Hiding Behind the Window Blinds: Strategic Trading under Portfolio Partial Disclosure[☆]

Ron Kaniel[a], Jennifer (Jie) Li[b] , Donghui Shi[c], and Qi Zhang[d]

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Abstract

We study implications of partial disclosure on mutual fund trading and performance by exploiting a unique hybrid disclosure policy in the Chinese stock market, requiring full disclosure at a semi-annual frequency but only disclosure of top-10 holdings at a quarterly frequency, and utilizing a dataset covering the entire daily trading records of all mutual funds in Shanghai Stock Exchange. Funds benefit from partial disclosure by strategically concealing private information and reducing window dressing efforts. Fund holdings under partial disclosure outperform those under full disclosure by 3% over the following three months. Partial disclosure does not deteriorate market liquidity and risk profiles of funds' portfolios. Together the evidence suggests that the extent of fund portfolio disclosure is an important dimension in disclosure policy.

JEL Classifications:

Keywords: Mutual Fund, Strategic Trading, Concealing Behavior, Window Dressing, Portfolio Disclosure Policy

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[a] Department of Finance, Simon School of Business, Rochester University, Rochester, NY 14627. Email: ron.kaniel@simon.rochester.edu. http://rkaniel.simon.rochester.edu/.

[b] Shanghai Advanced Institute of Finance, 211 West Huaihai Road, Shanghai, China 200030. Tel.: +86 21 62933591. E-mail: jli6@saif.sjtu.edu.cn.

[c]Fanhai International School of Finance, Fudan University, 220 Handan Road, Yangpu District, Shanghai, China.

[d] Department of Economics and Finance, Durham University Business School, Mill Hill Lane, Durham DH1 3LB, UK. Tel.: +44 191 3345376. E-mail: qi.zhang2@durham.ac.uk.

1. Introduction

Portfolio disclosure policies have been at the center of mutual fund regulation. There are extensive debates on how the increased frequency of full disclosure can affect funds' activities and stock market quality. For example, in 2004, aiming to increase transparency to investors and reduce window dressing, the SEC changed mutual funds' full portfolio disclosure frequency from semi-annually to quarterly. However, some practitioners and academics argued that increased disclosure would impede on funds' ability to capitalize on the information they collect. [1] Though much discussion has focused on the frequency of disclosure, the extent of disclosure (full versus partial disclosure) has been ignored by the literature. A natural question is whether partial disclosure can mitigate the cost of full disclosure and encourage information collection, and at the same time reduce window dressing yet maintain sufficient transparency.

A unique hybrid disclosure policy at Quarters 1&3 (partial) versus Quarters 2&4 (full) in China, combined with a novel dataset that covers the entire daily trading records of all mutual funds in the Shanghai Stock Exchange enable us to shed light on this issue, for the first time.

We find that partial disclosure of top holdings benefits informed funds and their investors because it helps them to better capitalize on information collection efforts by strategically concealing part of their private information, and therefore encouraging information collection efforts. It also reduces window dressing incentives for the majority of funds in the market and consequently moderates funds' performance distortions due to window dressing. At the same time, disclosure of top-10 holdings seems sufficiently reflective of funds' overall portfolio, does not significantly alter risk characteristics compared to full disclosure, and does not impede on market liquidity of stocks in the market.

According to China's Securities Regulatory Commission, in quarterly reports funds are only required to disclose the portfolio's top-10 holdings, while they are required to disclose the

[1] For SEC Final Rule IC-26372 released on May 10, 2004, please refer at http://www.sec.gov/rules/final/33-8393.htm. From the practitioners' perspective, Wall Street Journal were discussing the benefits and downside of increasing the frequency of mutual fund portfolio holding disclosure by U.S. SEC in several articles. For example, "SEC moves to widen mutual fund disclosure" at https://www.wsj.com/articles/SB10396427343142262 73. Academic papers discussing the impact of more frequent mutual fund portfolio disclosure including Wermers (2001), Frank et al (2004), Ge and Zheng (2006), and Agarwal et al. (2015).

whole portfolio in the semimanual and annual reports, which are effectively at the ends of Quarters 2&4. We find that returns of fund holdings at the ends of Quarters 1&3 outperform the ones at the ends of Quarters 2&4 by 1.23%, 2.25% and 2.97% in the future 1/2/3 months, respectively. The significant difference is consistent with the argument that partial disclosure benefit funds by encouraging information collection and reducing window dressing incentives.

To provide more direct evidence that partial disclosure encourages information collection, we start by showing that funds strategically conceal information at the ends of Quarters 1&3. There are several reasons motivating concealing behaviour. First, generally funds prefer to keep their proprietary investment strategies confidential. The requirement to disclose only their top-10 holdings enables them to obfuscate their strategies by strategically controlling which holdings to disclose. Second, it can reduce the costs in building up and unwinding positions by avoiding copycat funds from mimicking their strategies and competing for liquidity. Theoretically, Huddart, Hughes, and Levine (2001) and Agarwal et al. (2013) argue that it is beneficial for investment managers not to disclose their informed holdings before fully reaping the benefits of their private information.

We find that funds actively move some of their top-10 holdings to be just below the top-10 disclosure threshold right before the ends of Quarters 1&3, by increasing positions of other stocks or decreasing slightly positions of some top-10 holdings; therefore, hiding them from the public. These stocks exhibit significantly higher future risk-adjusted returns than those just above the top-10 disclosure threshold at disclosure. For example, the one, two, and three months Daniel et al. (1997, DGTW) characteristics-adjusted return differences are 1.08%, 2.20% and 2.32%, respectively. Importantly, we show that it is unlikely that these stocks are moved out of the top-10 to facilitate swapping in of stocks due to window dressing considerations. Furthermore, consistent with the *hiding motive* at Quarters 1&3, stocks that move similarly at Quarters 2&4 when the full portfolio is disclosed, or at other month ends when no disclosure is required, do not exhibit superior future performance relative to stocks just above the top-10 threshold. The superior performance by hidden stocks suggests funds benefit from this strategic concealing behaviour.

To shed light on the mechanism at play, we explore the sources of information associated with the hidden stocks, starting by considering quarterly earnings announcements. We find that

hidden stocks exhibit superior cumulative abnormal returns around subsequent earnings announcement days relative to stocks disclosed just above the top-10 threshold in the Quarters' 1&3 filings. When earnings announcements are expected to be after the top-10 disclosure date, hiding could prevent competition from copycat funds in building up and unwinding positions, and indeed we observe more hiding activities accordingly. Hidden stocks also predict higher probability of irregular information-sensitive events such as M&A deals, dividend pay-outs, executive changes, and large shareholder holdings increases.

Besides stocks actively moved out of the top-10, stocks initiated in the quarter that do not cross the top-10 threshold and are kept just below it at the end of Quarters 1&3 also significantly outperform those stocks that are just above the top-10 disclosure threshold. For instance, the one, two, and three months DGTW characteristics-adjusted return differences are 1.05%, 1.21% and 0.70%, respectively.

Our empirical results on identifying hiding activities support the hypothesis that a partial disclosure policy could be beneficial to funds by allowing them to strategically conceal holdings with information, thus sustaining their incentive to collect information. We also find that compared to full disclosure, partial disclosure substantially reduces distortions to fund performance due to window dressing activities. Specifically, funds spend more efforts on window dressing in Quarters 2&4 than Quarters 1&3. Furthermore, funds spending more efforts on window dressing in Quarter 2&4 versus 1&3 also suffer more performance distortion after Quarters 2&4 than 1&3. To highlight and summarise the benefits of partial disclosure, in a regression analysis we show that proxies for information collection and window dressing significantly predict future returns of fund holdings at the ends of quarters. [2] Together they can explain about 30% of the future return gap between the holdings at the ends of Quarters 1&3 and Quarters 2&4.

While the benefits of partial disclosure seem significant, it is also important to evaluate the costs. Agarwal et al (2015) find that increasing frequency of full disclosure can increase market liquidity due to increased transparency. We investigate whether partial disclosure can maintain the

[2] We use the increase of the ranking score of fund holdings approaching quarter end to proxy for window dressing efforts. To proxy for information collection efforts, we construct variables based on the active share of fund holdings according to the methodology introduced in Cremers and Petajisto (2009). and fund managers' efforts to conduct site visits to firms before the ends of quarters.

benefits of transparency from full disclosure. First, we find that disclosure only of top-10 can still provide a high-level of transparency of portfolio holdings to the public. The average asset under management of top-10 (20) holdings is 53% (80%) of the whole portfolio, and the correlation of risk-adjusted returns between top-10 (20) holdings and the whole portfolio is 92% (98%), suggesting that top-10 holdings are representative of the whole portfolio. More importantly, we do not find significant differences in liquidity measures between Quarters 1&3 and Quarters 2&4, both for the whole market and for stocks across different size deciles, suggesting partial disclosure does not impede on market liquidity. We also examine risk characteristics at Quarter ends including volatility, idiosyncratic volatility, beta, size, and book-to-market ratio, and find difference between Quarters 1&3 and 2&4 are insignificant, suggesting partial disclosure does not affect funds' portfolio risk profiles.

The remaining of the paper is organized as follows. Section 2 discusses the related literature. Section 3 presents baseline hypotheses development. Section 4 describes the data and summary statistics. Section 5 presents the empirical analyses and main results. Section 6 discusses the potential costs of partial disclosure policy. Section 7 concludes.

2. Related Literature

Our study contributes to several strands of the literature. First, there are extensive discussions on the cost of mandatory disclosure by institutional investors. For example, Frank et al. (2004) and Verbeek and Wang (2010) create hypothetical "copycat" funds based on mutual fund disclosures and show that such a strategy can generate positive abnormal return. Agarwal et al. (2015) show that mutual funds' performance deteriorated after the SEC increased the frequency of holding disclosure in 2004. These results imply that more frequent full disclosure reduces funds' incentives to collect and process private information. Complementing this literature, we focus instead on the extent of portfolio holdings that are required to be disclosed, and show that partial disclosure can mitigate the costs while maintaining the main benefits of full disclosure. In addition, different from these studies, since our data set tracks funds' daily trading, we are able to provide direct evidence of strategic concealing activities and the associated benefits.

Second, we contribute to the literature on strategic responses of institutional investors to mandatory disclosure. It is well documented that funds strategically window dress disclosed

portfolios (See for example, Lakonishok et al. (1991), He, Ng, and Wang (2004), Ng and Wang (2004), Agarwal, Gay and Ling (2014)). We show that partial disclosure reduces funds' window dressing activities, and consequently improves performance.

There are a couple of studies providing evidence that hedge funds strategically hide positions (Agarwal et al. (2013), Aragon, Hertzel, and Shi (2013), Jank, Roling, and Smajlbegovic (2019)). Our study is the first to identify hiding behavior by mutual funds, which are typically considered less sophisticated than hedge funds. More importantly, while existing studies vaguely refer to hiding of proprietary trading strategies and private information, we explicitly identify part of the information funds hide.

Third, we contribute to the literature debating whether mutual fund managers are skilled; the jury is still out on this question.[3] Most studies considering funds' trading as part of the evaluation utilize quarterly disclosed holdings data. One exception is Pucket and Yan (2011) which use transaction data of a subset of institutional investors provided by ANcerno Ltd. (formerly the Abel Noser Corporation). They find that institutions' interim trading within quarters earn significant abnormal returns, indicating mutual fund managers have stock picking skills with short lived private information. Our study, also taking advantage of granular transaction level data, provides evidence of longer-lived information, finding there are funds who can pick stocks with private information beyond the quarter ends, and actively hide such information.

3. Baseline Hypothesis Development

The China Securities Regulatory Commission requires mutual funds to prepare and complete the quarterly reports/semi-annual reports/annual reports at the end of each corresponding disclosure period. For Quarters 1&3 only the top-10 holdings of the fund portfolio need to be disclosed, while for Quarters 2&4 the whole portfolio. A significant benefit for funds of a top-10 disclosure policy is it provides discretion to hide stocks they have private information on below the top-10 threshold. Consequently, it encourages funds to spend more efforts on information

[3] For example, Carhart (1997), Busse, Goyal, and Wahal (2010), and Fama and French (2010) find that mutual fund managers do not possess trading skills, while Cohen, Coval, and Pastor(2005), Kacperczyk, Sialm, and Zheng (2005), Mamaysky, Spiegel, and Zhang (2008), Kacperczyk and Seru (2007), and Cremers and Petajisto (2009) argue the opposite.

collection. Another important benefit of a partial disclosure policy is it reduces fund managers' window dressing incentives and subsequently window dressing efforts, which are generally believed to have a negative impact on fund performance. Given these two benefits, we predict that the future performance of fund holdings at the ends of Quarters 1&3 should be significantly higher than at the ends of Quarters 2&4.

To identify strategic concealing behaviors around the top-10 disclosure threshold, we first focus on funds' activities that move out some stocks to be just below the threshold before the ends of Quarters 1&3, either by increasing positions of other stocks or decreasing slightly positions of some existing top-10 holdings.

Several major factors are important in linking these stocks to strategic concealing. Table 1 describes the definition of "Just moved-out" stocks. The first criteria is *Moved just below* - a stock that is one of the top-10 holdings at the end of second last week and is ranked 1-5th below the top-10 (i.e., ranks 11-15) at the end of the quarter, with a position decrease of less than 20%.[4] The intuition is that if a fund intends to hide stocks they have private information about, they would move these stocks just bellow of, yet not far away from, the top-10 threshold. The second criteria is *Outperform*- the past performance ranking score of the stock is higher than the average ranking score of the stocks that rank 8th, 9th, and 10th of the top-10.[5] We impose this restriction to alleviate the concern that funds move out these stocks due to their poor past performance (*window dressing motive*). The third is *Actively moved-out*- the stock is moved out of top-10 either by actively buying other stocks or reducing it's own position in the last week of each quarter. This criterion is to eliminate situations where stocks might move in and out of top-10 holdings passively due to price fluctuations. The fourth is *Built within the same quarter*- the stock was not disclosed in the previous quarter. That is, the position in the stock was built up within the current quarter. The incentive to hide is likely lower for a stock disclosed last quarter, as others know this stock is part of the fund's recent strategy. To serve as the benchmark to compare with "Just moved-out" stocks,

[4] The definition is based on the conjecture that it is more likely to be hiding behavior if fund managers do not decrease the position significantly; otherwise it is more likely that they are unwinding these stocks. Robustness tests show similar results when we use 10% position decrease to define "*Moved just below*" criteria. In fact, 79% of "Just moved-out" stocks defined using 20% threshold do not reduce any fraction of positions.

[5] The ranking score is calculated following Agarwal, Gay and Ling (2014) on window dressing: we rank stocks into percentiles based on their past 60 days cumulative returns and then assign scores between 1 and 100 to stocks according to their percentiles.

we define "Disclosed just-above" (hereafter "Disclosed-JA") stocks as the ones that are ranked 8th, 9th, and 10th of the top-10 holdings at the end of each quarter.[6]

There are at least two important motives for hiding holdings with private information. First, information disclosure allows other competitors in the market to free ride by copy catting the fund's investment strategy (Wermers (2001), Frank et al. (2004), and Verbeek and Wang (2010)). Second, the fund may be concerned that the costs for building up and unwinding the positions will be higher due to disclosure. If the fund is in the middle of the process of building the position in the stock, other competitors may pump up the price of the stock. Even if the fund has completed building the position, disclosing the holdings to the public could reduce profits when unwinding the position due to competition from copycat funds. Given the above, we conjecture that "Just moved-out" stocks at the end of Quarters 1&3 should have superior performance going forward relative to "Disclosed-JA" stocks, and they should also outperform the "Just moved-out" stocks at the end of Quarters 2&4.

There is also a reputation benefit for a manager to be able to argue in retrospect that they anticipated that a given stock would do well. This would lead them to disclose in the top-10 stocks that they anticipate to be future good performers. Hiding such a stock would suggest that the benefit of hiding outweighs the cost of giving up the benefit of future bragging rights. Funds could of course also move stocks out of the top-10 if they have concerns that these stocks would generate either mediocre or poor future performance. If they anticipate poor performance, it is unlikely that they will reduce the position only slightly. On the other hand, if they anticipate that while this stock might do reasonably well other stocks are likely to do better, they may want to increase positions in those stocks so they become top-10 holdings for two reasons. First, this will increase the return of the portfolio. Second, disclosing those other stocks will provide future bragging rights. Importantly, both rationales work against the finding that "Just moved-out" stocks at Quarters 1&3 have superior performance relative to "Disclosed-JA" stocks.

It is widely known in the literature that mutual funds window dress their portfolio holdings and that such activities distort fund performance. However, existing studies of window dressing

[6] We mainly compare "Just moved-out" stocks with the "Disclosed-JA" stocks that are ranked 8th, 9th, and 10th of the top-10 holdings because these stocks should share similar market value of positions with "Just moved-out" stocks.

mostly focus on the US in which regulators require full portfolio disclosure. Another potential benefit of partial disclosure is it reduces incentives to window dress. Therefore, we conjecture that in Quarters 1&3 funds engage less in window dressing than in Quarters 2&4, and exhibit less future performance distortions.

