gillan and Starks 1998, Karpoff 1999). They can also vote against directors if the firm's actions do not align with blockholders expectations. Further, blockholders can trade in the company's shares and their trades can exert downward stock price pressure hurting managerial wealth and position. Consistently, Parrino et al. (2003), Gopalan (2008), Gallagher et al. (2009), Chen et al. (2009), Bharath et al. (2010), and Qian (2011) find that institutional stock sales significantly increase the probability of forced CEO turnover. We expect that managers will adjust the firm's disclosure policy to conform to the informational needs of blockholders because the latter can more directly affect managerial behaviour compared to non-blockholders.

We focus on voluntary disclosure because it is an important component of the firm's corporate communication (Healy and Palepu 2001) and it is a channel through which managers communicate their private information (Wang 2007, Coller and Yohn 1997, Hirst, Koonce and Venkataraman 2008). Beyer et al. (2010) find that management forecasts account for most of the quarterly return variance compared to earnings announcements, earnings pre-announcements, analyst forecasts, and SEC filings. Studies find a significant association between voluntary communication and information asymmetry (Diamond and Verrecchia 1991, Coller and Yohn 1997, Williams 1996), share price performance (Graham et al. 2005, Feng 2006), litigation risk (Kasznik 1999, Soffer, Thiagarajan and Walther 2000), cost of capital (Botosan 1997), and analyst coverage (Healy, Hutton and Palepu 1999). We measure voluntary disclosure by the propensity to issue management forecasts and comprehensiveness of forecasts, which captures the number of forecasted items. In sensitivity tests, we also examine the firm's propensity to host conference calls and to file voluntary 8-K filings because guidance can reflect other considerations than disseminating private information, such as expectations management (Matsumoto 2002, Bartov, Givoly and Hayn 2002, Richardson, Teoh and Wysocki 2004).³

To establish the importance of our setting, we first examine the prevalence of blockholdings for a sample of Compustat firms over the period 2001-2015. We find that the average proportion of shares held by blockholders in a firm increases from around 10% in 2001 to 19% in 2015, a 90% increase. For comparison, He and Huang (2017) report average blockholdings of 10.2% over the period 1980-2010. Further, we find that the proportion of Compustat firms with at least one

3. Managers have been called to stop providing guidance (CFA Institute 2006, U.S. Chamber of Commerce 2007) to avoid myopic behaviour related to meeting earnings benchmarks, such as boosting short-term profitability (Fuller and Jensen 2002, Jensen et al. 2004, Chen Matsumoto and Rajgopal 2011).

blockholder increases from 63.9% in 2001 to 81.9% in 2015. Thus, in recent years, a substantial proportion of outstanding shares are held by blockholders.

Next, we examine the effect blockholdings have on voluntary disclosure. Empirical tests show a negative association between blockholdings and the likelihood of quarterly management forecasts and the effect is economically significant. A one standard deviation increase in blockholdings leads to a 9.0% lower propensity to provide guidance. Consistent with previous studies (e.g. Ajinkya et al. 2005, Bushee and Noe 2001, Bonne and White 2015), we find a positive effect of average institutional ownership on the likelihood of guidance. When we jointly include blockholdings and average institutional holdings, the latter captures the effect of non-blockholding institutional ownership, i.e. institutional ownership below 5% of outstanding common shares. We confirm that the positive effect institutional ownership has on managerial guidance is driven by institutional non-blockholdings.

To address the concern our results may be driven by a specific measure of blockholding, we re-do the analysis using the Herfindahl measure of ownership concentration. We continue to find a negative effect of concentrated ownership on voluntary disclosure. A one-standard-deviation increase in ownership concentration leads to a 144% lower likelihood of guidance. We find similar results using the number of blockholders in a stock. Thus, our conclusions are not sensitive to the measure of blockholding.

Next, we perform three tests to ensure our conclusions are not sensitive to the measure of voluntary disclosure. First, we measure the comprehensiveness of voluntary disclosure by the number of items included in the management forecast. This test helps us differentiate between firms that issue one compared to multiple forecasts. A single forecast can reflect opportunistic guidance, e.g. to lower the share price before option grant dates (Aboody and Kasznik 2000, Cheng and Lo 2006, Nagar, Nanda, and Wysocki 2003). Comprehensive guidance is more likely to capture

disclosure that is part of the firm's corporate communication (Ajinkya et al. 2005). We expect both the occurrence and the number of forecasted items to change in response to block ownership. We find that on average managers disclose two income statement items, with the most common items including forecasts of earnings and revenue. Using Poisson regressions, we find a negative effect blockholdings has on the number of items disclosed, which supports our main results.

Second, we examine the likelihood of conference calls hosted by management. Conference calls allow managers to build a narrative for firm performance and outlook complementing quantitative guidance. Qualitative information can provide incremental information to investors (Arslan-Ayaydin et al. 2016, Cho et al. 2009, 2010). We find that blockholdings reduce a firm's propensity to host conference calls. Third, we follow Guay et al. (2016), Segal and Segal (2016), Bourveau et al. (2018), Cadman et al. (2018), and Bao, Kim, Mian and Su (2019) and use the number of 8K filings to measure voluntary disclosure. The Securities and Exchange Commission (SEC) mandates firms to file 8K forms to notify of material firm events, i.e. events that could influence investors' investment decisions. We select only 8Ks that managers categorize as voluntary disclosure to avoid contaminating the sample by mandatory filings. We confirm that higher blockholdings reduce the number of voluntary 8K filings. Thus, our conclusions are not affected by the choice of voluntary disclosure measure.

To address the endogeneity concern and establish a causal relation between blockholdings and voluntary disclosure, we perform five tests. First, to control for unobserved firm effects that could correlate with the decision to provide management guidance and blockholdings, we estimate the regressions using firm-fixed effects. These regressions support our main conclusions. Second, we use a quasi-natural experiment to perform a difference-in-differences test. The psychology literature documents that busyness harms performance (Lopez and Peters 2012, Tanyi and Smith 2015, Fich and Shivdasani 2006, Gunny and Hermis 2019). We exploit this feature and argue that

managers are particularly busy close to the fiscal year-end as their attention is devoted to preparing and assessing the accuracy of the annual statements. 10K filings and annual reports need to be audited and are more comprehensive in contrast to 10Qs, which are unaudited and shorter. Limited managerial time and resources close to fiscal year-end means managers are less able to respond to blockholders pressure for private communication, thus the blockholder effect on voluntary disclosure should be weaker around fiscal year-end. We use this exogenous variation in managerial ability to respond to blockholders to contrast the disclosure effect of blockholders in the fourth compared to the other three fiscal quarters. Consistent with our prediction, the blockholder effect is weaker in the fourth quarter. Third, we use cross-sectional variation in *managerial* incentives to respond to blockholder pressure as identification. Specifically, we argue that analysts use public guidance to improve the quality and informativeness of their reports and are more likely to follow companies that provide guidance (Givoly and Lakonishok 1979, Lys and Sohn 1990, Stickel 1991, Feng and McVay 2010). Managers may be reluctant to cut guidance if this will negatively affect their relationship with analysts and risk losing coverage. Thus, the blockholder effect on voluntary disclosure should be weaker in the presence of analyst coverage, a result we confirm. Fourth, we expect blockholders' incentives to monitor and gain private information to reduce with portfolio diversification. This effect is driven by limited blockholder ability to monitor an increasing number of securities in a portfolio and a comparatively lower effect idiosyncratic shocks have on wealth (Faccio Marchica and Mura 2011). Consistently, we find a diminishing effect of blockholdings on voluntary disclosure as blockholders' portfolio diversification increases. Finally, our results could capture the reverse association between voluntary disclosure where blockholders choose to invest in infrequent voluntary disclosure firms. To address this concern, we run a Granger-type lead-lag approach test similar to Ajinkya et al. (2005) which rejects this prediction. Overall, our tests that address endogeneity and reverse causality support our main conclusion.