4. Data and Variable Construction

Our main database includes the entire daily trading records of all mutual funds in the Shanghai Stock Exchange from 2005 to 2018. For stocks listed on the Shenzhen Stock Exchange, we observe the relevant disclosed holdings at quarter ends, but do not have information on trading records. To define "Just moved-out" and "Disclosed-JA" stocks, we form a simulated top-10 threshold based on fund holdings in Shanghai Stock Exchange in the following way. At the end of each quarter, we observe the specific number of stocks from Shanghai Stock Exchange in the top-10 holdings according to the market value of holdings published in the quarterly reports. This number of stocks is used as the simulated top-10 threshold to define "Just-moved out" stocks and "Disclosed-JA" stocks in each quarter. For instance, for a certain fund at the end of Quarter 1, 2018, the number of stocks from Shanghai stock exchange in the disclosed top-10 stocks is 6, "*Moved just below*" criterion is defined as the stock that is ranked at first to sixth at the end of second last week and is ranked 7^{th} to 11^{th} at the end of Quarter 1, 2018 in Shanghai exchange data. "Disclosed-JA" stocks are the stocks that ranked 4^{th} to 6^{th} among Shanghai stocks at the end of Quarter 1, 2018.[7]

Our data set covers three main files: trading, holding, and account type. In the trading file, we have account-level trading data that covers the common trade variables, with security code, encrypted account identifier, trade price, trade volume, trade direction, and date and time stamps of the trade. The holdings file is recorded daily to reflect each account's end-of-day holding value

[7] Such simulated strategy on "Disclosed-JA" stocks allows us to conduct placebo tests by pretending other month ends as ends of Quarter 1&3 and therefore is used for the main analyses in the paper. At each quarter-end, CSMAR would disclose the top-10 stocks with both Shanghai and Shenzhen Stock Exchange. In the robustness checks, we define "Disclosed-JA" stocks as stocks that ranked 8^{th} to 10^{th} at the end of the quarter including Shenzhen Exchange stocks in the top-10 holdings. Accordingly, the *Outperform* criterion for "Just moved-out" stocks is re-defined: the ranking score (normalized based on the past 60 days cumulative returns) of the stock is higher than the average ranking score of the stocks that rank 8^{th}, 9^{th}, and 10^{th} above the top-10 threshold at the end of each quarter including Shenzhen Exchange Stocks. We replicate all the analyses on quarter ends using the new definition of "Disclosed-JA" stocks and "Just moved-out" stocks and find the results consistent with the case with simulated top-10 threshold only in Shanghai Stock Exchange. Please refer to the Internet Appendix for further results.

for each stock. The holding variables include encrypted account identifier, date, security code, holding balance, effective date and so on. The account type file classifies each account as a specific type, including individuals, mutual fund, qualified foreign institutional investor, social security fund, insurance firm, brokerage asset management, hedge fund, and other institutions.

Pricing information and equity mutual fund characteristics come from two major sources: China Stock Market and Accounting Research (CSMAR), which is available from the Wharton Research Data Services (WRDS), and Wind Financial Database (WIND), another leading integrated service provider of financial data, information, and software. From these two databases, we retrieve daily prices (i.e., the net asset value or NAV), returns, and TNA for all the equity funds, as well as characteristics such as fund fees and benchmarks. We also obtain earnings announcements, events related to M&A deals, dividend payouts, executive changes, and large shareholder holdings increases. We use accounting related control variables include Sales Growth, Tobin's Q, P/E Ratio, Accounting Liquidity Ratio, and Debt-to-Asset Ratio from CSMAR. We crosscheck the two databases to ensure the accuracy of all the information.

Given the fact that the Shanghai Stock Exchange provides entire trading and holding data of mutual funds without the public fund identifier, we use a matching algorithm to match the mutual funds in the Shanghai Stock Exchange with CSMAR in order to obtain the basic public information. The matching process is conducted at the ending date of each semi-annual and annual reporting periods, as CSMAR contains full holding information while only top-10 holding stocks are publicly available at Quarters 1&3. The detailed matching algorithm is described in Appendix A.

Essentially, we conduct two rounds of matching for the exchange funds and CSMAR funds. The first round of matching requires a unique zero distance match between fund holdings in the two databases. Round two focuses on the funds that are not matched in round one. In round two, we define a pair funds (p, q) as a match if among all funds in CSMAR q has the smallest distance in holdings from exchange fund p, and among all exchange funds p has the smallest distance in holdings from CSMAR fund q.[8]

After two rounds of matching, the sample consists of 2688 funds out of 3185 funds in

[8] Please refer to the Appendix A for the formula to calculate the distance between fund holdings in both Shanghai stock exchange and CSMAR.

CSMAR. The matched sample accounts for 94% of equity funds in terms of total net assets (TNA) on Dec 31, 2018. After identifying the fund type in the matching sample, we filter out Index funds and ETFs and require a trading history of at least eight quarters. The resulting final sample includes 1648 equity funds. For each matching pair, we compute the scaled distance in a semi-annual disclosing period as the ratio of the distance to the maximum of total dollar values of shares held by the exchange fund or CSMAR fund, and then calculate the average of scaled distance across disclosing periods. Specifically, the 95^{th} percentile of average of scaled distance is 0.037, which can be interpreted as a 96.3% match between two funds' holdings. In cases where the average of scaled distance was bigger than 0.037, we manually checked the holdings and found that the large distance are mainly due to delayed recordings of non-tradable shares in the stock exchange. Therefore, we validated these matches as well.

Table 2 reports summary statistics of fund-level characteristics. We take the equal-weighted average of the variables across all funds. Across the 1648 funds, the total number of average trading days is 1103.4. On average, these funds span 18.1 quarters during our sample period. The average number of unique stocks by these funds is 370.7 while the maximum number is 1371 during the entire sample period. The daily average total market capitalization of stocks in mutual funds' portfolios is 476 million RMB. In addition, the daily average number of stocks held by mutual funds in our sample is 26.4.

5. Empirical Results

5.1 Future returns of the portfolio holdings

In the baseline hypothesis development, we discuss two benefits of partial disclosure policy in Quarters 1&3, i.e. increasing funds' incentive to collect information and mitigating their window dressing behaviors. Both benefits imply superior future performance of funds' holdings at the ends of Quarters 1&3 compared to Quarters 2&4.

To test this prediction, we adopt the DGTW measure to calculate the adjusted future 1/2/3 month returns of the portfolio holdings in the Shanghai Stock Exchange. The DGTW measure corresponds to the stock characteristic selectivity component and has the advantage of focusing on stock-picking ability of mutual fund managers. First, we form the benchmark portfolios at the end of June for each year using all the common stocks listed on Shanghai Stock Exchange. These

stocks are sorted into 125 (5*5*5) portfolios based on the size (using the CSMAR size quintile), book-to-market ratio, and momentum dimensions. The DGTW benchmark-adjusted performance of a given stock is its return in excess of that of the benchmark portfolio to which it belongs. We then take the value-weighted average future 1/2/3 months DGTW benchmark-adjusted returns across all the stocks within each fund for each date. To account for fund fixed effects, we further adjust the value-weighted future returns by the previous one-year moving average returns of each fund. Finally, we take the equal-weighted average adjusted future 1/2/3 months returns across funds at a daily basis.

Figure 1(a) to 1(c) show the dynamic patterns for the future 1/2/3 months returns of the portfolio holdings, respectively. General pattern in the three figures present a striking difference of the future returns between Quarters 1&3 versus Quarters 2&4. For example, Figure 1(c) shows that the future 3-month returns for Quarters 2&4 exhibit a sharp decrease from around 20 days towards quarter-ends. However, the future 3-month returns for Quarters 1&3 are steadily increasing from around 20 days towards quarter-ends. The difference of the 3-month future returns between Quarters 1&3 and Quarters 2&4 is 2.97% at the end of the quarter. Figures 1(a) and 1(b) show similar patterns for the future 1 and 2-month returns. The difference of the future 1 and 2-months returns are 1.23% and 2.25%, respectively. The stark differences of future performance approaching the ends of Quarters 1&3 versus 2&4 highlight the positive effects of partial disclosure on funds' future performance.

5.2 Performance of "Just moved-out" stocks

In this section, we analyze the performance associated with "Just moved-out" stocks. We start with the prediction that "Just moved-out" stocks at the end of Quarters 1&3 should exhibit superior performance in the future due to hiding information motive.

5.2.1 DGTW characteristic-adjusted return

We first calculate the value weighted future 1/2/3 months DGTW benchmark-adjusted returns starting from the end of each quarter for "Just moved-out" and "Disclosed-JA" stocks of each fund; equal weighting generates qualitatively similar results. Then, for each quarter and return horizon we take the average across all funds.

To serve as a placebo, we treat other month ends as if they were quarter ends, defining "Just moved-out" and "Disclosed-JA" accordingly, and then compute the corresponding value weighted future 1/2/3 months DGTW benchmark-adjusted return averages across funds. Among all these quarter ends and month ends, the top-10 holdings disclosure policy is in effect only at the ends of Quarters 1&3. Therefore, the *hiding motive* would predict that only at the end of Quarters 1&3 "Just moved-out" stocks should outperform "Disclosed-JA" stocks in the future.

Figure 2 shows the differences of future 1/2/3 months DGTW characteristics-adjusted returns with 95% confidence interval of "Just moved-out" and "Disclosed-JA" stocks defined at each month-end. The horizontal line shows the month distance to the end of Quarters 1&3, which is labeled as "0" in the figure. [9] The striking and persistent feature in the figure is the peak at the end of Quarters 1&3. For instance, the future 3-month return differences between "Just moved-out" and "Disclosed-JA" stocks peak at 2% at the end of Quarters 1&3. We also calculate the return differences at other month ends as placebo test and find that there is no any other month end where "Just moved-out" stocks significantly outperform "Disclosed-JA" stocks in the future. Consistent with the *hiding motive*, this evidence suggests that "Just moved-out" stocks at the ends of Quarters 1&3 are likely associated with private information that funds intend to hide by moving them to below the top-10 threshold.

Table 3 shows the detailed comparison of the DGTW benchmark-adjusted returns between "Just moved-out" and "Disclosed-JA" stocks at ends of Quarters 1&3 versus 2&4. Panel A shows that after Quarters 1&3 "Just moved-out" stocks achieve on average 1.01% of future 1-month DGTW benchmark-adjusted returns. The return difference between "Just moved-out" and "Disclosed-JA" stocks is statistically and economically large, equating to 1.08% per month. Future 2 and 3-month returns show similar patterns with larger magnitudes.

An important feature of Table 3 Panel B is that both "Just moved-out" and "Disclosed-JA" stocks show significantly negative future returns at the end of Quarters 2&4. For example, the future 1-month adjusted return of "Just moved-out" stocks is -1.79% for Quarters 2&4, and for "Disclosed-JA" it is -0.95%. Future 2 and 3-month returns show a similar pattern. These negative

[9] The end of Quarters 1&3 is labeled as "0", 1/2/3 months after the end of Quarters 1/2/3 are labeled as "1", "2", and "3". 1/2/3 months before the end of Quarters 1&3 are labeled as "-1","-2" and "-3". "-3" and "3" effectively refer to the same months of June and December, and therefore have the same value on the Y-axis.

future returns are consistent with the stronger efforts of window dressing at Quarters 2&4 (full disclosure) than 1&3 (partial disclosure), which distort funds' future performance. We will provide more evidence on window dressing efforts and fund performance distortions in section 5.5.

As the entire holdings of funds will be disclosed after the ends of Quarters 2&4, the *hiding motive* for proprietary trading strategies and private information that we expect at the ends of Quarters 1&3 generally do not apply to Quarters 2&4. Therefore, we do not expect that "Just moved-out" stocks outperform "Disclosed-JA" stocks after Quarters 2&4. The results in Table 3 Panel B are consistent with this prediction. Furthermore, it shows that "Just moved-out" stocks underperform "Disclosed-JA" stocks in future returns. These results are consistent with *bragging motives* to highlight stocks with predicted good future performance.

To be consistent with the hiding identification, "Just moved-out" stocks at the ends of Quarters 1&3 should also outperform "Just moved-out" stocks at the ends of Quarters 2&4 in future performance. Table 3 Panel C looks into this comparison. Indeed, the return differences for "Just moved-out" stocks between Quarters 1&3 and Quarters 2&4 at future 1/2/3 months are significantly positive (2.79%, 5.14%, and 6.37%, respectively). While this pattern is consistent with the distinctive *hiding motive* at the end of Quarters 1&3, it could also be related to the generally stronger negative effects of window dressing efforts on future performance of portfolios at the ends of Quarters 2&4 as shown in Panel B of Table 3. To control for the effect of window dressing and provide a cleaner identification on hiding, the row for "Disclosed-JA" in Table 3 Panel C reports the future return differences for "Disclosed-JA" stocks between Quarters 1&3 and Quarters 2&4, which is also significantly positive (0.87%, 1.74%, and 2.43%, respectively). These positive return differences can serve as a benchmark to control for the effect of window dressing. As the last row of Panel C shows, the difference of "Just moved-out" stocks' future returns between Quarters 1&3 and 2&4 is significantly higher than the difference of "Disclosed-JA" stocks' future returns between Quarters 1&3 and Quarters 2&4.[10] This provides further evidence in support of *hiding motive* being at play.

[10] Table 3 Panel C shows that the future 1/2/3 months return difference of "Just moved-out" and "Disclosed-JA" stocks between Quarters 1&3 and Quarters 2&4 is 1.92%, 3.4%, and 3.94%, respectively. We further calculate the differences in differences returns for longer period and find that the future 12 months return difference of "Just moved-out" and "Disclosed-JA" stocks between Quarters 1&3 and Quarters 2&4 is 5.9%. This result is consistent with the prediction that there is no return reversal for the future performance of "Just moved-out" stocks.

5.2.2 Calendar portfolio alpha

In investigating the calendar portfolio alpha for "Just moved-out" stocks, we find results echoing the findings with DGTW benchmark adjusted returns. We follow Agarwal et al (2013) to calculate calendar portfolio alpha in the following way. For each fund at each quarter-end, we calculate the value-weighted daily raw returns of "Just moved-out" and "Disclosed-JA" stocks in the corresponding funds in the following three months. The daily risk-adjusted returns (alphas) of the portfolios are estimated with Carhart (1997) four-factor model and Liu, Stambaugh, and Yuan (2019) China four-factor models.[11] Specifically, for each "Just moved-out" or "Disclosed-JA" portfolio *p* held by fund *i* at the end of calendar quarter *t*, we estimated the following model:

$$r_{f,q,p,t} = \alpha_{f,q,p} + \sum_{k=1}^{4} \beta_{k,f,q,p} F_{k,t} \quad (1)$$

where *f* indicates fund, *q* indicates calendar quarter; *p* indicates the type of portfolio, i.e., whether the portfolio consists of "Just moved-out" or "Disclosed-JA" stocks; and *t* indicates the dates in the three months following the quarter-end. $r_{f,q,p,t}$ is the date *t* excess return of the portfolio *p* held by fund *f* at the end of quarter *q*, $F_{k,t}$ are the daily returns of the factors. The estimated intercept $\alpha_{f,q,p}$ is the daily alpha of the corresponding portfolio *p*.

We multiply 3-month daily alphas by 60 to normalize daily alpha to quarterly level. The average performance of "Just moved-out" and "Disclosed-JA" stocks at the ends of Quarters 1&3 and Quarters 2&4 are calculated by taking the average of portfolio alphas across funds and calendar quarters within the corresponding portfolio category.

We conduct the same placebo test for calendar portfolio alphas as we did with DGTW benchmark-adjusted returns, by treating month ends as quarter-ends and calculating the calendar portfolio alphas for "Just moved-out" and "Disclosed-JA" stocks starting from the end of those months accordingly. Figure 3 shows the differences of future 3-month calendar portfolio alphas with 95% confidence interval of "Just moved-out" and "Disclosed-JA" stocks defined at each

[11] Carhart (1997) four-factor model includes excess market return, size, book-to-market, and momentum factors. Liu, Stambaugh, and Yuan (2019) constructs China four-factor models including market, size, value and a sentiment-motivated turnover factor. Size and value factors are adjusted according to the institutional background of Chinese financial market. The China size factor excludes the smallest 30% of firms, which are companies that are valued significantly as potential shells in reverse mergers. The China value factor is based on the earnings-price ratio instead of Book-to-Market ratio.

month-end. The pattern in both Figures 3(a) and 3(b) is that, benchmarking with the "Disclosed-JA" stocks, "Just moved-out" stocks at the end of Quarters 1&3 exhibit the highest future performance compared to all other months. This evidence is consistent with the inverted V-shape pattern in Figure 2, supporting the *hiding motive*.

Table 4 reports the calendar portfolio alphas for both "Just moved-out" and "Disclosed-JA" stocks. We calculate both Carhart four-factor alpha and China four-factor alpha (Liu, Stambaugh, and Yuan (2019)). Consistent with results with DGTW benchmark-adjusted returns, we find that "Just moved-out" stocks at the end of Quarters 1&3 achieve on average a positive Carhart four-factor alpha (China four-factor alpha) of 2.38% (3.34 %) for the next 3 months. The alpha difference between "Just moved-out" and "Disclosed-JA" stocks is 1.41% (2.03%) per quarter, statistically significant for both methodologies. In contrast, at the ends of Quarters 2&4 subsequent returns of "Just moved-out" are lower than those of "Disclosed-JA". Finally, the difference in subsequent returns between ends of Quarters 1&3 and 2&4 for "Just moved-out" stocks' is significantly higher than for "Disclosed-JA" stocks.

5.2.3 Controlling for analyst recommendations

If fund managers trade stocks by simply free riding analysts' recommendations, they could also potentially generate superior future performance for "Just moved-out" stocks. To account for the information from analyst recommendations, we estimate the future return differences between "Just moved-out" and "Disclosed-JA" stocks in Quarters 1&3 controlling for variables related to analyst recommendations in fixed effect models as shown in the Equation (2).

$$Future\ DGTW\ adjusted\ returns_{f,s,q} = \beta_1 Q13JustMovedOutDummy_{f,s,q} + \sum \beta_2 Dummies\ for\ other\ stock\ types_{f,s,q} + \beta_3 AnalystRecom_{s,q} + Year\ FE + Stock\ FE \quad (2)$$

where *f, s, q* denote fund, stock, and quarter, respectively. The dependent variables are future 1/2/3-month DGTW adjusted returns of stock *s* held by fund *f* at the end of quarter *q*. Independent variables include a set of dummies indicating the type of stocks. For example, $Q13JustMovedOutDummy_{f,s,q}$ equals 1 if quarter *q* is Quarter 1 or 3, and stock *s* held by fund *f* is classified as a "Just moved-out" stock; otherwise, the dummy equals 0. Other dummies, namely, *Q13DisclosedDummy*, *Q24JustMovedOutDummy*, and *Q24DisclosedDummy*, are defined in

similar ways. In addition to these four stock types, since all the stocks in the portfolios are included in the regressions, we further defined two types of stocks, *FurtherTop and RemainBelow*. Stock *s* held by fund *f* at the end of quarter *q* is classified as *FurtherTop* if it is above the top-10 threshold and is not defined as a "Disclosed-JA" stock; on the contrary, it is classified as *RemainBelow* if it is below the top-10 threshold and is not a "Just moved-out" stock. Then four more dummies, *Q13FurtherTop*, *Q13RemainBelow*, *Q24FurtherTop*, and *Q24RemainBelow*, are defined similarly as the dummies above. In the equation, *Q13Disclosed* is regarded as the base group and the corresponding dummy is excluded. Thus, the coefficient of *Q13JustMovedOutDummy*, β_1, equals the return difference between "Just moved-out" and "Disclosed-JA" stocks in Quarter 1&3 and is the variable of interest.

We use two sets of variables to proxy for analyst recommendations. The first, based on changes of consensus analyst recommendations in the last two weeks of quarter-ends, *RecomChg.*[12] The second, relies on price targets.

For the first, for each stock-quarter, we collect the latest analyst reports available on the last day of the quarter and the 10th trading day before quarter-end. We require the reports to be no older than two quarters to ensure informativeness. The recommendations provided by CSMAR have been standardized with a scale of 1 to 5, where 1 indicates "Strong Sell" and 5 indicates "Strong Buy". The change of recommendation for each analyst-stock-quarter is then the difference between standardized scores on the last day and 10 days before.[13] Finally, the consensus change of recommendation is the average of changes across analysts. To account for asymmetric predictability of the changes, we include the positive changes, *RecomChg_Pos (= max{RecomChg, 0})*, and the negative changes, *RecomChg_Neg (= min{RecomChg, 0})*, in the regression separately.[14]

For the second, for each analyst report, we first calculate the return target as the difference between price target and the quarter-end closing price, divided by the quarter-end closing price.

[12] Using analyst recommendations in the last week of quarter-end, or in the whole quarter, generates qualitatively similar results.

[13] If analysts publish a report within the last two weeks of quarter-end but do not publish a report within two quarters prior to the last two weeks, we then assume that the recommendation is changed from a "Neutral" recommendation with a standardized score of 3.

[14] We also include two dummy variables indicating the sign of *RecomChg*, *I(RecomChg > 0)* and *I(RecomChg < 0)* as robustness checks.

Since analysts report the price targets in different horizons, we scale all the return targets to a 3-month horizon. The scaled returns are adjusted by 3-month market index returns in the same horizon and truncated at 1% and 99% percentiles. Finally, for each stock-quarter, the consensus return targets, *RetTarget*, are calculated as the average return targets across analysts' latest reports published within the last two weeks at quarter-ends. To account for analyst coverage, we include a dummy variable *NotMissingRetTarget,* which equals 1 if return target is not missing and equals 0 otherwise.

In Equation (2), each observation corresponds to one fund-quarter-stock pair. The sample consists of all the stocks in the funds' quarter-end holdings. The observations are weighted in an analogous way to the weighting scheme in calculating Table 3. Specifically, for each fund in each quarter, the weights of stocks of the same type are proportional to the market values held by the fund; then it is equally weighted across funds and quarters. The equation is estimated with stock fixed effects and year fixed effects. Standard errors are clustered at the calendar quarter level.

The results are reported in Table 5. Column (1), (4), (7) present the return difference between "Just moved-out" and "Disclosed-JA" stocks in Quarter 1&3. The return differences for future 1/2/3 DGTW adjusted returns are 1.13%, 2.21%, 2.81%, respectively. After controlling for analyst recommendations in Column (2), (5), (8), we find that the corresponding return differences are 1.13%, 2.23%, 2.84%, both statistically and economically significant. In addition, we also reproduce the results in the last row of Table 3 Panel C by calculating the coefficient of "Q13JustMoveOutDummy - (Q24JustMoveOutDummy - Q24DisclosedDummy)". [15] The differences in differences of DGTW adjusted returns after controlling for analyst recommendations are 1.96%, 3.77%, 4.12%, comparable to the results in Table 3 Panel C. This evidence suggests that the superior performance of "Just moved-Out" stocks in Quarter 1&3 does not stem from fund managers free riding analysts' recommendations.

5.2.4 Frequency of "Just moved-out" stocks in Quarters 1&3 by fund family

In previous sections, we show that mutual funds actively hide stocks with private information by moving them just below the top-10 threshold at the ends of Quarters 1&3. We also

[15]Recall that *Q13Disclosed* is used as the base group and the coefficients of the dummy variables are the return difference between the corresponding stock type and *Q13Disclosed*. Thus *Q13DisclosedDummy* is omitted three times in the formula.

show that the return predictability does not simply reflect potential predictive ability of analysts' recommendations. To better understand funds hiding activities, we examine the frequency of "Just moved-out" stocks in Quarters 1&3 by fund families.

Within a fund family, for each fund-quarter-stock observation, we count each "Just moved-out" stock for each fund and each quarter as one hiding activity. The number of fund families and the number of funds conducting hiding activities are 104 and 548, respectively. The summary statistics are shown in Table 6. For each fund family, we calculate the number of hiding activities per fund as the total number of "Just moved-out" stocks of the family divided by the total number of funds in the family. We rank all fund families into five quintiles according to the number of hiding activities per fund and take the average across all fund families within each quintile. The average number of hiding activities per fund is 0.08 for Quintile 1 and 1.2 for Quintile 5. This implies that funds hide stocks by moving them bellow the top-10 threshold infrequently. A less costly and possibly more frequent hiding behaviors is to keep stocks they want to hide always below top-10, which we will study in section 5.4. The percentage of funds having hiding activity is calculated as the number of funds with hiding activities divided by the total number of funds in the family. The ranking is monotonically increasing from Quintile 1 to Quintile 5, indicating that fund families with more hiding activity per fund also have more funds conducting hiding activities as well. The average percentage of funds with hiding activities across all fund families is 31.7%, suggesting that one-third of funds conduct hiding activities for each fund family. We also calculate the fraction of time hiding in fund family as the number of quarters that with "Just moved-out" stocks divided by the total number of quarters for each fund family in the sample. The average percentage of time hiding across funds with hiding activities is 16.6%, which is around three times the average percentage of time hiding across all funds (5.6%).

5.3 The Information Funds Hide

Given the challenge to identify hiding behaviors, to the best of our knowledge, there are only two existing studies looking at concealing behavior of different investors in financial markets; Agarwal et al. (2013) for hedge funds and Jank, Roling, and Smajlbegovic (2019) for short selling. Importantly, what information exactly is hidden is less clear in these studies. It is only generally

attributed to managers' proprietary trading strategies and private information. In this section, we seek to identify the sources of funds' private information.

5.3.1 Earnings Announcements

First, we explore information on earnings announcements, the most frequent firm public announcements. If mutual funds hide earnings information, "Just moved-out" stocks should exhibit superior cumulative abnormal returns over "Disclosed-JA" stocks around the following earnings announcement dates after the ends of Quarters 1&3.[16] In addition, "Just moved-out" stocks at the end of Quarters 1&3 should also outperform their peers at the ends of Quarters 2&4 around the following earnings announcement dates. To estimate abnormal returns, for each stock we first estimate beta using the past 120 daily stock returns and market returns before the event window based on market model. We then estimate the daily abnormal returns for the most recent earnings announcements after the end of each quarter for each stock using the estimated beta. We obtain the cumulative abnormal returns by aggregating the daily abnormal returns of the specific event windows for "Just moved-out" and "Disclosed-JA" stocks, respectively.

In Table 7, CARs are reported over various windows around the event dates for "Just moved-out" and "Disclosed-JA" stocks using the CAPM. Panel A shows that after Quarters 1&3 "Just moved-out" stocks achieve higher abnormal returns than "Disclosed-JA" stocks, with differences significant for all event windows. This evidence suggests that the outperformance of "Just moved-out" stocks can be partially attributed to anticipating the next earnings announcement. Similar to the results in Table 3 Panel B, Table 7 Panel B reports that after Quarter 2&4 "Just moved-out" stocks achieve lower abnormal returns than "Disclosed-JA" stocks, with differences significant for all event windows. Panel C shows that the return differences between "Just-moved out" and "Disclosed-JA" stocks at Quarters 1&3 are significantly higher than the ones at Quarters 2&4. This provides further evidence that funds hide earnings related information at the end of Quarters 1&3.

Baker et al. (2010) show that stocks mutual funds buy outperform the stocks that they sell at subsequent earnings announcements in raw (benchmark-adjusted) returns with an annualized

[16] 28.4% of annual earnings announcement are reported after the end of Quarter 1. In these situations, it is less clear that fund managers are hiding for annual or quarterly earnings information. In our main analysis, we use the annual earnings announcements if the reports day are after end of Quarter 1. We conduct robustness checks by using the Quarter 1 earnings announcements, which are after annual reports and it generate the qualitatively similar results.

magnitude of 38 (34) bps around [-2, 2] event window. As "Just moved-out" stocks are newly bought within the quarter, it could be just a reflection of the stock-picking abilities of mutual funds shown by Baker et al. (2010). To rule out this concern, we follow Baker et al. (2010) and calculate market-adjusted returns (MAR) and benchmark-adjusted returns (BAR) around the earnings announcement dates in the next quarter for both weight-increased and weight-decreased stocks in the whole portfolio at quarter-ends.

Table 8 shows that there are some weak evidences that overall funds in our sample can predict future earnings, in line with Baker et al. (2010). In the whole sample the return differences between weight-increased and weight-decreased stocks by funds for the [-2, 2] window around the next earnings announcement is positive but not statistically significant for both MAR and BAR. In Quarters 1&3 only the difference of MAR between weight-increased and weight-decreased stocks is statistically significant, equaling 41 bps around [-2, 2] at a quarterly basis. For the benchmark-adjusted returns, for stocks that funds generally increased weight in the abnormal return is 46 bps, which is around half of 90 bps for "Just moved-out" stocks at Quarters 1&3 for the same event window [-2, 2]. [17] This evidence suggests that the superior performance of the hiding stocks we identify is beyond funds' general skill to predict future earnings. For Quarters 2&4, similar to the whole sample, there is no significant differences between weight-increased and weight-decreased stocks.

Next, we take advantage of the time gaps between mutual fund disclosure and firm earnings announcements to provide further identifications for funds' strategic hiding behavior. According to Shanghai Stock Exchange listing rules, listed companies are required to report annual, semi-annual and quarterly reports.[18] The annual (semi-annual) reports should be reported within 4 (2 months) from the end of each fiscal year, and the quarterly reports should be completed and disclosed within one month after the end of Quarter 1 and Quarter 3 of each fiscal year.[19] According to the China Securities Regulatory Commission, mutual funds' semi-annual (annual) reports should be published within two (three) calendar months from the end of Quarter 2 (4). For

[17] Following most existing literature, we calculate the abnormal returns using market model in event study. To compare with the magnitude in Baker et al. (2010), we also calculate the benchmark-adjusted returns and report the results in online appendix.

[18] http://www.sse.com.cn/lawandrules/sserules/main/listing/stock/c/c_20190430_4801807.shtml

[19] According to the Accounting Law in China, the accounting fiscal year begins on January 1 and ends on December 31 of the calendar year.

quarterly reports, CSRC requires mutual funds to disclose top-10 stock holdings within 15 trading days after the end of each quarter.

Figure 4 shows the distribution of fund disclosure dates and firm earnings announcement dates. Figure 4(a) (4(b)) describes the distribution of firm earnings announcements (fund portfolio disclosures). For each year, we calculate the number of firms (funds) reporting earnings (disclosing holdings) on the specific calendar dates and divided by the total number of firms (funds) after each reporting period, and then take the average of the ratios across years. For earnings announcements, Quarters 1&3 reports tend to concentrate in a narrow window, while semi-annual and annual reports tend to spread over longer periods. For fund portfolio disclosures, reports are usually concentrated in a short period as required by the disclosure rules. We take advantage of these reporting features to provide further evidence for the identification of strategic information concealing and help us to understand the nature of the information funds hide.

We notice that, for Quarters 1&3, 10% of the earnings announcements are within 15 trading days and 90% of the earnings announcements are beyond 15 days. At the ends of Quarters 1&3, funds have weaker incentives to hide the stocks with persistently early earnings announcements. Because if the stock frequently announces its earnings within 15 trading days after the end of quarters, then funds would expect that the earnings will probably be published before they disclose their top-10 holdings. However, for stocks that are highly likely to announce their earnings after 15 trading days, funds will have stronger incentives to hide the stocks so that they will not be front-run or replicated by competitors. The trading of these competitors can reduce a fund's profits from the good news, especially when the fund has not completed building its position by the disclosure date. Even if funds have already built up their positions, they would face more selling pressure by copycat funds in unwinding these positions. As a result, we predict that at the ends of Quarters 1&3, the intention to hide should be lower for the stocks that persistently announce their earnings before 15 trading days than those with late earnings announcements

As shown in Table 9, the results are consistent with this prediction. In this table, we report the likelihood of hiding for early and late announcement firms around 15 trading days in Quarters 1&3. Early (late) announcements are defined as ones within (beyond) 15 trading days after the ends of Quarters 1&3. In each Quarter 1 or 3, firms are defined as frequently early (late) earnings announcements firms when they have more (less) than 60% of quarters with early announcements

among all previous Quarters 1&3. [20] The average number of trading days between quarter-ends and announcements for early firms is 14.75 and for late firms is 16.47. Likelihood of hiding is calculated as the number of "Just moved-out" stocks among the early and late earnings announcement firms to the total numbers of firm-quarter pairs. Table 9 shows that the likelihood of hiding is higher for firms with frequently late earnings announcements: 2.62% versus 1.89%.

5.3.2 Other Irregular information sensitive events

In the previous section, we discussed how funds strategically hide stocks with information related to earning announcements. Next, we explore information related to irregular and information-sensitive events including M&A deals, dividend payouts, executive changes, and large shareholders holding increases. To catch the most informative events, we only include those events with top 5% cumulative abnormal returns around the window [0, 2].

If mutual funds would like to avoid disclosing information, "Just moved-out" stocks should be able to help predict these information-sensitive events in the next quarter. We therefore resort to the following logit model to examine the probability of "Just moved-out" stocks to predict information-sensitive events in the next quarter.

$$\text{Events in the Next Quarter}_{\text{s,q}} = \alpha_0 + \alpha_1 * \text{Q13Dummy}_{\text{q}} + \alpha_2 * \text{JustMovedOutDummy}_{\text{s,q}}$$
$$+\alpha_3 * \text{Q13Dummy}_{\text{q}} * \text{JustMovedOutDummy}_{\text{s,q}} + \alpha_4 \times X_{s,q} + \varepsilon_{s,q}, \quad (3)$$

where the dependent variable is a dummy variable that equals to 1 if there is an irregular information-sensitive event for stock *s* in the next quarter *q*. *Q13Dummy* is a dummy variable that equals to 1 if the quarter is Quarter 1 or 3, otherwise 0 for Quarter 2 or 4. *JustMovedOutDummy* is a dummy variable that equals to 1 if the stock is above top-10 threshold at the end of second last week and is ranked 1-5th below the top-10 at the end of each quarter, with a position decrease of less than 20%. *Log (Market Capitalization)* is the natural log of the market capitalization of the stock at the end of quarter *q*, all data provided by CSMAR. *Sales Growth* is the natural log of current annual sales scaled by previous year sales. *Tobin's Q* is the market value of assets over the book value of assets. *P/E Ratio* is the ratio of the year-end stock price to earnings per share at the end of last fiscal year. *Accounting Liquidity Ratio* is the ratio of net liquid assets to total assets at the end of last fiscal year. *Debt-to-Asset Ratio* is ratio of debt to equity at the end of last fiscal year.

[20] 70% or 80% thresholds deliver similar results.