Our final tests examine the two channels through which blockholding can affect voluntary disclosure. First, we argue that blockholders substitute private for public information acquisition. Obtaining private information is less costly if blockholders hold board seats (Cohen, Frazzini, and Malloy 2008). Consistently, we find that the effect we document is stronger when blockholders hold board seats. To sharpen this analysis, we also count the number of board seats by blockholders and find that a larger presence on the board has an incrementally stronger negative effect on the propensity to provide management forecasts. This result reflects that the likelihood of private information acquisition increases with the number of potential interactions with managers (Hermalin and Weisbach 1998, Raheja 2005, Song and Thakor 2006).

To test the prediction that an increasing proportion of non-monitoring blockholders reduces managerial incentives to provide voluntary disclosure, the *non-monitoring blockholder* hypothesis, we exploit heterogeneity in blockholder composition to examine the effect among blockholders with higher monitoring costs. Almazan et al. (2005) argue that passive institutional investors have higher monitoring costs as their low fee structure limits their ability to attract skilled managers and devote resources to active monitoring. We use mutual fund classification into passive and active to identify funds with different monitoring incentives.⁴ Regression results confirm the negative effect of passive mutual funds on voluntary disclosure that is higher compared to active mutual funds. This result is consistent with the prediction that when block ownership by investors with low monitoring incentives increases, managers have less incentive to engage in costly voluntary public disclosure.

4. We use mutual fund classification because Bushee's (2001) classification of quasi-indexers includes not only pure index-tracking passive institutions, but also actively managed institutions whose portfolio holdings mimic a passive institution. These institutions may be quite active in governance and demand information in different ways from index-tracking institutions.

Our study offers an important contribution to the literature. We document a significant negative effect blockholdings have on voluntary disclosure, which contrasts the positive association between average institutional ownership and the likelihood of managerial forecasts documented in earlier research (Healy, Hutton and Palepu 1999, Bushee and Noe 2001, Bushee, Matsumoto and Miller 2003, Ajinkya, Bhojraj and Sengupta 2005, Karamanou and Vafeas 2005, Bonne and White 2015, Basu, Pierce and Stephan 2018 and Abramova, Core and Sutherland 2017). As the proportion of stocks with at least one blockholder reached 82% in 2015, our results identify an important institutional factor shaping today's corporate disclosure. Our results complement and expand the evidence in Ali, Chen, and Radhakrishnan (2007) who find that 177 family firms that are S&P500 constituents between 1998-2002, defined as firms where members of the founding family hold positions in top management, are on the board, or are blockholders, have a similar unconditional propensity to issue management forecasts as non-family firms. We also expand the evidence in Chen, Chen, and Cheng (2008), who find that controlling for average institutional ownership, concentrated institutional ownership does not affect the likelihood of management forecasts in family firms that are part of S&P1500 between 1996-2000. Our results also complement research that shows that the likelihood of managerial forecasts increases with demand for information by other external parties, such as analyst and independent boards (Ajinkya et al., 2005, Karamanou and Vafeas 2005, Chapman and Green 2018).⁵

5. Ajinkya et al. (2005) study the association between properties of management forecasts and outside directors and average institutional ownership between 1997-2002. As part of their sensitivity tests, they include an interaction between ownership concentration and regulation Fair Disclosure (reg FD) indicator to test the effect regulation had on voluntary disclosure by various institutional investor groups. Because they do not report an average effect ownership concentration has on the propensity to issue management forecasts, it is impossible to make directional conclusions based on their analysis. Further, they do not include an interaction between average institutional ownership and reg FD indicator and the effect of ownership concentration in post-reg FD setting can be driven by an association between non-blockholders and guidance. Thus, their results do not answer if ownership concentration associates on average with lower voluntary disclosure. This further motivates our focused analysis on the association between blockholdings and voluntary disclosure.

Second, the study adds to the growing literature on the effects blockholders have in capital markets. Brav, Jiang, Partnoy and Thomas (2008) find that hedge fund blockholdings lead to higher returns and operating performance. Faccio, Marchica and Mura (2011) report that firms with diversified large shareholders undertake riskier investments. Bertrand and Mullainathan (2000) document that firms with more blockholders can better distinguish between a CEO's effort and luck. Fich, Harford and Tran (2014) document that acquisitions where targets have significant blockholding have higher completion rates, higher premiums, and lower acquirer returns. Bhojraj and Sengupta (2003) find that bond ratings have a negative association with average institutional ownership, but a positive association with ownership concentration.

Importantly, we identify two channels through which blockholders affect voluntary disclosure—private for public substitution and inactive monitoring by passive blockholders. We find support for both channels affecting voluntary disclosure, which advances the knowledge of how a firm's information environment develops. Our paper complements Bonne and White (2015), who find that passive institutional ownership promotes more voluntary disclosure. We show that when passive institutional ownership is concentrated, as captured by passive mutual funds holdings, the effect on voluntary disclosure is negative.

2. Data and research design

The starting point of our sample are institutional 13-F holdings reported between 2001 and 2015, which we merge with quarterly management forecast data from I/B/E/S Guidance dataset. We use Compustat, CRSP and BoardEx to obtain accounting, market, and board data to create control variables. The resulting sample consists of 97,970 firm-quarters.

2.1 Research methods

We estimate the effect of cumulative institutional blockholder ownership on firm voluntary disclosure using the following logit model

$$P(MF_occur_{it+1}) = \alpha_0 + \alpha_1 Block_{it} + \alpha_2 IO_{it} + BControls_{it} + \omega_i + \tau_t + \varepsilon_{it} \quad (1)$$

where MF_occur_{it+1} is an indicator variable equal to 1 if a firm issued any management forecast during a calendar quarter $t+1$, and 0 otherwise. We follow Brickley, Lease and Smith (1988), Agrawal and Mandelker (1990), and Baysinger, Kosnik and Turk (1991) and define blockholdings, $Block_{it}$ as overall holdings by blockholders. We define institutional blockholders as institutional investors who hold at least 5% of the firm's outstanding common shares⁶. α_1 captures whether firms with more institutional blockholder ownership make more voluntary disclosures, compared to firms with similar non-blockholder institutional ownership. IO_{it} is the percentage of institutional ownership, and captures the effect of non-blockholding institutional investors. $Controls_{it}$ is a vector of control variables. ω_i are industry dummies based on 2-digit SIC code classification, and τ_t are 56 quarter-year time dummies. ε_{it} represents the error term. Standard errors are clustered at the firm level.