All accounting related control variables are winsorized at 1% at the upper and lower tail. *Stock Return [-60, -1]* is daily cumulative return of the stock over the last 60 trading days before the end of the quarter. *Amihud Illiquidity Measure* is measured as the daily ratio of absolute stock return to its dollar volume average over the last 60 trading days. *M&A in the Last Quarter* is a dummy variable that equals to 1 if there exist M&A deals in the last quarter.

Table 10 presents the results on the predictability of "Just moved-out" stocks about irregular information-sensitive events. The unconditional probability of information-sensitive events is calculated as the number of "Just moved-out" ("Disclosed-JA") stocks with information-sensitive events in the next quarter divided by the total number of "Just moved-out" ("Disclosed-JA") stocks in the current quarter. Panel A shows that the unconditional probability of information-sensitive events for "Just moved-out" stocks in the next quarter is 2.69% higher in Quarters 1&3 than in Quarters 2&4, indicating that "Just moved-out" stocks in Quarters 1&3 have a higher probability to predict information-sensitive events in the next quarter. Panel B reports the results of a logit regression in which we regress a dummy variable that equals 1 if there is an irregular information-sensitive event in the next two or three on two dummies *Q13Dummy* and *JustMovedOutDummy*. The coefficient of the interaction term between *Q13Dummy* and *JustMovedOutDummy* is positive and significant, meaning that conditional on Quarters 1&3, those stocks that are just moved out of top-10 before quarter ends have higher a probability to predict information-sensitive events in the next 2-3 months.

5.4 Other hiding activities

In previous sections, we discuss the superior performance of "Just moved-out" stocks and the sources of information advantages related to these stocks. However, hiding by actively moving stocks out of top-10 holdings could just be the tip of the iceberg of concealing by funds. In this section, we explore another potential means of strategic hiding.

Moving a top-10 holding to just below the top-10 threshold is costly for mutual funds, though this action indicates strong hiding incentives. Another potential strategic way is always keeping the stocks with information just below top-10 threshold. Following this intuition, we define "Always below" stocks with the following criteria.

The first criterion is *Always below* – a stock that is ranked 1-5th below the top-10 threshold at the end of the quarter, and more importantly, the stock is never moved above the top-10 threshold by the fund within the same quarter. The economic intuition is that if funds would like to save the costs of moving the stocks out of the top-10 they could simply keep the positions just below the top-10 at the end of Quarters 1&3. The second criterion is *Outperform* – the past performance ranking score of the stock is higher than the average ranking score of the stocks that rank 8th, 9th, and 10th of the top-10 holdings. For *window dressing motives*, funds have incentives to move these outperforming stocks to the top-10 holdings. Consistently hiding these stocks below the top-10 threshold is highly likely due to *hiding motives* and not *window dressing motives*. The third criterion is *Built within the same quarter* – stocks that are initiated within the past three months, and not reported by the fund in the preceding quarter holdings disclosure. This criterion is the same as the one for "Just moved-out" stocks as funds would have less incentives to hide the stocks that were already disclosed in the last quarter. "Disclosed-JA" stocks are defined similarly as the ones that are ranked 8th, 9th, and 10th of the top-10 holdings at the end of each quarter.

In Table 11, we compare the DGTW benchmark-adjusted returns for "Always below" and "Disclosed-JA" stocks for Quarters 1&3 and Quarters 2&4. Panel A shows that "Always below" stocks have subsequent 1/2/3 month DGTW benchmark-adjusted returns at the end of Quarters 1&3 of 1.09%, 1.38%, and 1.88%. "Always below" stocks outperform "Disclosed-JA" stocks by 0.93% and 1.14% over the next 1/2 months, which is statistically and economically significant. Superior performance of "Always below" stocks relative to "Disclosed-JA" stocks at the end of Quarters 1&3 is consistent with *hiding motives.* In Panel B, both "Always below" stocks and "Disclosed-JA" stocks exhibit significantly negative future returns at the ends of Quarters 2&4, which is consistent with future performance distortion induced by full disclosure. Panel C examines differences of future returns between Quarters 1&3 and Quarters 2&4 for "Always below" and "Disclosed-JA" stocks. Similar to "Just moved-out" stocks, "Always below" stocks at Quarters 1&3 outperform those at Quarters 2&4 in the next 1/2/3 months, respectively. We also calculate the return differences for "Disclosed-JA" stocks between Quarters 1&3 and Quarters 2&4, which is also significantly positive. To control window dressing related effects, we calculate the future return difference of "Always below" stocks between Quarters 1&3 and 2&4, and find that it is significantly higher than the difference of "Disclosed-JA" stocks' future returns between

Quarters 1&3 and Quarters 2&4. [21] In conclusion, Table 11 indicates that "Always below" stocks are associated with superior future performance, and these results are consistent with *hiding motives*.

5.5 Window dressing

5.5.1 Window dressing efforts

In this section, we quantify the dynamics of window dressing behaviors in Quarters 2&4 versus Quarters 1&3. Following Agarwal, Gay, and Ling (2014), we calculate the average ranking scores of stocks in the funds' portfolios in Quarters 1&3 and 2&4, respectively.[22] As shown in Figure 5, the ranking score at the end of Quarters 2&4 is significantly higher than that of Quarters 1&3, indicating stronger efforts of window dressing at the ends of Quarters 2&4. Figure 5(a) show that ranking scores gradually start to increase from around 35 days before the ends of Quarters 2&4, while in Quarters 1&3 the ranking score starts to decrease around 30 days before the ends of the quarter, and only slightly increases in the last 10 days. As only top-10 holdings are disclosed at the ends of Quarters 1&3, window dressing distortions measured by the increase of ranking scores should mainly concentrate among top-10 holdings. In Figure 5(b), we only calculate the average ranking scores of stocks below top-20. As we expected, the slope of the last 10-day increase of ranking scores in Quarters 1&3 flattens out, while the general pattern of ranking scores in Quarters 2&4 remains the same.

5.5.2 Cross-sectional window dressing distortion under partial disclosure

To provide further evidences on the reduction of window dressing under partial disclosure, we examine the relationship between window dressing efforts and fund performance distortions in the cross section. For each fund-quarter, we define window dressing efforts as the difference between ranking scores at day 0 and -30 before the quarter-end. Positive values generally indicate

[21] We calculate the differences in differences returns for longer period and find that the future 12 months return difference of "Initiated Below" stocks and "Disclosed-JA" stocks between Quarters 1&3 and Quarters 2&4 is 3.93%.
[22] At each date, we rank stocks into percentiles based on their past 60 days cumulative returns and then assign scores between 1 and 100 to stocks according to their percentiles. We then calculate the equal-weighted average ranking score of the stocks in the portfolio for each fund at daily basis. Value weighting generates qualitatively similar results. To account for fund specific characteristics, the previous 1-year moving average ranking score is subtracted from the daily ranking score for each fund. In the final step, we take the equal-weighted average of the adjusted ranking score across funds and across event days.

stronger window dressing effort than negative values. For each fund-quarter, fund performance distortion is defined as the difference between the portfolio's future 1/2/3-month returns of day 0 and day -30. Negative values suggest stronger performance distortion than positive values. The future 1/2/3-month returns are calculated similarly to Figure 1.

In Table 12, we compare window dressing efforts and fund performance distortions at the ends of Quarters 1&3 versus Quarters 2&4. In Panel A, we rank funds into 10 deciles by the funds' average efforts of window dressing across all Quarters 2&4. In Quarters 2&4, the majority of the window dressing deciles exhibit positive values except for the Low decile with a negative value of -4.6. This indicates strong window dressing efforts for the other 9 deciles, except for the lowest decile. For each decile, we calculate the average performance across funds in the subsequent 1/2/3-months. In Quarters 2&4, the performance generally increases from decile 1 (Low distortion decile) to decile 10 (High distortion decile). The differences in performance between decile 1 and 10 are statistically significant for the subsequent 1, 2, and 3 months, respectively. This pattern implies that higher levels of window dressing efforts cause more deteriorations of future portfolio performances. In Panel B, we rank funds into 10 deciles in a similar way as for Quarters 2&4. The majority of values of the window dressing efforts measure in Quarters 1&3 are negative. The only positive value is 2.75 for the High decile, implying mutual funds conduct much less window dressing efforts in Quarters 1&3. The performance distortion in Quarters 1&3 generally increases from decile 1 (Low decile) to decile 10 (High decile) and the differences of performance between decile 1 and 10 are significant. In the High decile, the subsequent 1/2/3 months performance distortion is negatively significant. The findings imply that weak effort of window dressing could still generate performance distortions for Quarters 1&3. [23]

In Panels A and B, we observe that stronger window dressing efforts are associated with larger fund performance distortions in the cross-section of funds both for Quarters 1&3 and for Quarters 2&4. However, this association could be due to reverse causality that funds with low investment skills, as reflected by poor performance, conduct more window dressing. To rule out this concern, we calculate the differences of window dressing efforts between Quarters 2&4 and Quarters 1&3 for each fund and sort funds into 10 deciles accordingly. This is to control for funds'

[23] We also find that in Quarters 1&3 funds' top-10 holding experience more performance distortions when funds spend more efforts of window dressing on top-10 holdings.

skill. We show the results in Table 12 Panel C. Similar to the results in Panels A and B, the performance distortion generally increases from decile 1 to 10, and the difference between decile 1 and 10 are statistically significant for the subsequent 1, 2 and 3 months, respectively. In untabulated results, we find that even for top-10 stocks more than 90% of funds spend more efforts on window dressing in Quarters 2&4 than in Quarters1&3, and consequently suffer more future performance distortions. Overall, the cross-sectional results in Table 12 and the time series results in Figure 5 point out that partial disclosure can mitigate performance distortions due to window dressing.

5.5.3 The impact of partial disclosure on window dressing in Quarters 2&4

Previous sections show that weaker window dressing efforts in Quarters 1&3 under partial disclosure are associated with less fund performance distortions compared to Quarters 2&4. However, partial disclosure at Quarters 1&3 might motivate funds to conduct more window dressing at Quarters 2&4 due to reduced disclosure at Quarters 1&3. Similar to this argument, in the 2004 U.S. disclosure policy change [24] SEC state that increasing full disclosure frequency from semi-annually to quarterly could reduce window dressing manipulation by making the portfolio holdings more transparent. To address this concern, it would have been ideal to compare window dressing efforts at Quarters 2&4 in our sample with ones at a hypothetical scenario with full disclosure at Quarters 1&3. However, in the Chinese stock market there has never been a full disclosure requirement at a quarterly frequency. Alternatively, we look at 2004 U.S. disclosure policy change that the SEC changed mutual fund full disclosure frequency from semi-annually to quarterly to increase the transparency of disclosure. If the concern that reduced transparency at Quarters 1&3 increases window dressing in Quarters 2&4 is valid, we should observe that in the U.S. following the disclosure policy change of 2004, window dressing efforts in Quarters 2&4 decreased.

However, we do not find a reduction of window dressing efforts at Quarters 2&4 after 2004 using a Difference-in-Difference framework. Specifically, we consider U.S. active managed equity mutual funds between 1998 and 2008 and separate them into two groups based on their disclosure frequency before 2004. To measure window dressing efforts, we use Rank Gap and Backward

[24] Please See SEC Final Rule IC-26372 at http://www.sec.gov/rules/final/33-8393.htm.

Holding Return Gap (BHRG) following Agarwal, Gay, and Ling (2014). Appendix Table B3 presents that for all three different sample periods in Panel A, window dressing efforts at Quarters 2&4 for funds that are affected by the disclosure policy do not change significantly after May 2004. In Panel B with BHRG as a proxy, we find marginal increase in window dressing efforts after the policy shock for affected funds. Similarly, evidence from Dyakov, Harford, and Qiu (2021) shows no significant change in window dressing efforts for funds with volatile past performance after the 2004 regulatory change. Overall, these results suggest that changing disclosure transparency at Quarters 1&3 do not significant impact mutual funds' window dressing efforts in Quarters 2&4.

5.6 The impact of information collection and window dressing on future fund performance

In previous sections, we find a gap in subsequent returns of fund holdings between ends of Quarters 1&3 and 2&4, and show evidence of strategic concealing and reduced window dressing efforts under partial disclosure. In this section, we study how information collection and window dressing affect subsequent performance of fund holdings. Specifically, we use the following regression model.

$$\begin{aligned} Future\ \ 3\ month\ DGTW\ adjusted\ returns_{f,q} \\ = \gamma_0 + \gamma_1 * WindowDressingEffort_{f,q} + \gamma_2 * ActiveShareResidual_{f,q} \\ + \gamma_3 * SiteVisitAverage_{f,q} + \gamma_4 \times X_{f,q} + \varepsilon_{f,q}, \end{aligned} \quad (4)$$

where the dependent variable is the future three months DGTW benchmark-adjusted returns of fund *f* holding at the end of quarter *q*, further adjusted by the previous one-year moving average returns of fund *f*. $WindowDressingEffort_{f,q}$ is defined as the difference between average ranking score from day -4 to day 0 and average ranking score from day -34 to day-30 before the quarter-end for fund *f*.

For information collection efforts, we use two proxies based on the active share of fund holdings, and fund managers' site visits to firms before the end of the quarter. Specifically, for $ActiveShareResidual_{f,q}$ we first calculate the change between average active shares (Cremers and Petajisto, 2009) from day -4 to day 0 and average active shares from day -34 to day-30 before the quarter-end. This measure reflects how fund holdings are different from funds' benchmark index

towards the ends of quarters. With more private information collected, funds should have higher levels of active shares. However, window dressing could also cause funds' holdings to deviate from the benchmark, and increase active share. To remove the effect of window dressing, we regress the change of active shares on $WindowDressingEffort_{f,q}$ to get the residual which is defined as $ActiveShareResidual_{f,q}$.

The site visit variable is a more direct measure of fund managers' efforts to collect information. We take advantage of the fact that the Shenzhen Stock Exchange discloses the number of site visits of fund families to Shenzhen listed firms. While the Shanghai Stock Exchange does not publicize similar data, we use the site visits of fund families to Shenzhen listed Stocks to proxy for site visits of families to Shanghai listed stocks. We calculate the site visit frequency as the number of site visits of each fund family to Shenzhen listed companies during the last 30 trading days of the quarter, expressed as the percentage of the total site visits of all fund families during the calendar year. $SiteVisitAverage_{f,q}$ is defined as the average site visit frequency of the fund family *f* in quarters q and q-2. We take the average of two quarters to acknowledge that the site visit variable is constructed at the fund family level and based on the data from the Shenzhen Exchanges, while it is used to proxy for information collection efforts at the fund level in the Shanghai Exchange. The efforts at family and fund levels might not align well at some quarters, and therefore we take the average over quarters q and q-2 to generate a more representative measure on information collection efforts. [25]

We also include several control variables in the regression. *Fund Return [-1]* is the fund's NAV return during the previous quarter q-1. *Turnover* is the minimum of quarterly purchases and sales, divided by the portfolio size at the previous quarter-end. To make this coefficient's value more interpretable, we divide *Turnover* by 100. *Flow* is the change in total net assets between two consecutive quarters net of the increase due to returns, divided by the total net asset at the previous quarter-end. *Size* is the natural logarithm of the fund's total net assets (in millions of RMB) at the quarter-end.

[25] The reason we skip a quarter is that our analysis focuses on comparing Quarters 1&3 to 2&4. Taking average over q, q-2, q-4, q-6 generates qualitatively similar results, but reduce sample size significantly. So we report the one averaged over two quarters in the main text.

Table 13 presents the results. Window dressing effort is significantly negatively correlated with DGTW adjusted performance in the next three months, which is consistent with the prediction that stronger window dressing efforts deteriorate future fund performance. On the other hand, the three proxies for information collection are significantly positively correlated with future fund performance, which indicates that funds' information collection efforts are associated with better future performance of fund holdings.

We use Table 13 Column (7) to explain the magnitude of both information collection and window dressing on fund performance. The question of interest is how much information collection and window dressing can explain the future return difference between Quarters 1&3 and Quarters 2&4. To answer the question, we first calculate the average future 3-month DGTW benchmark adjusted returns for Quarters 1&3 (1.21%) and Quarters 2&4 (-1.71%). As a result, the average difference of DGTW adjusted returns in the next quarter between Quarters 1&3 and Quarters 2&4 is 2.92%. We further calculate that the average window dressing effort across all funds for Quarters 1&3 is -8.679 while for Quarters 2&4 is 9.356. Thus the average difference of window dressing efforts between Quarters 1&3 and Quarters 2&4 is -18.035. If we account for the coefficient (-0.030) of window dressing efforts on the DGTW adjusted returns in the next quarter, the impact is about 0.541 ((-0.03)*(-18.035)). Window dressing efforts can explain about 19% (0.541/2.92) of return difference between Quarters 1&3 and Quarters 2&4.

To quantify the impact of information collection, the average difference of *ActiveshareResidual*, and *SiteVisitsAverage* between Quarters 1&3 and Quarters 2&4 are 0.011, and 0.047, respectively.[26] We then multiply the coefficients of the two proxies by their average differences to obtain that the impacts of *ActiveshareResidual*, and *SiteVisitsAverage*, are 0.055 (0.011*5.03), and 0.253 (0.047*5.376). Summing the impacts of the two proxies, we infer they explain around 11% ((0.055+0.253)/2.92) of the return difference between Quarters 1&3 and Quarters 2&4. Taken together, information collection and window dressing can explain about 30% of the difference in future returns of fund holdings between the ends of Quarters 1&3 and Quarters 2&4.

[26] The average *ActiveshareResidual* across all funds for Quarters 1&3 (2&4) is 0.009 (-0.001). The average *SiteVisitsAverage* across all funds for Quarters 1&3 (2&4) is 0.203 (0.156).

6. Transparency, liquidity and risk of fund portfolios

In this paper, we highlighted that the extent of mutual fund disclosure is an important dimension of fund disclosure policy. Morning Star's Global Investor Experience Study 2020 reviewed 26 global markets in terms of best practices of mutual fund portfolio disclosure regulations. Twelve out of 26 markets require full disclosure of all positions in the semiannual and annual reports.[27] Markets that require full disclosure with quarterly frequency including Korea, South Africa and the US. Five markets require partial disclosure: Australia, Canada, Italy, Singapore and Taiwan.[28] The diversity of portfolio disclosure regulations around the world underscores the importance discussing optimal disclosure policy. While partial disclosure could increase funds' incentive to collect information and reduce their incentive to conduct window dressing, it could have potential costs such as deteriorating market efficiency by changing portfolio liquidity and risk. Bellow we discuss the potential costs of instituting a partial disclosure policy.

First, we examine whether partial disclosure can still provide high level of transparency of portfolio holdings to the public. In our mutual fund sample, the average assets under management of top-10 (20) stock holdings are 53% (81.6%) of the whole portfolio. Furthermore, the correlation of risk-adjusted returns between top-10 (20) holdings and the whole portfolio is around 0.92 (0.985), respectively. These statistics imply that top-10 holdings indeed account for a large fraction of assets under management, and the weighted performance of top-10 holdings are representative for the whole portfolio.

Next, we investigate whether partial disclosure leads to either decreased market liquidity or increased risk of fund portfolios. Agarwal et al (2015) finds that more frequent mandatory disclosure could improve market liquidity due to improved transparency. It is important to explore whether partial disclosure could potentially reduce market liquidity. We first calculate daily market liquidity measures including *Amihud*, *Rspread*, *Size-Weighted Rspread*, and *Effective Spread*, and

[27] These global markets include Belgium, Denmark, Finland, France, Germany, Hong Kong, Japan, Netherlands, New Zealand, Norway, Switzerland, and Thailand.

[28] Mutual funds in Australia are not required to publish full and complete disclosures of their portfolio holdings. For Canada, managers are only required to disclosure the top 25 positions in the portfolio on a quarterly basis. For Italy, managers are required to publish top 50 holdings or all holdings representing more than 0.5% of the portfolio semiannually. For Singapore, funds are required to disclose top-10 holdings in the semiannual and annual reports. For Taiwan, funds are required to disclose the top-10 holdings on a monthly basis and all holdings with a position size of 1% or more of the entire portfolio on a quarterly basis.

then calculate monthly market liquidity measures by averaging daily measures across dates within each stock-month and across stocks for each calendar month for Quarters 1&3 versus Quarters 2&4.[29] As shown in Table 14, we do not find significant differences of liquidity measures between Quarters 1&3 and Quarters 2&4. To rule out the concern that liquidity effects might be different across stock with different sizes, we further sort stocks into different size deciles and find that liquidity measures are not significantly different within each decile.[30] The results imply that the partial disclosure policy in Quarters 1&3 does not seem to reduce market liquidity.

Lastly, we look at the risk characteristics of the mutual fund portfolios at the ends of Quarters 1&3 and Quarters 2&4; shown in Table 15. We examine five dimensions of portfolio characteristics including volatility, idiosyncratic volatility, beta, size and book-to-market ratio. Volatility is total volatility of past 12 monthly stock returns. Idio.Vol and Beta are idiosyncratic volatility and portfolio beta from the four-factor model using past 36 monthly stock returns. Size rank is the ranking of the quarter-end market capitalization of the stock ranging from 1 (smallest) to 100 (largest). B/M rank is the ranking of the quarter-end book to market ratio of the stock ranging from 1 (smallest) to 100 (largest). Risk characteristics are first value- or equal-weighted across stocks within each fund and quarter, and then averaged across funds and quarters for Quarters 1&3 and Quarters 2&4, respectively. In Table 15, we report the risk characteristics for the whole portfolio, top-10 holdings and non top-10 holdings and calculate the differences for these portfolios between Quarters 1&3 and Quarters 2&4. The results show that there are no significant differences of these risk characteristics between Quarters 1&3 and Quarters 2&4. The implication is that the partial disclosure policy does not exacerbate the risk profile of fund portfolios for Quarters 1&3.

[29] The liquidity measures are defined as the follows. *Amihud* is the square root of the absolute value of the daily return over daily dollar volume as in Amihud (2002). *Rspread* is average difference between the bid and ask prices divided by their midpoint, equally weighted across all trades of a trading day. *Size-Weighted Rspread* is average difference between the bid and ask prices divided by their midpoint, weighted by their trade size across all trades of a trading day. *Effective Spread* is twice the absolute value of the difference between the execution price and the bid-ask midpoint divided by the midpoint of the bid-ask spread, averaged across all trades of a trading day.

[30] As robustness checks, we calculate the liquidity in different deciles by removing the first 15 and last 15 days and focusing on the middle periods of the quarters, which are more likely affected by disclosures. Similar to Table 14, we do not find significant differences of liquidity measures between Quarters 1&3 and Quarters 2&4.

7. Conclusion

We study the benefits and costs of a partial portfolio disclosure policy by taking advantage of a unique hybrid mutual fund holdings disclosure policy in China, and utilizing a novel dataset that covers the entire daily trading records of all mutual funds in the Shanghai Stock Exchange from 2005 to 2018.

Our empirical findings show that partial disclosure has several benefits. First, it increases funds' incentive to collect and capitalize their information. We further explore the sources of information funds hide and find that stocks hidden from disclosure are associated with good earnings announcement news and other information-sensitive events. Second, partial disclosure significantly reduces window dressing activities, and consequently decreases the associated distortions to portfolios' future performance.

We also consider potential costs associated with a partial disclosure policy. We show that partial disclosure can still provide high level of transparency of portfolio holdings to the public, and that the benefits do not come at the expense of reducing liquidity or increasing the risk of the fund's portfolio.

Our empirical evidence has policy implications on the ongoing debate regarding the optimal design of portfolio disclosure policies. Overall, our results suggest that a hybrid of full and partial quarterly disclosure policy might be better than quarterly full disclosure. One should not interpret our evidence as suggesting a policy that requires quarterly partial disclosure dominates one requiring quarterly full disclosure. The natural experiment we take advantage of does not enable us to answer this question. As to the extent of the partial disclosure, our evidence focuses on a top-10 partial disclosure rule. A broader analysis of what is the optimal fraction of holdings required to be disclosed is left for future research.

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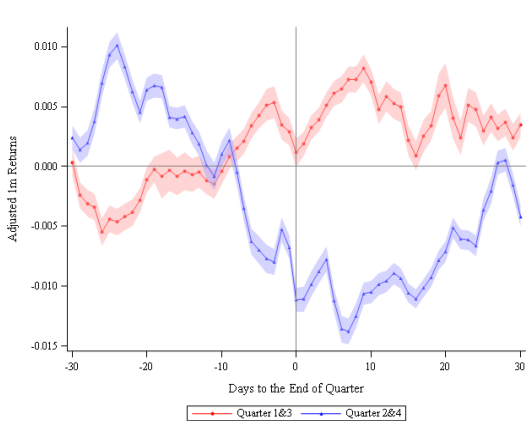
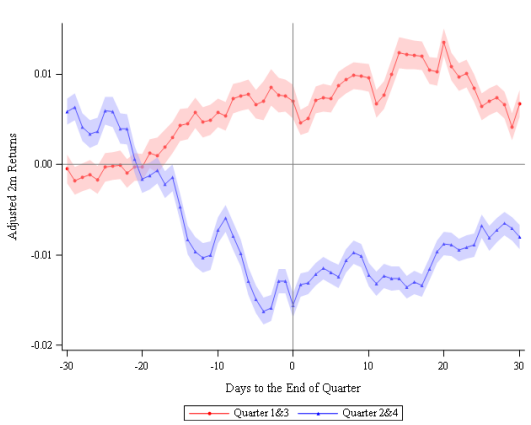
Figure 1. Future returns of the portfolio holdings for Quarters 1&3 versus Quarters 2&4

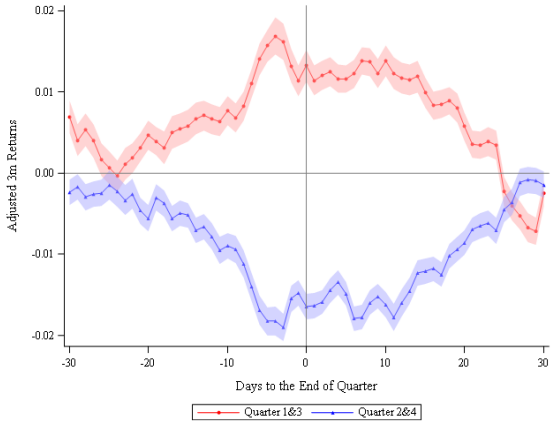
This figure presents the future 1/2/3 months returns of the portfolio holdings. For each fund on each date, we first calculate the future 1/2/3 months DGTW benchmark-adjusted returns of the stocks in the portfolio holdings. We then take the value-weighted average benchmark-adjusted returns across all the stocks within each fund for each date. In order to control for fund fixed effects, we further adjust the value-weighted future returns by the previous one-year moving average returns of each fund. Finally, we take the equal-weighted average adjusted future 1/2/3 months returns across funds at daily basis. Figures (a) to (c) shows the equal-weighted average returns with 95% confidence interval across days from -30 to 30 around the ends of Quarters 1&3 and 2&4.



(a) Future 1-month returns



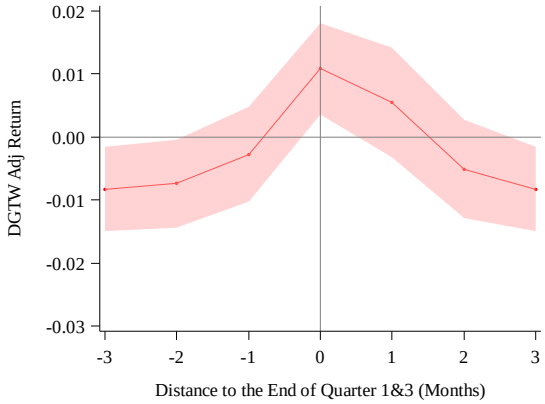
(b) Future 2-month returns



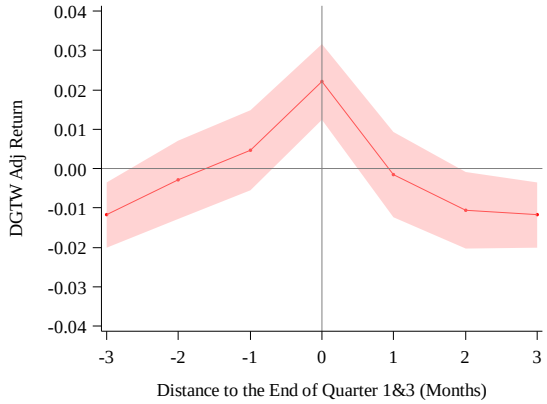
(c) Future 3-month returns

Figure 2. Performance of "Just-moved-out" stocks at month-end: DGTW characteristics adjusted return

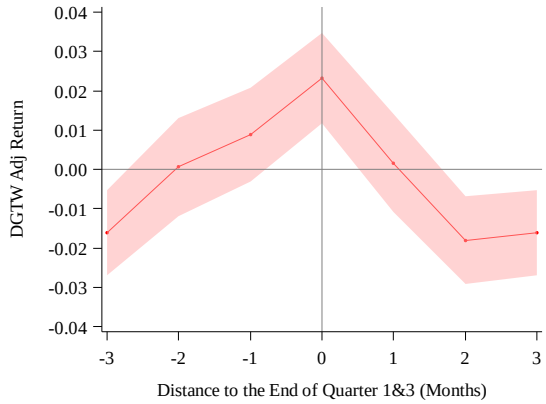
This figure shows the differences of future 1/2/3 months DGTW characteristics-adjusted returns between "Just moved-out" and "Disclosed-JA" stocks defined at each month-end. We first calculate the future 1/2/3 months DGTW benchmark-adjusted returns for all "Just moved-out" and "Disclosed-JA" stocks starting from the end of each month. We then take the value-weighted average DGTW benchmark-adjusted returns across "Just moved-out" and "Disclosed-JA" stocks within each fund and across all funds for each month-end. This figure plots the differences of average future 1/2/3 months DGTW benchmark-adjusted returns between "Just moved-out" and "Disclosed-JA" stocks with 95% confidence interval.



(a) Future 1 month



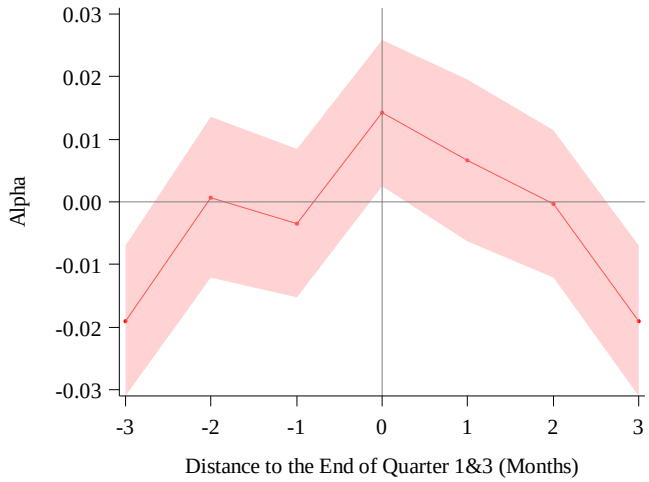
(b) Future 2 months



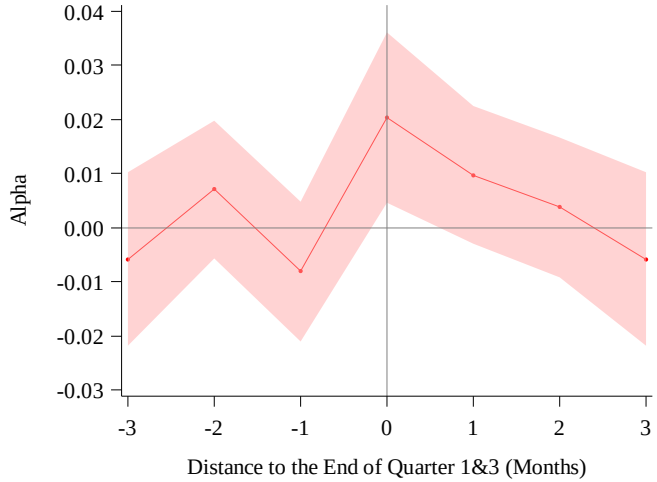
(c) Future 3 months

Figure 3. Performance of "Just-moved-out" stocks at month-end: calendar portfolio alpha

This figure shows the differences of calendar portfolio alphas between "Just moved-out" and "Disclosed-JA" stocks defined at each month-end. For each fund at each month-end, we calculate the value-weighted daily raw returns of "Just moved-out" and "Disclosed-JA" stocks. The abnormal return measure is calculated by regressing the raw returns time series on the daily Carhart (1997) four factors and Liu, Stambaugh, and Yuan (2019) China four factors. We then multiply the 3-month daily alphas by 60 to match the horizon. For each calendar month, the average performance for "Just moved-out" and "Disclosed-JA" stocks is calculated by average portfolio alphas across funds. This figure reports the differences of calendar portfolio alpha between "Just moved-out" and "Disclosed-JA" stocks for the future 3 months.



(a) Carhart four-factor model



(b) China four-factor model

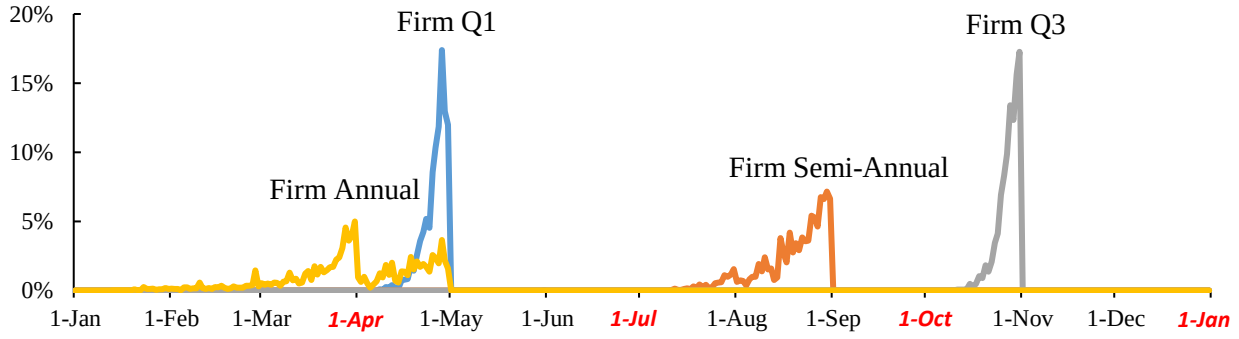
Figure 4. The schedule of firm earnings announcement dates and fund portfolio disclosure dates

This figure shows the average distributions of firm earnings announcements and fund portfolio disclosures across dates within a year estimated from 2005 to 2018.