MF_occur_{it+1} does not distinguish between firms that provide single vs. multiple forecasts. A single forecast may reflect managerial opportunism rather than a deliberate strategy to disclose private information (Ajinkya et al. 2005). We expect that blockholdings will affect both the propensity to report forecasts and the number of forecasted items. To capture the latter effect, we define comprehensiveness of guidance, MF_items_{it} , which measures the number of items disclosed in management forecasts during a calendar quarter. Although earnings per share (EPS)

⁶ We follow previous literature and use 5% as the cut-off. Previous literature typically defines a blockholder as a 5% shareholder, because this level triggers disclosure requirements in the united states (Edmans 2014). The result is also robust using other cut-off such as 1%.

is the most common item provided in management forecasts, managers frequently disclosed other forecasts such as revenue and cash flows (Han and Wild 1991, Hirst et al. 2007, Chen et al. 2009, Lansford et al. 2013). Since MF_items_{it} is a count variable, we use Poisson regression to estimate model (1) when MF_items_{it} is the dependent variable.

We follow prior literature on voluntary disclosure to include control variables that might influence firms' management forecast decisions (Ajinkya et al. 2005, Bushee and Noe 2001, Bonne and White 2015, Karamanou and Vafeas 2005, Chapman and Green 2018). These include firms' market value of equity, leverage ratio, market to book ratio, return on assets, stock return during the quarter, stock return volatility, special items, changes in earnings per share, the number of analysts following a firm, board size, board independence, CEO turnover, and business complexity. We winsorize all continuous variables at 0.5% and 99.5% percentiles. The definitions of all variables can be found in Appendix A.

3. Blockholdings and voluntary disclosure: empirical analysis

3.1 Regression results

Our first test looks at the prevalence of block ownership to establish the importance of the effect we examine. If block ownership is sparse, it is hard to argue it will have an economically meaningful effect on voluntary disclosure. Figure 1 reports that the average proportion of shares held by blockholders almost doubles over the sample period, increasing from 10% in 2001 to 19% in 2015. Thus, a substantial proportion of outstanding equity is held by blockholders. For comparison, we present the percentage of institutional holdings, which increase from 33% in 2001 to 58% in 2015, a 74% increase. This evidence suggests a faster pace with which blockholders' ownership increases compared to growth in average institutional ownership.

[Figure 1]

To sharpen the analysis, Figure 2 presents the proportion of firms with at least one blockholder. We run this test because blockholding may concentrate in a few stocks limiting the generalizability of the effect we study. The proportion of firms with at least one blockholder increases from 64% in 2001 to 82% in 2015. Thus, in recent years, most firms have blockholder ownership. Jointly, Figures 1 and 2 suggest blockholding is a staple element of the ownership structure, which justified the need to examine its effects on corporate disclosure.

[Figure 2]

Table 1 Panel A presents descriptive statistics for variables from equation (1). On average 51.0% of firms provide quarterly forecasts with an average of 2.413 items disclosed by managers. Institutional investors hold on average 58.6% shares in sample firms with 17.6% of shares held by blockholders. Our numbers are comparable with Bonne and White (2015), who report that 40.4% of firms issued guidance in their sample over the period 1996-2006 and an average institution ownership of 43.5% for Russell 1000 stocks.

[Table 1]

Table 1 panel B shows the descriptive statistics by tertiles of block ownership. Most of the control variables differ significantly in the high and low groups. Firms with high block ownership have a higher level of institutional ownership, firm size, leverage, return on asset, analyst coverage, board size, board independence, CEO turnover, and segment income diversification compared to firms with low block ownership. They also have a lower market to book ratio, special items, stock return, and volatility.

3.2 Institutional blockholders and management forecasts

Panel A of Table 2 shows the results for equation (1). Model (1) excludes blockholdings to estimate

the average effect institutional holdings have on the occurrence of management forecasts. We confirm earlier findings that higher institutional ownership is associated with a higher likelihood of management forecasts. Model (2) reports full specification of equation (1) and we find a negative and economically significant effect of blockholdings on the propensity to report guidance: a one standard deviation increase in blockholdings reduces the likelihood of guidance by 13%. Including concentrated ownership with average institutional holdings means the latter captures the effect of institutional non-blockholdings. Model (2) confirms that the positive relation between average institutional holdings and the likelihood of guidance in Model (1) is driven by institutional non-blockholdings. The signs of the coefficients on the control variable are in line with earlier studies (Karamanou and Vafeas 2005, Bonne and White 2015, Basu et al. 2018).

[Table 2]

The evidence on the negative association between blockholdings and the likelihood of guidance could be driven by unobserved firm characteristics that correlate both with guidance likelihood and concentrated ownership. As a first test to address the endogeneity issue, we re-estimate equation (1) after including firm-fixed effects, which controls for time-invariant firm characteristics. Model (3) in Table 2 shows regression results and we continue to find a negative effect of blockholdings on the probability of management forecasts, but the result is not significant.

Our conclusions could be affected by infrequent opportunistic guidance where managers provide only a single forecast that is easier to beat. To illustrate, Aboody and Kasznik (2000), Cheng and Lo (2006), and Nagar, Nanda, and Wysocki (2003) report increased pessimistic guidance before option grant dates. To address this concern, we examine whether blockholdings affect the comprehensiveness of guidance measured by the number of forecasted items, MF_items. Model (4) reports Poisson regression results and we find a negative association between blockholdings and the comprehensives of guidance.

The 5% cut-off to define blockholdings follows past literature, but is arbitrary, which is why we also measure concentrated holdings using the Herfindahl index of institutional ownership calculated as $HHI_{it} = \sum_{i=1}^N \left(\frac{\text{shares held by institution } i}{\text{total shares outstanding}} \right)^2 * 100$. Model (1) in Panel B of Table 2 reports results for equation (1) where we use *HHI* instead of *Block*. We continue to find a negative association between ownership concentration and the likelihood of management forecasts and the effect remains economically significant: a one standard deviation increase in *HHI* lowers the likelihood of guidance by 2.1%. Model (2) repeats the analysis controlling for firm-fixed effects and our conclusions are unchanged. Overall, Table 2 evidence suggests that when the institutional ownership shifts from dispersed to concentrated, firms decrease their propensity to communicate through management forecast.