Figure (a) reports the average distribution of firm earnings announcements across a year. The horizontal axis shows all dates within one year. The vertical axis reports the historical probability of earnings announcements happening on the specific dates. For each quarter, the probability of earnings announcements on each date is calculated as the number of firms announcing earnings on that date divided by the total number of firms reporting earnings for each reporting period. We take the average probability on the dates across all years from 2005 to 2018 and plot the distribution in this figure.

Figure (b) reports the distribution of fund portfolio disclosure across a year. The horizontal axis shows all dates within one year. The vertical axis reports the historical probability of funds disclosing holdings on the specific dates. For each quarter, the probability of funds disclosing holdings on each date is calculated as the number of funds disclosing holdings divided by the total number of funds. We take the average probability on the dates across all years from 2005 to 2018 and plot the distribution in this figure.

(a) Firm earnings announcements



(b) Fund portfolio disclosure

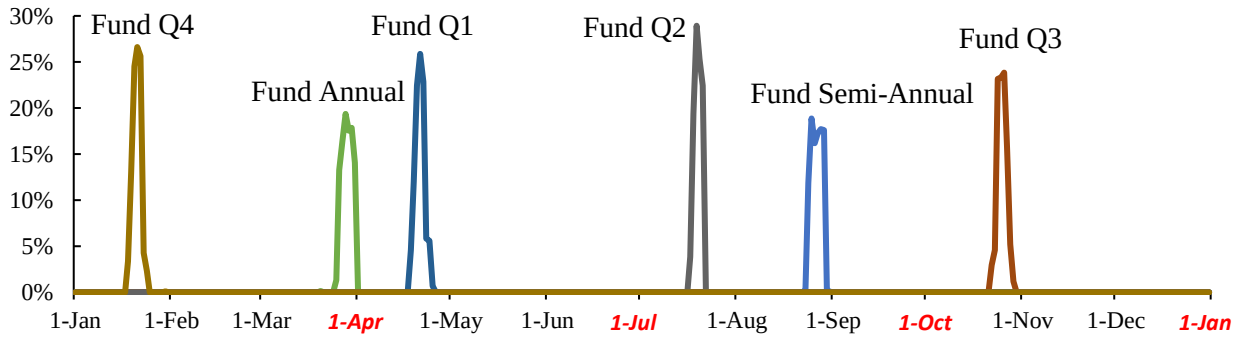
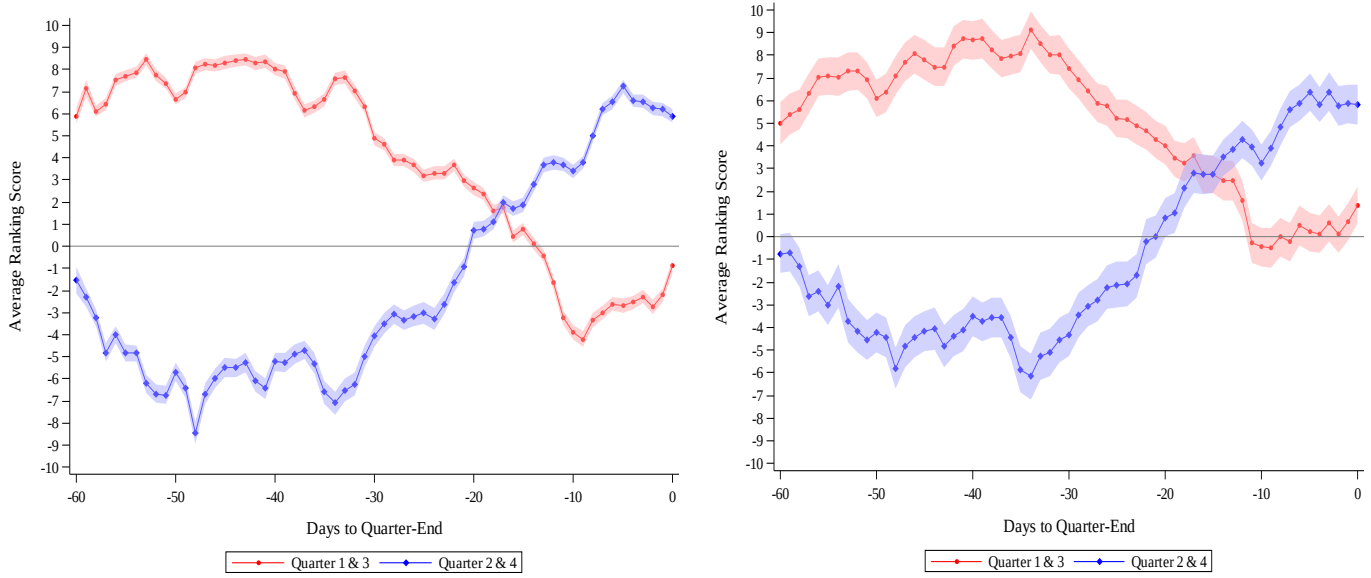


Figure 5. Window dressing before the quarter-end: stock return ranking scores

This figure shows the average ranking scores of stocks in the funds' portfolios in Quarters 1&3 and 2&4, respectively. Figure (a) shows average ranking scores of all the stocks in the fund portfolio. Figure (b) shows the average ranking scores of stocks below top-20.

We calculate the ranking scores in the following way. At each date, we first calculate the past 60 days cumulative returns of each stock and rank stocks into percentiles based on their past 60 days cumulative returns and then assign scores between 1 and 100 to stocks according to their percentiles. We then calculate the equal-weighted average ranking scores of the stocks in the portfolio for each fund at daily basis. To account for fund specific characteristics, the previous 1-year moving average ranking score is subtracted from the daily ranking score for each fund. In the final step, we take the average of the adjusted ranking score across funds and across event days. The figures show the averages by event days to the quarter-end across funds.



(a) All the stocks in the portfolio

(b) Stocks below top-20

Table 1. Definition of "Just moved-out" and "Disclosed-JA" stocks

This table explains the criteria of "Just moved-out" and "Disclosed-JA" stocks. "Just moved-out" stocks are the stocks that meet the strategic concealing motives of mutual fund managers. "Disclosed-JA" stocks are defined as the benchmark stocks to evaluate the performance of "Just moved-out" stocks.

Basic Definition: "Just moved-out" and "Disclosed-JA" stocks	
"Just moved-out" stocks	*Moved just below*: stock that is above top-10 threshold at the end of second last week and is ranked 1-5th below the top-10 at the end of each quarter, with position decrease less than 20%.
	Outperform: the ranking score (normalized based on the past 60 days cumulative returns) of the stock is higher than the average ranking score of the stocks that rank 8th, 9th, and 10th above the top-10 threshold at the end of each quarter.
	Actively moved-out: stock that is moved out of top-10 either by actively selling or buying other stocks in the last week of each quarter.
	Build within the same quarter: the position of the stock is built up within the quarter, and not held by the fund at the end of the preceding quarter.
"Disclosed-JA" stocks	Stock that is ranked 8th, 9th, 10th of the top-10 threshold at the end of each quarter.

Table 2. Summary Statistics of fund-level characteristics

This table reports the summary statistics of fund characteristics. Our final sample consists of 1648 equity funds from 2005 to 2018. We take the equal-weighted average of the variables across all funds. The # of trading dates is the total number of trading days across all funds. The # of quarters is total number of quarters with trading data in our sample period. The # of unique stocks ever hold is the total number of stocks that the fund has ever hold in our sample period. The average daily market value is the daily average market capitalization of stocks in the mutual fund portfolio. The average daily # of stocks hold is the daily average number of stocks hold in the mutual fund portfolio.

	# Obs.	Mean	Std. Dev.	Min	Med.	Max
# of trading dates	1648	1379.2	902.7	480.0	926.0	3308.0
# of quarters	1648	23.4	14.8	8.0	16.0	55.0
# of unique stocks ever hold	1648	435.1	223.8	19.0	401.5	1373.0
Avg. daily mkt. value (million yuan)	1648	482.8	1081.0	1.3	98.0	16737.6
Avg. daily # of stocks hold	1648	25.3	23.4	2.0	18.6	314.2

Table 3. Performance of "Just moved-out" stocks: DGTW characteristic-adjusted return

This table reports DGTW benchmark-adjusted returns for both "Just moved-out" and "Disclosed-JA" stocks held for different time horizons. Panels A-C report the DGTW benchmark-adjusted returns evaluated 1/2/3 months after each quarter-end for "Just moved-out" and "Disclosed-JA" stocks, and the differences between the two.

We first calculate the future 1/2/3 months DGTW benchmark-adjusted returns for all "Just moved-out" and "Disclosed-JA" stocks starting from the end of each quarter. We then take the value-weighted average benchmark-adjusted returns across "Just moved-out" and "Disclosed-JA" stocks within each fund and across all funds for each quarter. Panel A, B and C report the average DGTW benchmark adjusted returns with *t*-test statistics. Year fixed-effects are included to account for return correlation within year. *T*-statistics in parentheses. Coefficients marked with ∗∗∗, ∗∗, and ∗ are significant at the 1%, 5%, and 10% level, respectively.

Panel A. Quarters 1&3

	Future DGTW Adjusted Returns (%)		
Stock Type	1m	2m	3m
Just moved-out	1.01***	2.09***	3.34***
	(4.07)	(6.55)	(8.43)
Disclosed-JA	-0.07	-0.11	1.02**
	(-0.30)	(-0.35)	(2.58)
Diff: Just moved-out - Disclosed-JA	1.08***	2.20***	2.32***
	(3.10)	(4.89)	(4.14)

Panel B. Quarters 2&4

	Future DGTW Adjusted Returns (%)		
Stock Type	1m	2m	3m
Just moved-out	-1.79***	-3.05***	-3.03***
	(-7.02)	(-9.31)	(-7.42)
Disclosed-JA	-0.95***	-1.86***	-1.40***
	(-3.74)	(-5.69)	(-3.46)
Diff: Just moved-out - Disclosed-JA	-0.84**	-1.20**	-1.63***
	(-2.34)	(-2.59)	(-2.82)

Panel C. Diff: Quarters 1&3 - Quarters 2&4

	Future DGTW Adjusted Returns (%)		
Stock Type	1m	2m	3m
Just moved-out	2.79***	5.14***	6.37***
	(7.87)	(11.23)	(11.18)
Disclosed-JA	0.87**	1.74***	2.43***
	(2.46)	(3.83)	(4.28)
Diff: Just moved-out - Disclosed-JA	1.92***	3.40***	3.94***
	(3.84)	(5.27)	(4.91)

Table 4. Performance of "Just moved-out" stocks: calendar portfolio approach

This table reports the performance of "Just moved-out" stocks using calendar portfolio approach following Agarwal et al (2013). In Columns (1)- (3), we show the future 3-month Carhart (1997) four-factor alpha for both "Just moved-out" and "Disclosed-JA" stocks starting from the ends of Quarters 1&3 and Quarters 2&4. We also calculate the differences between Quarters 1&3 and Quarters 2&4 for the two types of stocks. In Columns (4)-(6), we estimate alpha using Liu, Stambaugh, and Yuan (2019) China four-factor models.

For each fund at each quarter-end, we calculate the value-weighted daily raw returns of "Just moved-out" and "Disclosed-JA" stocks in the following three months. We regress the daily raw returns of the portfolios on the factors to obtain the alpha for "Just moved-out" and "Disclosed-JA" stocks. We then multiply 3-month daily alphas by 60 to match the horizon. The average performances of the "Just moved-out" and "Disclosed-JA" stocks at the ends of Quarters 1&3 and Quarters 2&4 are calculated by average portfolio alphas across funds and calendar quarters within the corresponding portfolio category.

Coefficients marked with ∗∗∗, ∗∗, and ∗ are significant at the 1%, 5%, and 10% level, respectively.

	Alpha in the following three months (%)					
	Carhart 4-factor model			China 4-factor model		
Stock Type	(1) Quarters 1&3	(2) Quarters 2&4	(3) Diff: (1) – (2)	(4) Quarters 1&3	(5) Quarters 2&4	(6) Diff: (4) – (5)
(a) Just moved-out	2.38***	-0.95**	3.33***	3.34***	0.32	3.02***
	(5.66)	(-2.23)	(5.56)	(5.84)	(0.55)	(3.71)
(b) Disclosed-JA	0.97**	0.89**	0.08	1.31**	0.90	0.41
	(2.33)	(2.08)	(0.14)	(2.31)	(1.55)	(0.50)
Diff: (a) – (b)	1.41**	-1.84***	3.25***	2.03**	-0.58	2.62**
	(2.39)	(-3.05)	(3.85)	(2.53)	(-0.71)	(2.28)

Table 5. Performance of "Just moved-out" stocks: DGTW characteristic-adjusted return after controlling for analyst recommendations

This table reports the DGTW characteristic-adjusted returns for "Just moved-out" after controlling for analyst recommendations. The future return differences between "Just moved-out" and "Disclosed-JA" stocks in Quarters 1&3 are estimated as follows:

$$Future\ DGTW\ adjusted\ returns_{f,s,q} = \beta_1 Q13JustMovedOutDummy_{f,s,q} + \sum \beta_2 Dummies\ for\ other\ stock\ types_{f,s,q} + \beta_3 AnalystRecom_{s,q} + Year\ FE + Stock\ FE$$

Where where *f, s, q* denotes fund, stock, and quarter, respectively. The dependent variables are future 1/2/3-month DGTW adjusted returns of stock *s* held by fund *f* at the end of quarter *q*. The key independent variable $Q13JustMovedOutDummy_{f,s,q}$ equals 1 if quarter q is Quarter 1 or 3, and stock *s* held by fund *f* is classified as a "Just moved-out" stock according to the criteria in Table 2. *RecomChg* is the consensus change of recommendations averaged across analysts. To account for asymmetric predictability of the changes, we include the positive changes, *RecomChg_Pos (= max{RecomChg, 0})*, and the negative changes, *RecomChg_Neg (= min{RecomChg, 0})*, in the regression separately. We also include two dummy variables indicating the sign of *RecomChg*, *I(RecomChg > 0)* and *I(RecomChg < 0)*.

	Dependent Variable: DGTW adjusted returns								
	1m			2m			3m		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Q13JustMovedOutDummy	1.13**	1.13***	1.13**	2.21***	2.23***	2.22***	2.81***	2.84***	2.82***
	(2.62)	(2.69)	(2.61)	(3.28)	(3.35)	(3.27)	(3.35)	(3.42)	(3.34)
I(*RecomChg* > 0)		0.36			0.84			2.10	
		(0.54)			(0.84)			(1.23)	
I(*RecomChg* < 0)		1.71			1.41			2.15	
		(1.30)			(0.87)			(1.19)	
RecomChg_Pos		-0.27			-6.97			-13.73*	
		(-0.08)			(-1.60)			(-1.87)	
RecomChg_Neg		-0.22			-5.48			-9.74	
		(-0.04)			(-1.01)			(-1.31)	
NotMissingRetTarget			-0.20			-0.30			-0.12
			(-0.50)			(-0.66)			(-0.22)
RetTarget			0.06			0.38			-1.78
			(0.03)			(0.21)			(-0.63)
DiD	1.96***	1.96***	1.96***	3.75***	3.77***	3.75***	4.09***	4.12***	4.09***
	(3.45)	(3.52)	(3.44)	(3.99)	(4.05)	(3.98)	(3.62)	(3.69)	(3.62)
Other Type Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Stock Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	738,517	738,517	738,517	741,129	741,129	741,129	744,478	744,478	744,478
R^2	0.341	0.342	0.341	0.273	0.273	0.273	0.223	0.224	0.223

Table 6. Frequency of "Just moved-out" stocks in Quarters 1&3 by fund family

This table describes the frequency of "Just moved-out" stocks in Quarters 1&3 by fund family. Each "Just moved-out" stock is regarded as one hiding activity for each fund at each Quarter 1 or3, respectively. We calculate the *# of hiding activities per fund* for each fund family and rank the fund families into quintiles accordingly. *# of hiding activities per fund* is the total number of hiding activities divided by the total number of funds having hiding activities for each fund family. *% of funds having hiding activities* is the number of funds having hiding activities divided by the total number of funds in the family. *% time hiding in fund family* is the number of quarters that have "Just moved-out" stocks divided by the total number of quarters for each fund family in the sample. *Average % time hiding across funds in the family* is the equal-weighted average of the percentage of hiding quarters for each fund across funds having hiding activities within the fund family. *Average % time hiding across funds in the family (uncond.)* is the equal-weighted average of the percentage of hiding quarters for each fund across all funds within the fund family. *Fund Family size* is the total amount of asset under management in billion RMB. For each fund family quintile, we report the average of these variables in the table.

"Just moved-out" stocks						
Rank of # of hiding activities per fund	# of hiding activities per fund	% of funds having hiding activities	% time hiding in fund family	Average % time hiding across funds in the family	Average % time hiding across funds in the family (uncond.)	Fund family size (in billions)
1 = Low	0.08	7.50%	10.40%	10.80%	1.60%	81.1
2	0.35	27.90%	30.20%	17.80%	5.00%	193.8
3	0.51	39.80%	31.00%	21.20%	8.60%	124.9
4	0.71	44.00%	35.00%	19.00%	7.90%	90.3
5 = High	1.2	58.40%	39.50%	16.80%	10.40%	118.8
All	0.53	31.70%	35.70%	16.60%	5.60%	

Table 7. "Just moved-out" stocks: CAR around the next quarter earnings announcements

This table reports the cumulative abnormal returns around the earnings announcement dates in the next quarter for both "Just moved-out" and "Disclosed-JA" stocks, and the differences between the two types. Panels A-C show the cumulative abnormal returns for different event windows using CAPM model for Quarters 1&3, Quarters 2&4 and the differences between the two.