3.3 Alternative measures of voluntary disclosure

Management forecast is just one type of firms' voluntary disclosure. To ensure our conclusion is not driven by this specific measure of corporate disclosure, Table 3 repeats the analysis where we measure the likelihood of conference calls and 8K filings. Conference call data comes from Thomson Reuters Streetevents and starts in 2002. We code as 1 if a firm holds at least one conference call in quarter t+1, and 0 otherwise. The 8-K filing data comes from the SEC and starts in 2001. We count the number of voluntary 8-K filings for each firm-quarter. We follow prior literature and consider a filing voluntary if it is reported under the item labelled Other Events and Regulation FD (He and Plumlee 2019). Figure 3 reports that the proportion of firms with conference calls is 13% in 2002 and 67% in 2015. For comparison, Frankel, Johnson and Skinner (1999) report that around 11% of firms held conference calls between February and November 1995, and Tasker (1998) finds that around 35% of firms hosted quarterly conference calls between

March 1995 and February 1996. Chen et al. (2008) report that around 79% of S&P1500 firms had conference calls between 1996-2000. Figure 3 shows that the number of 8K filings is 1.83 in 2001 and 2.29 in 2015. He and Plummler (2019) find that the average number of voluntary filings is 2.78 for a sample of Compustat firms between 2005 and 2016.

[Figure 3]

Model (1) in Table 3 reports estimates for equation (1) that models the likelihood a firm will host a conference call. Blockholdings reduce the likelihood of conference calls in contrast to the positive effect of non-blockholding institutional ownership. Thus, the results using conference calls confirm our main conclusions. Models (2) repeat the analysis for voluntary 8K filings and our conclusions for Poisson regressions are similar to our main results. Overall, Table 3 results show our conclusions are not driven by a specific measure of voluntary disclosure.

[Table 3]

3.4 Endogeneity concerns

This section presents tests that address the endogeneity concern that our results capture unobserved characteristics that correlate with both blockholdings and frequency of management forecasts. First, we use cross-sectional variation in managerial incentives to respond to blockholder pressure as identification. Specifically, we argue that analysts use public guidance to improve the quality and informativeness of their reports and are more likely to follow companies that provide forecasts (Givoly and Lakonishok 1979, Lys and Sohn 1990, Stickel 1991, Feng and McVay 2010). Managers may be reluctant to cut guidance if this will negatively affect their relationship with analysts and risk losing coverage. Thus, the blockholder effect on voluntary disclosure should be weaker in the presence of analyst coverage. Model (1) in Table 4 confirms that higher analyst coverage moderates the negative effect blockholding has on the likelihood of issuing management

forecasts.

Second, we build on the psychology literature that documents a negative association between busyness and performance (Lopez and Peters 2012, Tanyi and Smith 2015, Fich and Shivdasani 2006, Gunny and Hermis 2019). We exploit this feature and argue that managers are particularly busy close to the fiscal year-end as their attention is devoted to preparing and assessing the accuracy of the annual statements. In contrast to 10Qs, which are unaudited and shorter, 10K filings and annual reports need to be audited and are more comprehensive. Limited managerial time and resources close to fiscal year-end means managers are less able to respond to blockholders pressure for private communication, thus the blockholder effect on voluntary disclosure should be weaker around fiscal year-end. We use this exogenous variation in managerial ability to respond to blockholders to contrast the disclosure effect of blockholders in the fourth compared to the other three fiscal quarters. The treatment group in this analysis are stocks with at least one blockholdings and the control sample includes non-blockholding stocks. Model (2) in Table 4 reports difference-in-differences regression results and we confirm the incrementally less negative effect of concentrated ownership on the propensity to issue guidance in the fourth quarter.

[Table 4]

Third, we exploit heterogeneity within blockholders to identify instances where the blockholding effect on managers is likely to be stronger. Specifically, we argue that blockholding demand for private communication reduces with the level of blockholder portfolio diversification. This effect is driven by limited blockholder ability to monitor an increasing number of securities in the portfolio and a comparatively lower effect idiosyncratic shocks on wealth (Faccio Marchica and Mura 2011). We use the number of firms held by each blockholders to measure their diversification and calculate the average institutional blockholders' portfolio diversification in each firm weighted by their percentage of ownership. Specifically, *Port_Num* is the average number of

firms in each type of blockholders' portfolio scaled by 100. Consistently, Model (3) confirms a diminishing effect of blockholdings on voluntary disclosure as blockholders' portfolio diversification increases.

Fourth, our results could capture the reverse association between voluntary disclosure where blockholders choose to invest in infrequent voluntary disclosure firms. To address this concern, we run a Granger-type lead-lag test similar to Ajinkya et al. (2005) where we include a lagged indicator for managerial guidance as an independent variable. Regression results in Model (4) reject this prediction.

Finally, we use an instrumental variable approach to address the endogeneity problem. We make use of the reconstitution of the Russell 3000 index every year, and use the inclusion into Russell 2000 as an instrument for blockholding. Because being added into an index can usually increase the shareholders holding the firm, and potentially decrease the ownership concentration, this introduces some exogenous variation in institutional blockholding.

We use data from 2001 to 2006 because Russell changed their reconstitution policy afterwards. Before 2007, the Russell included the 1000 largest US stocks in terms of market capitalization, and the Russell 2000 included the next largest 2,000 stocks not included in the Russell 1000. The rankings which determine whether a stock is included in the Russell 3000 index are based on the end of May market capitalization. We use a similar method to rank stocks and select the sample that rank between 2500 to 3500. This method ensures that the firms in our sample are similar in terms of market capitalization. To get rid of the potential effect of the change in average institutional investor changes, we select firms with institutional ownership higher than 50%.

We use a 2SLS method to test our main hypothesis. Equation (2) shows the specification of the first-stage regression. We regress the ownership of blockholders on the dummy variable

R2000, which indicates whether the firm is included in R2000. In the second stage specified as equation (3), we run the regression of the probability of management forecast on instrumented block ownership, and control for the level of institutional ownership and market capitalization.

$$Block_{it} = \alpha_0 + \alpha_1 R2000_{it} + \alpha_2 IO_{it} + \alpha_3 \ln(\text{marketcap})_{it} + \omega_i + \tau_t + \varepsilon_{it} \quad (2)$$

$$P(MF_{occur_{it+1}}) = \alpha_0 + \alpha_1 Block_{it} + \alpha_2 IO_{it} + \alpha_3 \ln(\text{marketcap})_{it} + \omega_i + \tau_t + \varepsilon_{it} \quad (3)$$

The results are shown in Table 5. In the first stage, being included in Russell 2000 decreased the ownership of institutional blockholders by about 1.5%, which is around 8.5% of the average shares held by blockholders. In the second stage, we find a consistent negative effect of instrumented block ownership on the probability of management forecast⁷.

[Table 5]

Overall, our tests that address endogeneity and reverse causality support our main conclusion.

3.5 Channels through which blockholding affect voluntary disclosure

We propose two channels through which blockholdings affect voluntary disclosure. First, blockholders have easier access to managers which can facilitate private information acquisition. As blockholders substitute private for public information acquisition, managers have less incentive to provide costly public disclosure. Having a board seat creates opportunities for private communication between blockholders and managers and we examine if the effect we document is stronger in instances when blockholders hold board seats. We collect board director information from BoardEx and create an indicator variable *Board* if any of the blockholders hold board seats.