For each stock, we first estimate beta using the past 120 trading day stock returns and market returns before the event window based on market model. We then estimate the daily abnormal returns for the most recent earnings announcements after the end of each quarter for each stock using the estimated beta. We finally aggregate the daily alpha of the specific event window across "Just moved-out" and "Disclosed-JA" stocks, respectively. We take value-weighted average alphas across stocks and funds for each event window. Panel A, B and C report the cumulative abnormal returns for the event window [-2, 1], [-2, 2], [-2, 3], [-2, 5] and [-2, 10].

Year fixed-effects are included to account for return correlation within year. *T*-statistics in parentheses. Coefficients marked with ∗∗∗, ∗∗, and ∗ are significant at the 1%, 5%, and 10% level, respectively.

Panel A. Quarters 1&3

	CAR of the Event Window (%)				
Stock Type	[-2, 1]	[-2, 2]	[-2, 3]	[-2, 5]	[-2, 10]
Just moved-out	0.78***	0.91***	0.94***	0.97***	1.05***
	(5.89)	(6.12)	(5.94)	(5.65)	(4.81)
Disclosed-JA	0.31**	0.17	0.24	0.01	0.04
	(2.36)	(1.16)	(1.53)	(0.05)	(0.18)
Diff: Just moved-out - Disclosed-JA	0.47**	0.74***	0.70***	0.97***	1.01***
	(2.49)	(3.50)	(3.11)	(3.96)	(3.27)

Panel B. Quarters 2&4

	CAR of the Event Window (%)				
Stock Type	[-2, 1]	[-2, 2]	[-2, 3]	[-2, 5]	[-2, 10]
Just moved-out	-0.13	-0.30**	-0.34**	-0.31*	-0.39*
	(-0.98)	(-1.98)	(-2.07)	(-1.76)	(-1.74)
Disclosed-JA	0.41***	0.38**	0.36**	0.16	0.43*
	(3.03)	(2.49)	(2.24)	(0.88)	(1.94)
Diff: Just moved-out - Disclosed-JA	-0.55***	-0.68***	-0.70***	-0.47*	-0.82***
	(-2.84)	(-3.16)	(-3.05)	(-1.87)	(-2.61)

Panel C. Diff: Quarters 1&3 - Quarters 2&4

	CAR of the Event Window (%)				
Stock Type	[-2, 1]	[-2, 2]	[-2, 3]	[-2, 5]	[-2, 10]
Just moved-out	0.91***	1.21***	1.27***	1.28***	1.44***
	(4.82)	(5.69)	(5.62)	(5.20)	(4.61)
Disclosed-JA	-0.10	-0.21	-0.12	-0.15	-0.39
	(-0.52)	(-0.97)	(-0.54)	(-0.60)	(-1.26)
Diff: Just moved-out - Disclosed-JA	1.01***	1.41***	1.40***	1.43***	1.83***
	(3.77)	(4.71)	(4.36)	(4.11)	(4.15)

Table 8. Abnormal returns around the next quarter earnings announcements: mutual fund trades

This table reports the market-adjusted returns (MAR) and benchmark-adjusted returns (BAR) around the earnings announcement dates in the next quarter for both weight-increased and weight-decreased stocks at quarter-ends following Baker et al. (2010).

For each stock-quarter, the event date (day 0) is defined as the date of the most recent earnings announcements after the end of quarter. MAR are the differences between raw returns in event window [-2, 2] and the value-weighted market returns in the corresponding dates. BAR are the differences between raw returns in event window [-2, 2] and the characteristic benchmark returns, which is calculated as the value-weighted average [-2, 2] raw announcement returns of stocks in the corresponding 5×5×5 size, book-to-market, and momentum DGTW benchmark portfolio in the same quarter. We first calculate value-weighted average of MAR and BAR across stocks for each fund-quarter portfolio and then average them across funds for each quarter. Time-series average MAR and BAR and the corresponding *t*-statistics are reported in the table. We calculate the averages for Quarters 1&3, Quarters 2&4 and all quarters, respectively.

T-statistics are reported in parentheses. Coefficients marked with ∗∗∗, ∗∗, and ∗ are significant at the 1%, 5%, and 10% level, respectively.

	Market-adjusted returns (MAR, %)			Benchmark-adjusted returns (BAR, %)		
	Weight-increased	Weight-decreased	Increased – Decreased	Weight-increased	Weight-decreased	Increased – Decreased
Quarter 1&3	0.49*	0.08	0.41**	0.46***	0.19	0.27
	(1.77)	(0.39)	(2.03)	(2.71)	(1.38)	(1.33)
Quarter 2&4	0.13	0.27	-0.14	0.08	0.18	-0.11
	(0.64)	(1.16)	(-1.00)	(0.42)	(0.80)	(-0.93)
All Quarters	0.31*	0.18	0.13	0.26**	0.19	0.08
	(1.80)	(1.14)	(1.03)	(2.09)	(1.41)	(0.66)

Table 9. "Just moved-out" stocks at the ends of Quarters 1&3: firms with frequently early announcements

This table shows the probability of hiding, for early and late announcement firms in Quarters 1&3. Early (late) announcements are defined as ones within (beyond) 15 trading days after the ends of Quarters 1&3. In each Quarter 1 or 3, firms are defined as frequently early (late) earnings announcement firms when they have more (less) than 60% of quarters with early announcements among all previous Quarters 1&3. *Average trading days between quarter-end and announcement* is the number of trading days from the quarter-end to the earnings announcement dates calculated for each firm and then averaged across all firms and all Quarters 1&3. *Likelihood of hiding* is calculated as the number of "Just moved-out" stocks among the early and late earnings announcement firms to the total numbers of firm-quarter pairs.

Summary statistics about early and late announcement firms

	No. of firm-quarter pairs	Pct. of firm-quarter pairs	Average trading days between quarter-end and announcement	Likelihood of hiding (%)
Early announcement firms	3,152	12.4%	14.75	1.89
Late announcement firms	22,360	87.6%	16.47	2.62
Diff: early - late			-1.72***	-0.73**
			(-3.44)	(-2.26)

Table 10. "Just moved-out" stocks and their predictability about other irregular information sensitive events

This table reports the predictability of "Just moved-out" stocks related to irregular information sensitive events. These events include M&A deals, dividend payouts, executive changes, and large shareholder holding increase.

Panel A reports the unconditional probability of these events for "Just moved-out" and "Disclosed-JA" stocks in Quarters 1&3 or Quarters 2&4, and the differences between these different types. The unconditional probability is calculated as the number of "Just moved-out" ("Disclosed-JA") stocks with irregular information sensitive events in the next quarter divided by the total number of "Just moved-out" ("Disclosed-JA") stocks in the current quarter.

Panel B reports the logit regression results showing the predictability of "Just moved-out" stocks for irregular information sensitive events. The dependent variable is a dummy variable that equals to 1 if there is an event in future 2 months or 3 months. *Q13Dummy* is a dummy variable that equals to 1 if the quarter is Quarter 1 or 3, otherwise 0 for Quarter 2 or 4. *JustMovedOutDummy* is a dummy variable that equals to 1 if stock that is above top-10 threshold at the end of week -1 and is ranked 1-5th below the top-10 in the last week (week 0) of each quarter, with position decrease less than 20%. *Log(Market Capitalization)* is natural log of the market capitalization of the stock at the end of week -1, all data provided by CSMAR. *Sales Growth* is the natural log of current annual sales scaled by previous year sales. *Return on Equity* is ratio of earnings to average equity at the end of last fiscal year. *Tobin's Q* is the market value of assets over the book value of assets. *P/E Ratio* is the ratio of the year-end stock price to earnings per share at the end of last fiscal year. *Accounting Liquidity Ratio* is the ratio of net liquid assets to total assets at the end of last fiscal year. *Debt-to-Asset Ratio* is ratio of debt to equity at the end of last fiscal year. All accounting related control variables are winsorized at 1% at the upper and lower tail. *Stock Return [-60, -1]* is daily cumulative return of the stock over the last 60 trading days before the end of the quarter. *Amihud Illiquidity Measure* is measured as the daily ratio of absolute stock return to its dollar volume averaged the last 60 trading days. *M&A in the Preceding Quarter* is a dummy variable that equals to 1 if there exist M&A deals in the preceding quarter.

Panel A: Unconditional probability of events in the next quarter

	Stock Type		
	Just moved-out	Disclosed	Diff: Just moved-out - Disclosed
Quarters 1&3	4.32%	2.60%	1.72%***
			(3.02)
Quarters 2&4	1.63%	2.39%	-0.75%
			(-1.30)
Diff: Q1&3 - Q2&4	2.69%***	0.22%	2.47%***
	(4.68)	(0.38)	(3.04)

Panel B: Logit regression

	Dependent Variable: Events in the Future 2 or 3 Months			
	(1)	(2)	(3)	(4)
	3 months	3 months	2 months	2 months
Q13Dummy	-0.740*	-0.609	-0.828*	-0.570
	(-1.89)	(-1.53)	(-1.93)	(-1.30)
JustMovedOutDummy	-0.360	-0.489	-0.319	-0.334
	(-1.10)	(-1.42)	(-0.92)	(-0.90)
Q13Dummy×JustMovedOutDummy	1.059**	1.060**	1.388***	1.363**
	(2.43)	(2.33)	(2.69)	(2.43)
Log(Market Capitalization)	0.0302	-0.0368	0.0684	-0.130
	(0.37)	(-0.29)	(0.74)	(-0.90)
Sales Growth	0.207	-0.0202	0.554	0.241
	(0.48)	(-0.05)	(1.11)	(0.46)
Return on Equity	-0.00989	-0.0114	0.00424	0.00668
	(-0.83)	(-0.90)	(0.31)	(0.45)
Tobin's Q	0.0663	0.111	0.119*	0.188**
	(1.02)	(1.50)	(1.78)	(2.52)
P/E Ratio	-0.000877	-0.000952	-0.00106	-0.000954
	(-0.79)	(-0.84)	(-0.68)	(-0.63)
Accounting Liquidity Ratio	0.0229	0.0546	-0.0776	-0.0709
	(0.23)	(0.63)	(-0.76)	(-0.61)
Debt-to-Asset Ratio	0.0895	0.501	-0.0118	0.365
	(0.10)	(0.50)	(-0.01)	(0.24)
M&A in the Preceding Quarter	0.501	0.603*	0.620	0.756*
	(1.44)	(1.69)	(1.58)	(1.86)
Stock Return [-60, -1]		1.607***		0.985*
		(3.29)		(1.86)
Amihud Illiquidity Measure		0.320		0.571**
		(1.46)		(2.45)
Intercept	-2.922**	-5.227***	-3.341**	-7.018***
	(-2.03)	(-2.91)	(-2.06)	(-3.48)
Fixed Effects:				
Quarter Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
Number of Observations	3,425	3,089	2,895	2,462

Table 11. Performance of "Always below" stocks: DGTW characteristic-adjusted return

This table reports the DGTW benchmark-adjusted for both "Always below" and "Disclosed-JA" stocks held for different time horizons. Panels A-C reports the DGTW benchmark-adjusted returns evaluated 1/2/3 months after each quarter-end for "Always below" and "Disclosed-JA" stocks, and the differences between the two. At each quarter-end, "Always below" stocks are defined as the stocks initiated within the same quarter, outperformed the average ranking score of the stocks that rank 8th, 9th, and 10th of the top-10, and ranked 1-5th below the top-10 at the end of the quarter. "Disclosed-JA" stocks are defined as the stocks ranked 8th, 9th, 10th of the top-10 threshold at the end of the quarter.

We first calculate the future 1/2/3 months DGTW benchmark-adjusted returns for all "Always below" and "Disclosed-JA" stocks starting from the end of each quarter. We then take the value-weighted average benchmark-adjusted returns across "Always below" and "Disclosed-JA" stocks within each fund and across all funds for each quarter. Panel A, B and C report the average DGTW benchmark adjusted returns with *t*-test statistics. Year fixed-effects are included to account for return correlation within year. *T*-statistics in parentheses. Coefficients marked with ∗∗∗, ∗∗, and ∗ are significant at the 1%, 5%, and 10% level, respectively.

Panel A. Quarters 1&3

	Future DGTW Adjusted Returns (%)		
Stock Type	1m	2m	3m
Initiated Below	1.09*	1.38*	1.88**
	(1.95)	(1.89)	(2.28)
Disclosed-JA	0.16	0.25	1.11**
	(0.45)	(0.73)	(2.46)
Diff: Initiated Below - Disclosed-JA	0.93**	1.14*	0.77
	(2.43)	(1.99)	(1.18)

Panel B. Quarters 2&4

	Future DGTW Adjusted Returns (%)		
Stock Type	1m	2m	3m
Initiated Below	-1.03**	-2.06***	-2.05***
	(-2.28)	(-3.77)	(-2.65)
Disclosed-JA	-0.73***	-1.38***	-1.57***
	(-2.90)	(-3.62)	(-3.02)
Diff: Initiated Below - Disclosed-JA	-0.03	-0.68*	-0.47
	(-0.81)	(-1.69)	(-0.97)

Panel C. Diff: Quarters 1&3 - Quarters 2&4

	Future DGTW Adjusted Returns (%)		
Stock Type	1m	2m	3m
Initiated Below	2.12***	3.44***	3.93***
	(2.95)	(3.79)	(3.51)
Disclosed-JA	0.89*	1.62***	2.68***
	(1.98)	(3.18)	(3.89)
Diff: Initiated Below - Disclosed-JA	1.23**	1.82**	1.24
	(2.32)	(2.6)	(1.52)

Table 12. Window dressing effort and fund performance distortion

This table presents the relationship between window dressing effort and fund performance distortion. For each fund-quarter, window dressing effort is defined as the difference between ranking scores at day 0 and -30 before the quarter-end. Fund performance distortion is defined in a similar way by replacing ranking score with portfolio's future 1/2/3-month returns adjusted by market return and historical average return (the same as the returns calculated in Figure 5). Fund level window dressing efforts and performance distortions in Quarters 1&3 and Quarters 2&4 are then calculated as the averages of fund-quarter level variables across corresponding quarters. Funds are ranked by their average window dressing efforts and divided equally into 10 deciles. This table shows the average performance distortions of funds in each decile and the difference between the highest and the lowest deciles. Panel A and B show the results in Quarters 2&4 and Quarters 1&3, respectively. Panel C shows the results using the differences between Quarters 2&4 and Quarters 1&3 for both window dressing efforts and performance distortions.

Panel A. Quarters 2&4

	W.D. Effort	Performance Distortion					
		1m		2m		3m	
Rank of W.D. Effort	Mean	Mean	t-stat.	Mean	t-stat.	Mean	t-stat.
1 = Low	-4.6	-0.0092	-3.07	0.0062	1.55	0.0373	9.41
2	1.76	-0.0141	-6.11	-0.0005	-0.18	0.0189	6.25
3	4.06	-0.0137	-8.11	-0.0013	-0.66	0.0084	3.53
4	5.65	-0.0139	-7.31	-0.0034	-1.31	0.0031	1.19
5	6.89	-0.0111	-6.58	-0.0059	-2.92	-0.0012	-0.47
6	8.09	-0.0127	-7.2	-0.0094	-4.22	-0.0089	-3.94
7	9.8	-0.0158	-7.78	-0.0144	-6.55	-0.0086	-3.42
8	11.79	-0.0147	-7.09	-0.0106	-3.9	-0.0073	-2.54
9	14.63	-0.0183	-8.91	-0.0184	-6.82	-0.0134	-5.26
10 = High	22.67	-0.0218	-7.18	-0.0332	-7.28	-0.0305	-6.29
Diff: High - Low	27.27	-0.0125	-2.93	-0.0393	-6.5	-0.0678	-10.82

Panel B. Quarters 1&3

	W.D. Effort	Performance Distortion					
		1m		2m		3m	
Rank of W.D. Effort	Mean	Mean	t-stat.	Mean	t-stat.	Mean	t-stat.