⁷To make sure that the effect takes place not through the change in total ownership, we run a regression of total institutional ownership on the variable r2000, and find that in the sample, being included in r2000 index doesn't affect the total institutional ownership significantly, so that we can exclude the potential influence of total institutional ownership.

We then interact this variable with blockholdings, *Block*Board*, to capture the joint effect of blockholdings and board seats. Model (1) in Table 5 reports regression results for equation (1) augmented with the board membership measure. We document that the blockholder effect on voluntary disclosure becomes more negative when they have board representation. To sharpen this analysis, we also count the number of board seats held by blockholders, *#Board seats*. A larger number of seats gives more opportunities for private information acquisition. Consistently, Model (2) documents a more negative effect when blockholders hold more board seats. Overall, Table 5 results support the private for public information substitution hypothesis.

[Table 6]

The second channel through which blockholdings can affect voluntary disclosure is through monitoring incentives. Building on Almazan et al. (2005) and Boone and White (2015), we argue that passive blockholders have low demand for public information because of their low monitoring need and a disproportionately high cost of public disclosure they bear compared to non-blockholders.⁸ Their large holdings compensate for lower stock liquidity due to lower public disclosure. Consistently, Maug's (1998) blockholding formation model shows that blockholders build higher stakes to compensate for lower stock liquidity. Non-monitoring non-blockholders prefer higher disclosure to promote higher stock liquidity as transaction costs have a larger wealth impact on their trades (Heflin and Shaw 2000, Boone and White 2015).

Previous research uses Bushee's (2001) classification into transient, quasi-indexers, and dedicated investors. A disadvantage of Bushee's (2001) classification is that institutions categorized as quasi-indexers include not only pure index-tracking passive institutions but also actively managed institutions whose portfolio holdings mimic a passive institution. These

8. Passive blockholders have also limited demand for private information due to their limited ability to trade on private information (Parrino, Sias, and Starks, 2003).

institutions may be quite active in governance and demand for private information compared to index-tracking institutions. To avoid this misclassification concern, we use a more precise mutual fund-level measure of passive ownership to test our prediction. Specifically, we obtain fund names by merging Thomson Reuters data with the CRSP mutual fund data. We then categorize a fund as passively managed if the fund's name includes a string that identifies it as an index fund or if the CRSP Mutual Fund Database classifies the fund as an index fund. To generate variables for mutual fund ownership disaggregated into these two categories, we compute the percentage of each stock's market capitalization that is owned by passive, and other mutual funds at the end of each quarter. We then calculate the passive ownership concentration at the mutual fund level. Specifically, we define *Passive MFHHI* as the concentration of passive mutual fund holdings calculated using the Herfindahl index and multiplied by 100. We classify all other mutual funds as other mutual funds. Specifically, *Other MFHHI* is the concentration of other mutual fund holdings calculated using the Herfindahl index and multiplied by 100. We multiply the measures by 100 as they tend to have relatively small magnitudes, which increases the magnitudes of coefficients. Similar to our main regressions that control for total institutional ownership, we include *Passive MF*, which is the percentage of shares held by passive mutual funds, and *Other MF*, which is the percentage of shares held by other types of mutual funds.

[Table 7]

Table 7 reports results using the mutual fund classification. We confirm that both passive and other categories of concentrated passive mutual funds holdings have a negative effect on voluntary disclosure, which mirrors our main conclusions. In contrast, average mutual funds ownership has a positive effect on voluntary disclosure. To test if passive ownership has a more negative effect on voluntary disclosure, we compare magnitudes of coefficients on *Passive MFHHI* compared to *Other MFHHI*. We confirm that passive mutual fund ownership has an incrementally

more negative effect on voluntary disclosure, a result consistent with managers reducing costly public disclosure when ownership by concentrated investors with low monitoring incentives is high.

4. Conclusions

We study how institutional blockholders affect corporate voluntary disclosure. We document that blockholders reduce the likelihood of management forecasts and comprehensives of guidance. We find similar results using conference calls and voluntary 8K filings. We identify two channels through which blockholders affect a firm's voluntary disclosure. First, blockholders have easier access to managers and substitute private for public information acquisition. Second, a higher proportion of non-monitoring blockholders with low demand for voluntary disclosure, such as passive blockholders, reduces a firm's incentive to provide voluntary disclosure. The study identifies an important effect concentrated ownership has on firm corporate disclosure.

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Appendix A. Variable Definitions

This appendix provides definitions for variables used throughout the paper.

Variables	Description
<i>Disclosure Variables</i>	
MF_occur	An indicator variable that equals 1 if the firm issued at least one management forecasts during quarter t+1, and 0 otherwise. We consider as non-guidance firms absent from the I/B/E/S guidance database.
MF_items	The number of items disclosed in management forecasts in quarter t+1.
<i>Institutional Blockholding and Concentration</i>	
Block	Overall holdings by blockholders in a firm. We define institutional blockholders as institutional investors who hold at least 5% of the firm's outstanding common shares.
HHI	The ownership concentration of institutional investors measured by the Herfindahl index times 100.
<i>Control Variables</i>	
IO	The total percentage of shares owned by institutional investors
Size	Natural logarithmic of the firm market value of equity at the end of quarter t.
MTB	A ratio of the market value of equity plus book value of long-term liabilities scaled by the book value of total assets.
Lev	Leverage defined as the sum of long-term debt and short-term debt scaled by total assets.
ROA	Profitability measured as income before extraordinary items scaled by total assets.
Ret	Stock return momentum calculated as the buy-and-hold stock return during quarter t.
σ_{Ret}	Standard deviation of stock return.
Special	A ratio of special items divided by total assets
Analyst	Natural logarithmic of the number of analysts issuing earnings forecast for next year available at the end of quarter t.
ΔEPS	Change in earning per share in quarter t scaled by the stock price at the end of quarter t-1.
Boardsize	Natural logarithmic of the number of board directors at the end of quarter t.
Boardindep	The number of independent directors divided by the total number of directors.
CEOTurnover	A dummy variable that equals 1 if there is CEO turnover in quarter t.
Complexity	The diversification of business segments by total revenue.
ω_t	Industry effect based on 2-digit SIC code classification.
τ_t	Quarter-year time effects.

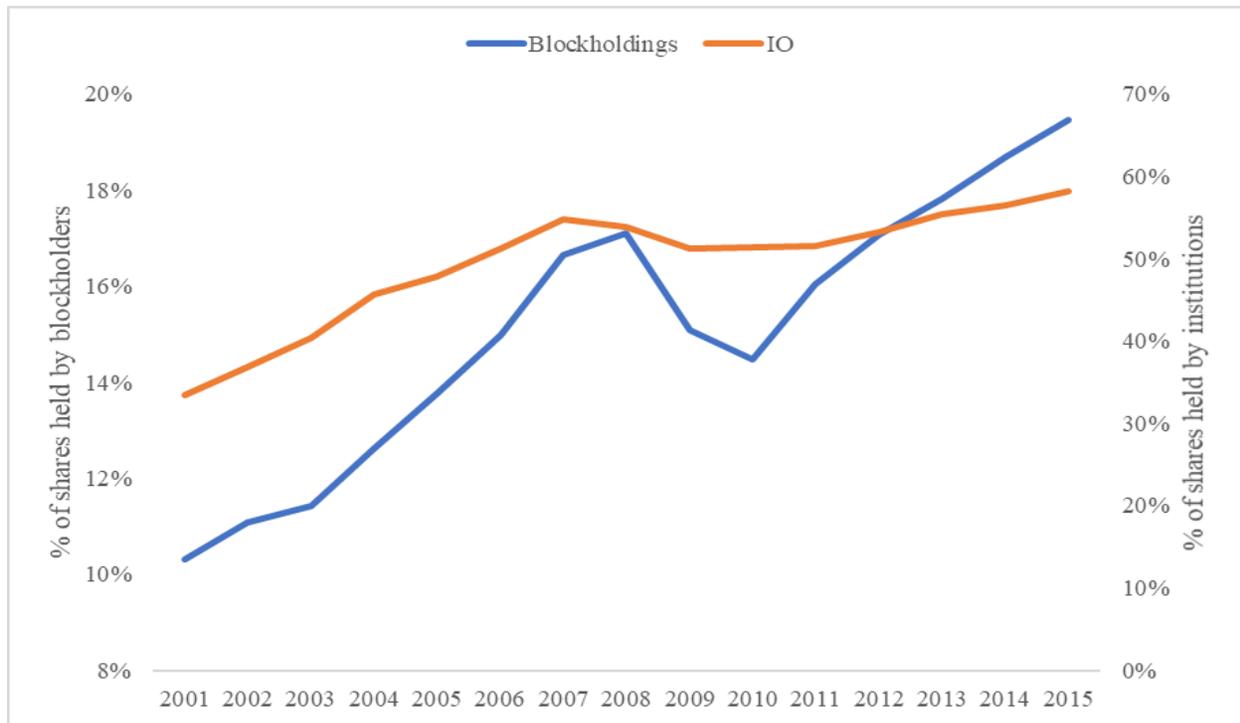


Figure 1: Average annual ownership by blockholders and institutional investors. Blockholders are defined as investors holding a minimum of 5% of the firm’s stock.

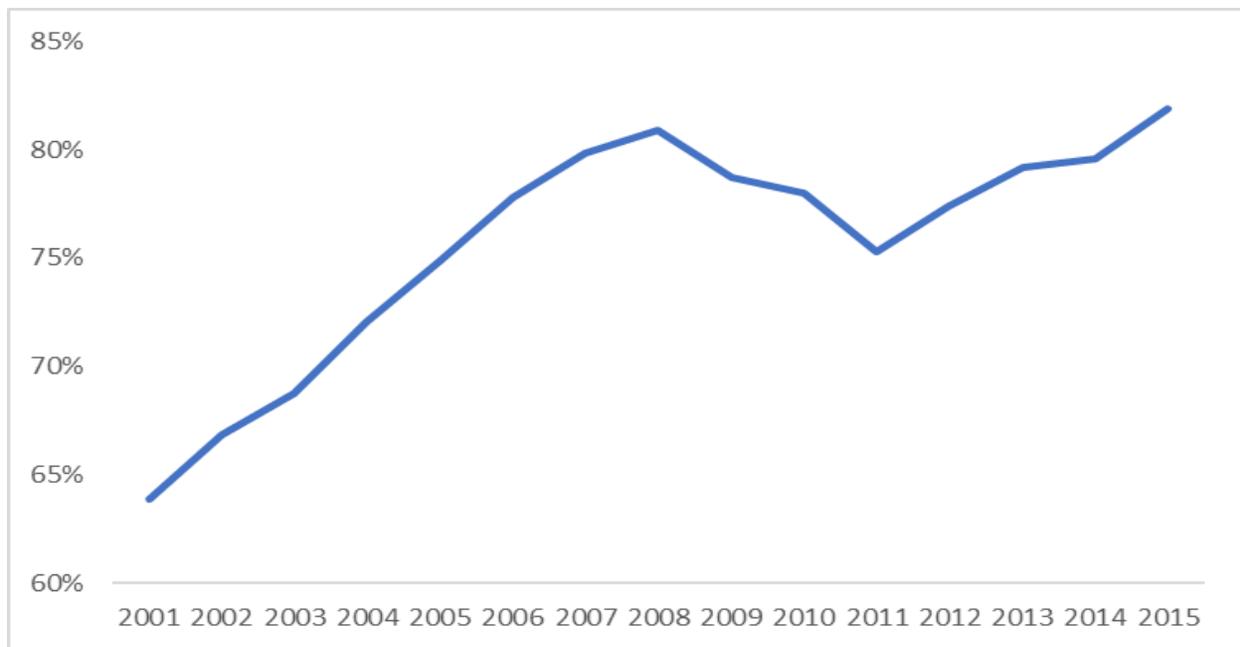


Figure 2: The annual proportion of Compustat firms with at least one blockholding.

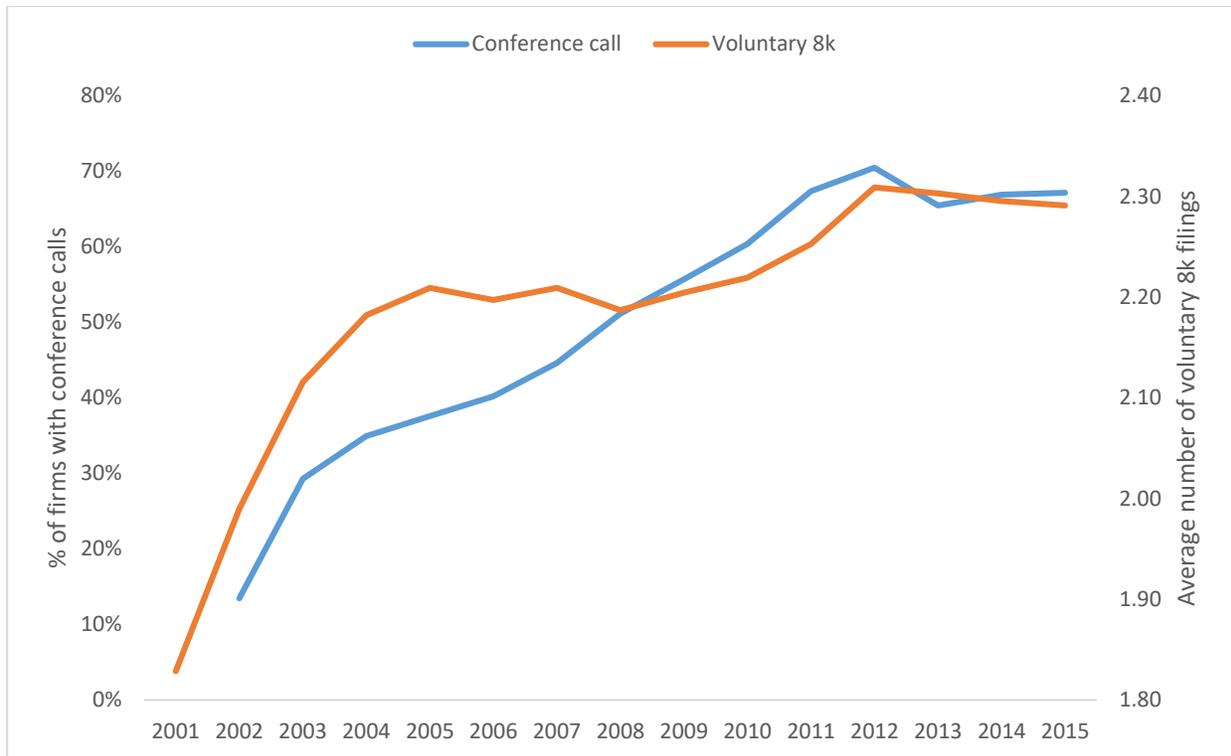


Figure 3: The annual proportion of firms hosting quarterly conference calls and providing voluntary 8K filings. Conference call data starts in 2002.

Table 1: Summary Statistics

This table provides summary statistics for the variables used in our main tests. The sample consists of 97,970 firm-quarter observations from 2001-2015. Panel A presents the summary statistics for the full sample. Panel B presents the summary statistics by tertiles of block ownership. Variables are defined in Appendix A.

Variable	Mean	Std. Dev.	Q1	Median	Q3
<i>Dependent variables</i>					
MF_occur	0.510	0.500	0.000	1.000	1.000
MF_items	2.413	1.713	1.000	2.000	3.000
<i>Ownership variables</i>					
IO	0.586	0.294	0.346	0.641	0.827
NBlock	2.352	1.733	1.000	2.000	4.000
Block	0.176	0.130	0.072	162.000	0.262
HHI	2.125	1.248	1.170	2.110	3.000
<i>Controls</i>					
Size	6.329	1.981	4.924	6.298	7.653
MTB	1.956	1.476	1.117	1.482	2.212
Lev	0.200	0.209	0.009	0.158	0.313
ROA	-0.003	0.065	-0.003	0.009	0.020
Special	-0.004	0.022	-0.001	0.000	0.000
ΔEPS	0.002	0.091	-0.006	0.000	0.007
Ret	0.039	0.264	-0.101	0.021	0.147
σRet	0.109	0.095	0.049	0.084	0.139
Analyst	1.586	1.010	0.693	1.609	2.398
Boardsize	1.907	0.386	1.609	1.946	2.197
Boardindep	0.809	0.154	0.714	0.833	0.909
CEOturnover	0.036	0.187	0.000	0.000	0.000
Complexity	0.742	0.285	0.500	0.878	1.000

Table 1, continued

Variable	Block			Difference (High vs. Low)
	Low	Medium	High	
	Mean	Mean	Mean	
Nblock	0.397	1.841	4.094	3.697***
IO	0.321	0.572	0.776	0.455***
HHI	0.675	1.884	3.299	2.624***
Size	5.825	6.497	6.522	0.697***
MTB	2.159	1.953	1.822	-0.337***
Lev	0.195	0.198	0.206	0.011***
ROA	-0.015	0.000	0.001	0.016***
Special	-0.004	-0.003	-0.004	0.000
Δ EPS	0.002	0.002	0.002	0.000**
Ret	0.050	0.046	0.026	-0.024***
σ Ret	0.121	0.107	0.102	-0.019***
Analysts	1.243	1.639	1.771	0.528***
Boardsize	1.842	1.919	1.939	0.097***
Boardindep	0.800	0.809	0.816	0.015***
CEOturnover	0.034	0.036	0.038	0.004***
Complexity	0.791	0.726	0.743	-0.048***
N	26,008	33,076	38,886	

Table 2: Management Forecast and Institutional Blockholders

This table presents regression results for the effect of institutional blockholding on management guidance. Block is the total ownership of institutional blockholders where blockholders are defined as holding at least 5% of ordinary shares outstanding. The dependent variable in Models 1-3 is an indicator for whether a firm issued guidance in the next quarter and in Model 4 it is the number of forecasted items.

	Model 1			Model 2			Model 3		Model 4	
	Estimate	ME	p-value	Estimate	ME	p-value	Estimate	p-value	Estimate	p-value
Panel A: Blockholdings and management guidance										
Intercept	-4.332		0.000	-4.229		0.000			-0.097	0.410
Block				-0.773	-13%	0.001	-0.148	0.331	-0.268	0.000
IO	1.466	25%	0.000	1.797	30%	0.000	0.387	0.001	0.286	0.000
Size	0.070	1%	0.018	0.051	1%	0.091	0.609	0.000	0.026	0.011
MTB	-0.066	-1%	0.003	-0.068	-1%	0.002	-0.114	0.000	0.003	0.630
Lev	0.348	6%	0.016	0.357	6%	0.013	0.340	0.001	0.090	0.038
ROA	4.05	68%	0.000	3.901	65%	0.000	2.229	0.000	0.811	0.000
Special	-5.239	-88%	0.000	-5.139	-86%	0.000	-1.167	0.073	-1.076	0.000
ΔEPS	-0.235	-4%	0.011	-0.216	-4%	0.019	-0.320	0.010	-0.105	0.019
Ret	0.146	2%	0.000	0.145	2%	0.000	-0.153	0.001	0.015	0.381
σRet	0.265	4%	0.059	0.258	4%	0.066	0.043	0.752	-0.061	0.273
Analyst	0.768	13%	0.000	0.753	13%	0.000	0.388	0.000	0.091	0.000
Boardsize	0.417	7%	0.000	0.423	7%	0.000	0.069	0.301	-0.006	0.825
Boardindep	0.411	7%	0.012	0.403	7%	0.014	-0.012	0.923	0.101	0.058
CEOturnover	-0.142	-2%	0.003	-0.142	-2%	0.003	-0.172	0.002	0.002	0.905
Complexity	-0.082	-1%	0.426	0.073	-1%	0.475	0.282	0.001	-0.082	0.011
<i>Year*quarter effects</i>	Yes			Yes			Yes		Yes	
<i>Industry effect</i>	Yes			Yes			No		Yes	
<i>Firm effects</i>	No			No			Yes		No	
N	97,970			97,970			97,970		49,976	
Pseudo R ²	0.2699			0.2705					0.0347	

Table 2, continued

	Estimate	Model 1		Model 2	
		ME	p-value	Estimate	p-value
Panel B: Herfindahl index and management guidance					
Intercept	-4.155		0.000		
HHI	-0.127	-2.1%	0.000	-0.042	0.076
IO	2.060	34.4%	0.000	0.517	0.000
Size	0.042	0.7%	0.159	0.601	0.000
MTB	-0.068	-1.1%	0.002	-0.115	0.000
Lev	0.361	6.0%	0.012	0.362	0.001
ROA	3.869	64.6%	0.000	2.217	0.000
Special	-5.100	-85.2%	0.000	-1.156	0.075
Δ EPS	-0.214	-3.6%	0.020	-0.319	0.010
Ret	0.146	2.4%	0.000	-0.151	0.002
σ Ret	0.256	4.3%	0.067	0.041	0.764
Analyst	0.750	12.5%	0.000	0.387	0.000
Boardsize	0.420	7.0%	0.000	0.07	0.293
Boardindep	0.400	6.6%	0.015	-0.012	0.921
CEOturnover	-0.142	-2.4%	0.003	-0.171	0.002
Complexity	-0.070	-1.2%	0.498	0.282	0.001
<i>Year*quarter effects</i>	Yes			Yes	
<i>Industry effect</i>	Yes			No	
<i>Firm effects</i>	No			Yes	
N	97,970			97,970	
Pseudo R ²	0.2706				

Table 3: Alternative measure of voluntary disclosure

This table presents regression results using different measures for voluntary disclosure. Column Conference calls reports results from a logit model predicting the likelihood of conference calls. Column Voluntary 8K filings reports the results of a Poisson regression measuring voluntary disclosure by the number of voluntary 8-k filings in a quarter.

	Conference calls		Voluntary 8K filings	
	Estimate	p-value	Estimate	p-value
Intercept	-1.299	0.217	-1.293	0.000
Block	-0.199	0.035	-0.084	0.013
IO	0.944	0.000	0.097	0.000
Controls	Yes		Yes	
<i>Year and quarter effects</i>	Yes		Yes	
<i>Industry effects</i>	Yes		Yes	
N	97,970		97,970	
Pseudo R ²	0.2464		0.0744	

Table 4: Endogeneity concerns

This table presents regression results using different measures for voluntary disclosure. *Port_Num* is the average number of firms in each type of blockholders' portfolio scaled by 100. Model 1 shows the moderation effect of analyst. Model 2 shows the moderation effect of Q4. Model 3 shows the moderation effect of portfolio diversification. Model 4 shows the result of the Granger-type lead-lag regression.

	Model 1		Model 2		Model 3		Model 4	
	Estimate	p-value	Estimate	p-value	Estimate	p-value	Estimate	p-value
Intercept	-4.932	0.000	-4.219	0.000	-4.230	0.000	-4.063	0.000
Block	-1.884	0.000	-0.877	0.000	-0.808	0.000	-0.491	0.002
Block*Analyst	0.483	0.064						
Block*Q4			0.406	0.001				
Q4			1.026	0.000				
Port_Num*Block					0.0001	0.001		
Port_Num					0.000	0.914		
MF_occur _t							3.067	0.000
IO*Analyst	-0.971	0.000						
IO	3.336	0.000	1.798	0.000	1.711	0.000	1.129	0.000
Controls	Yes		Yes		Yes		Yes	
<i>Year and quarter effect</i>	Yes		Yes		Yes		Yes	
<i>Industry effect</i>	Yes		Yes		Yes		Yes	
N	97,970		97,970		97,970		97,970	
Pseudo R ²	0.2744		0.2705		0.2710		0.4801	

	Model 1		Model 2		Model 3		Model 4	
	Estimate	P-value	Estimate	P-value	Estimate	p-value	Estimate	P-value
Intercept	-4.697	0.000	-4.317	0.000	-4.386	0.000	-3.975	0.000
Block	-2.626	0.000	-1.195	0.000	-1.091	0.000	-0.691	0.000
Block*Analyst	0.199	0.000						
Block*Q4			0.488	0.000				
Q4			0.883	0.000				
Port_Num*Block					0.000	0.034		
Port_Num					0.000	0.506		
MF_occur _t							3.171	0.000
IO*Analyst	-0.248	0.000						
IO	3.590	0.000	2.212	0.000	2.162	0.000	1.375	0.000
Controls	Yes		Yes		Yes		Yes	
<i>Year and quarter effect</i>	Yes		Yes		Yes		Yes	
<i>Industry effect</i>	Yes		Yes		Yes		Yes	
N	101,033		101,033		101,033		101,033	
R ²	0.2656		0.2575		0.2577		0.4842	

Table 5: Instrument variable

This table presents regression results using different measures for voluntary disclosure. *Port_Num* is the average number of firms in each type of blockholders' portfolio scaled by 100. Model 1 shows the moderation effect of analyst. Model 2 shows the moderation effect of Q4. Model 3 shows the moderation effect of portfolio diversification. Model 4 shows the result of the Granger-type lead-lag regression.

	2SLS Estimate	p-value
Intercept	4.539	0.139
Block	-4.994	0.057
IO	2.810	0.015
ln(mktcap)	-0.392	0.128
Controls	Yes	
<i>Year effect</i>	Yes	
Observations	1,966	
	First Stage	
R2000	-0.015	0.010
Adj R-squared	0.283	

Table 6: Institutional Blockholder Board Representative and Management Forecast

This table presents regression results for the effect of board representation on disclosure specified. Model 1 shows the effect of board representation and model 2 shows the effect of the number of seats an institution has on board.

	Model 1		Model 2	
	Estimate	p-value	Estimate	p-value
Intercept	-4.205	0.000	-4.234	0.000
Block*Board	-0.761	0.033		
Block*#Board seats			-0.717	0.037
Block	-0.763	0.001	-0.761	0.001
Board	-0.187	0.254		
#Board seats			-0.016	0.613
IO	1.792	0.000	1.790	0.000
Controls	Yes		Yes	
<i>Year and quarter effect</i>	Yes		Yes	
<i>Industry effect</i>	Yes		Yes	
N	97,970		97,970	
R ²	0.2707		0.2706	

Table 7: Passive Institutional Blockholders and Voluntary Disclosure

This table presents regression results for the effect of passive ownership concentration on disclosure specified. *Passive MFHHI* is the concentration of passive mutual fund holdings calculated using the Herfindahl index and multiplied by 100. *Other MFHHI* is the concentration of other mutual fund holdings calculated using the Herfindahl index and multiplied by 100. *Passive MF* is the percentage of shares held by passive mutual funds and *Other MF* is the percentage of shares held by other types of mutual funds.

	Estimate	p-value
Intercept	-3.464	0.002
Passive MFHHI	-4.585	0.005
Other MFHHI	-0.916	0.008
Passive MF	16.793	0
Other MF	3.881	0
Controls	Yes	
<i>Year and quarter effect</i>	Yes	
<i>Industry effect</i>	Yes	
N	97,970	
R ²	0.2647	
Test of coefficient equality: Passive MFHHI = Other MFHHI		
Chi2-test	4.81	
p-value	0.028	