1 = Low	-20.96	0.003	0.98	0.0186	6.18	0.024	6.74
2	-14.98	0.0066	2.93	0.0153	6.14	0.0186	5.28
3	-12.32	0.002	0.92	0.0077	3.52	0.0126	5.11
4	-10.48	0.0046	3.26	0.0097	4.72	0.0115	4.96
5	-9.05	0.0011	0.8	0.0058	3.48	0.0103	5.94
6	-7.81	0.001	0.61	0.0028	1.61	0.0069	3.49
7	-6.64	-0.0009	-0.5	0.0013	0.61	0.0028	1.15
8	-5.3	-0.0016	-0.83	0.0009	0.38	-0.0021	-0.78
9	-3.41	-0.0043	-1.54	0.0003	0.08	0.001	0.26
10 = High	2.75	-0.0228	-6.24	-0.0205	-4.91	-0.0296	-6.07
Diff: High - Low	23.7	-0.0259	-5.41	-0.0391	-7.6	-0.0536	-8.88

Panel C. Quarters 2&4 - Quarters 1&3

	W.D. Effort differences	Performance Distortion					
		1m		2m		3m	
Rank of W.D. Effort differences	Mean	Mean	t-stat.	Mean	t-stat.	Mean	t-stat.
1 = Low	-3.98	0.0167	3.15	0.0303	5.04	0.0691	8.92
2	6.72	-0.0071	-2.46	-0.0005	-0.14	0.0166	3.49
3	10.11	-0.0081	-2.73	0.0001	0.04	0.0098	2.38
4	12.65	-0.0095	-3.58	-0.0059	-1.93	0.0049	1.1
5	15.08	-0.0153	-6.95	-0.0109	-3.64	-0.0091	-2.52
6	17.23	-0.0183	-6.12	-0.0183	-4.13	-0.0174	-3.81
7	19.65	-0.027	-10.15	-0.0297	-9.65	-0.0271	-7.92
8	23.13	-0.0171	-5.2	-0.0272	-7.27	-0.0211	-4.48
9	28.15	-0.0242	-9	-0.0268	-7.52	-0.0286	-6.44
10 = High	40.19	-0.0239	-5.64	-0.0438	-7.46	-0.0554	-8.07
Diff: High - Low	44.16	-0.0406	-5.98	-0.0741	-8.82	-0.1246	-12.03

Table 13. The impacts of information collection and window dressing on future fund performance

This table presents the impacts of information collection and window dressing on the future fund performance. The dependent variable is the future three months DGTW benchmark-adjusted returns of fund *f* holding at the end of quarter *q*, further adjusted by the previous one-year moving average returns of fund *f*. We use WindowDressingEffort to proxy for fund managers' window dressing efforts, which is defined as the difference between average ranking score from day -4 to day 0 and average ranking score from day -34 to day-30 before the quarter-end. We use two different variables to proxy for information collection efforts. ActiveshareResidual is defined as the following. We first calculate the difference between average active share (Cremers and Petajisto, 2009) from day -4 to day 0 and average active share from day -34 to day-30 before the quarter-end. We then regress the difference on WindowDressingEffort to get the residual. ActiveshareResidual is defined as the residual of the quarter *q*. SiteVisitAverage is the average site visit frequency of the fund family in quarters *q* and *q*-2. The site visit frequency is the number of site visits of each family to Shenzhen listed companies during the last 30 trading days of the quarter, expressed as the percentage of the total site visits of all sample fund families during the calendar year. Turnover is the minimum of quarterly purchases and sales, divided by the portfolio size at the previous quarter-end. To make the coefficient value more interpretable, we divide Turnover by 100. Flow is the change in total net assets between two consecutive quarters net of the increase due to returns, divided by the total net asset at the previous quarter-end. Size is the natural logarithm of the fund's total net assets (in millions of RMB) at the quarter-end.

	Future 3-month DGTW adjusted returns						
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)
WindowDressingEffort		-0.022***			-0.023***	-0.028***	-0.030***
		(-8.48)			(-8.25)	(-8.93)	(-8.72)
ActiveshareResidual			4.262***		4.339***		5.030***
			(4.54)		(4.62)		(3.99)
SiteVisitAverage				7.445***		6.080***	5.376***
				(8.37)		(6.73)	(5.66)
Fund Return [-1]	-0.002	-0.005	0.001	0.017***	-0.002	0.015**	0.018***
	(-0.34)	(-1.09)	(0.23)	(2.86)	(-0.35)	(2.53)	(2.98)
Turnover	-0.034***	-0.034***	0.170	0.019	0.170	0.020	1.082**
	(-5.74)	(-5.82)	(1.31)	(0.54)	(1.33)	(0.60)	(2.00)
Flow	0.605***	0.634***	0.677***	0.652***	0.709***	0.683***	0.803***
	(4.29)	(4.48)	(3.90)	(3.72)	(4.10)	(3.90)	(4.18)
Size	-0.253***	-0.269***	-0.238***	-0.277***	-0.260***	-0.295***	-0.333***
	(-4.20)	(-4.47)	(-3.27)	(-3.31)	(-3.57)	(-3.55)	(-3.47)
Observations	24,690	24,690	20,355	16,702	20,355	16,702	14,240
R-squared	0.052	0.056	0.048	0.055	0.052	0.060	0.059
- Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
- Fund FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 14. Liquidity measures for Quarters 1&3 versus Quarters 2&4

This table presents the liquidity measures across different size groups for the holdings in the mutual funds for Quarters 1&3 versus Quarters 2&4. We calculate four liquidity measures including Amihud, Rspread, Size-weighted Rspread and Effective Spread. *Amihud* is the square root of the absolute value of the daily return over daily dollar volume as in Amihud (2002). *Rspread* is average difference between the bid and ask prices divided by their midpoint, equally weighted across all trades of a trading day. *Size-Weighted Rspread* is average difference between the bid and ask prices divided by their midpoint, weighted by their trade size across all trades of a trading day. *Effective Spread* is twice the absolute value of the difference between the execution price and the bid-ask midpoint divided by the midpoint of the bid-ask spread, averaged across all trades of a trading day. The daily liquidity measures are winsorized at 1% and 99% percentile. We calculate the monthly market liquidity measures by averaging daily measures across dates within each stock-month and then averaging across stocks for each calendar month. The table shows the average monthly liquidity measures for Quarters 1&3 and Quarters 2&4. Stocks are divided evenly into 10 groups based on their market capitalization every month.

	All	By Size Decile									
		1=Min	2	3	4	5	6	7	8	9	10=Max
Amihud ($\times 10^6$):											
Q1&3	20.39	33.39	27.89	25.51	23.13	21.01	19.22	17.39	15.19	12.76	8.43
Q2&4	20.05	33.47	27.70	25.10	22.69	20.61	18.72	16.91	14.83	12.36	8.08
Diff	0.34	-0.08	0.19	0.41	0.44	0.40	0.50	0.48	0.35	0.40	0.35
(t-stat)	(0.54)	(-0.03)	(0.09)	(0.21)	(0.27)	(0.27)	(0.38)	(0.41)	(0.34)	(0.46)	(0.62)
Rspread (bp):											
Q1&3	17.59	20.70	19.57	19.23	18.80	18.12	17.41	16.88	15.85	15.34	14.05
Q2&4	17.24	20.20	19.09	18.88	18.38	17.83	17.14	16.64	15.45	15.00	13.79
Diff	0.36	0.50	0.48	0.35	0.42	0.30	0.27	0.25	0.39	0.34	0.26
(t-stat)	(1.29)	(0.36)	(0.47)	(0.39)	(0.52)	(0.38)	(0.37)	(0.37)	(0.64)	(0.61)	(0.54)
Size-weighted Rspread (bp):											
Q1&3	19.79	23.51	22.23	21.74	21.21	20.43	19.57	18.95	17.80	17.05	15.37
Q2&4	19.45	23.11	21.79	21.48	20.84	20.15	19.31	18.73	17.40	16.64	15.06
Diff	0.35	0.40	0.44	0.26	0.38	0.28	0.26	0.22	0.40	0.40	0.31
(t-stat)	(1.13)	(0.27)	(0.40)	(0.27)	(0.44)	(0.34)	(0.34)	(0.31)	(0.59)	(0.67)	(0.59)
Effective Spread (bp):											
Q1&3	18.22	21.18	20.12	19.81	19.43	18.77	18.07	17.56	16.55	16.03	14.72
Q2&4	17.81	20.66	19.59	19.41	18.95	18.40	17.74	17.26	16.10	15.64	14.41
Diff	0.42	0.53	0.53	0.40	0.48	0.37	0.34	0.30	0.45	0.39	0.30
(t-stat)	(1.44)	(0.36)	(0.50)	(0.42)	(0.58)	(0.46)	(0.45)	(0.42)	(0.70)	(0.68)	(0.61)

Table 15. Portfolio risk characteristics

This table presents several risk characteristics of portfolios held by funds at the ends of Quarters 1&3 and Quarters 2&4. Volatility is variance of past 12 monthly stock returns. Idio.Vol. and Beta are idiosyncratic volatility and portfolio beta estimated from the four-factor model using past 36 monthly stock returns. Size rank is the ranking of the quarter-end market capitalization of the stock ranging from 1 (smallest) to 100 (largest). B/M rank is the ranking of the quarter-end book to market ratio of the stock ranging from 1 (smallest) to 100 (largest). Risk characteristics are first value-weighted or equal-weighted averaged across stocks within each fund and quarter, and then averaged across funds and quarters for Quarters 1&3 and Quarters 2&4, respectively.

		Value-Weighted			Equal-Weighted		
		All	Top-10	Non Top-10	All	Top-10	Non Top-10
Volatility:							
	Q1&3	0.1331	0.1312	0.1352	0.1350	0.1313	0.1363
	Q2&4	0.1319	0.1307	0.1349	0.1341	0.1311	0.1357
	Diff: Q1&3-Q2&4	0.0012	0.0004	0.0004	0.0009	0.0002	0.0006
	(t-stat.)	(0.12)	(0.04)	(0.04)	(0.09)	(0.02)	(0.05)
Idio.Vol.:							
	Q1&3	0.0987	0.0964	0.1010	0.1005	0.0968	0.1018
	Q2&4	0.0974	0.0959	0.1001	0.0995	0.0964	0.1010
	Diff: Q1&3-Q2&4	0.0013	0.0005	0.0010	0.0010	0.0004	0.0008
	(t-stat.)	(0.30)	(0.12)	(0.22)	(0.23)	(0.10)	(0.20)
Beta:							
	Q1&3	0.9774	0.9493	1.0096	1.0028	0.9559	1.0195
	Q2&4	0.9795	0.9491	1.0127	1.0047	0.9564	1.0212
	Diff: Q1&3-Q2&4	-0.0021	0.0002	-0.0031	-0.0019	-0.0005	-0.0017
	(t-stat.)	(-0.10)	(0.01)	(-0.15)	(-0.09)	(-0.02)	(-0.08)
Size Rank:							
	Q1&3	79.8123	83.5928	75.8598	75.9970	83.0210	73.8821
	Q2&4	80.4447	84.0836	76.5489	76.6461	83.5786	74.4643
	Diff: Q1&3-Q2&4	-0.6324	-0.4908	-0.6891	-0.6491	-0.5576	-0.5822
	(t-stat.)	(-0.34)	(-0.23)	(-0.41)	(-0.41)	(-0.27)	(-0.39)
B/M Rank:							
	Q1&3	48.3483	49.4209	47.5297	47.5623	49.3027	47.1560
	Q2&4	48.0111	49.5265	46.8664	47.0711	49.2756	46.5003
	Diff: Q1&3-Q2&4	0.3372	-0.1056	0.6634	0.4911	0.0270	0.6557
	(t-stat.)	(0.20)	(-0.05)	(0.41)	(0.31)	(0.01)	(0.42)

Appendix A Matching Algorithm

The matching is conducted at the ending date of each semi-annual reporting period, as CSMAR has full holding information while at the quarterly end, only top-10 holding stocks are publicly available. Given the fact that we only have mutual fund trading data from the Shanghai Stock Exchange, we do not observe their holdings in the Shenzhen Stock Exchange. We first count the numbers of funds separately in the Shanghai Stock Exchange and CSMAR. The first few columns in table A1 report the numbers. The second column reports the numbers of funds in the Exchange dataset in each period. The third column reports the funds holding Shanghai listed stocks, so this is a subset of second column. We exclude bond funds and monetary funds, and some equity funds that occasionally do not hold any shanghai stocks at that quarter end. We need to remove these funds as we do not know their position on Shenzhen exchange stocks, so no matching can be done. The fourth column reports the number of active equity funds from CSMAR at each corresponding period, which is slightly higher than the Column 3 in most of periods, as Column 3 exclude some funds that do not hold any shanghai stocks at the reporting date as mentioned above.

Matching is conducted between Columns 3 and 4. Theoretically for each of the funds in Column 3, we should find a perfect match in Column 4. However, in reality matching might not be perfect due to data entry or reporting errors, etc. Therefore, a matching algorithm is designed to tackle these issues.

For a fund *p* in the exchange database in each period, we calculate the distance between this fund's holdings and every fund from CSMAR in the following equation:

$$sqrt\left(\left(\text{HoldingValue}_{\text{Stock1}_{\text{Exchange}}} - \text{HoldingValue}_{\text{Stock1}_{\text{CSMAR}}}\right)^2 + \left(\text{HoldingValue}_{\text{Stock2}_{\text{Exchange}}} - \text{HoldingValue}_{\text{Stock2}_{\text{CSMAR}}}\right)^2 + \cdots + \left(\text{HoldingValue}_{\text{Stockn}_{\text{Exchange}}} - \text{HoldingValue}_{\text{Stockn}_{\text{CSMAR}}}\right)^2\right)$$

where $\text{HoldingValue}_{\text{Stock1}_{\text{Exchange}}}$ and $\text{HoldingValue}_{\text{Stock1}_{\text{CSMAR}}}$ are the dollar value of holding stock *s* of a fund in Shanghai stock exchange or CSMAR, respectively.

The first round of matching requires a unique zero distance exact match between exchange funds and CSMAR funds, i.e. fund *p* in exchange only has the zero distance with fund *q* in CSMAR,

but not any other funds in CSMAR, and the same fund *q* in CSMAR only has the zero distance with the same fund *p* in Exchange, but not any other funds in Exchange. Column 'round 1' in Table 1 reports the number of matching.[31]

Round 2 focuses on the funds which are not matched in round 1. For a fund *p* in exchange in a period, we find the minimum distance fund *q* in CSMAR, and then for the same fund *q* in CSMAR, we find the minimum distance fund in exchange, if this is the same fund *p*, then *p* and *q* are matched in this round. Column 'round 2' in Table A1 reports the number of matching. After round 2, the average matching percentage reaches to 86%. We have also conducted round 3 in the same fashion. However, the number of newly matched pair is trivial. The average matching percentage only increases to 86.5%. Therefore, we only use the matching results from first two rounds, given the reduced credibility and trivial improved matching of round 3.

To validate the matching pairs from the first two rounds, we pool matching pairs across different periods together to check the consistency. In exchange database, there are 3460 unique fund codes. Among them, 3230 funds find matches from the two rounds of matching. For each of these 3230 fund codes, it might appear in several periods, especially for funds with long histories. In some periods, the matching is based on round 1, while in other periods, it is based on round 2. 59 out of 3230 matched exchange funds has 2 or more matched CSMAR fund IDs from different periods, and are removed from the sample due to contradicting matching results. We require that an exchange fund must have at least one year of data (i.e. two semi-annual periods of matching) to be included in the sample. After filtering, we have found 2688 final matches out of 3068 funds in exchange (87.6%). The matching sample accounts for about 94% of the equity funds in terms of total net assets (TNA) on Dec 31, 2018. For our analysis, we apply two more filters to the sample. First, we require that an exchange fund must have at least two years of data to be included in the sample. Second, we remove Index funds as they only adopt passive strategies. The resulting final sample includes 1648 equity funds from 2005 to 2018.

Next, we check the matching quality of our final sample. For each match in a period, we compute the scaled distance as the ratio of the distance to the maximum of total dollar values of

[31] Before 2009, there was a higher level of inconsistency in stock holding data between exchange and CSMAR, and only about 30% of funds are matched in the first round, while by average more than 60% of funds are matched in the first round after 2008. Therefore, we use data from 2009 to build matching sample and funds before 2009 are linked according to the matching results after 2008.

shares held by the exchange fund or CSMAR fund. This ratio can be interpreted as a percentage of matched holding between pairs. We compute for each match the mean and standard deviation of scaled distances across periods and report descriptive statistics across fund matches for both the computed means and standard deviation in Table A2. We can see that the overall matching quality is high. Specifically, the average of Distance_mean is 0.0106, which means that by average 98.94% of holding between a pair are matched. The average of Distance_std is 0.0171, which shows that the variation of matching quality is stable. However, there are some extreme cases as indicated by 99 percentile and maximum of Distance-mean. We manually check these holdings and find that the mismatches are mainly caused by the delayed recording of non-tradable shares in the stock exchange. These shares are mostly from private offerings, seasoned equity offerings, and recent initial public offerings with trading restrictions lasting for three months to one year. They will not appear in the stock exchange accounts until they become tradable. In quarterly reports, however, funds disclose the total number of holding shares, including both the tradable and the non-tradable ones. Therefore, we also validate these matching as well.

Table A1 Summary of matching pairs

Year	Exchange	Shanghai Exchange	CSMAR	round 1	round 2	round 3	matching percentage after round2	matching percentage after round3
Jun-09	431	404	408	292	86	2	0.936	0.941
Dec-09	494	465	484	125	302	6	0.918	0.931
Jun-10	533	503	538	355	111	3	0.926	0.932
Dec-10	602	572	602	230	271	9	0.876	0.892
Jun-11	675	615	685	444	117	5	0.912	0.920
Dec-11	741	661	783	398	199	5	0.903	0.911
Jun-12	825	727	840	526	154	2	0.935	0.938
Dec-12	920	747	877	605	90	4	0.930	0.936
Jun-13	1053	806	957	642	92	4	0.911	0.916
Dec-13	1204	857	1011	732	75	3	0.942	0.945
Jun-14	1326	971	1060	590	250	2	0.865	0.867
Dec-14	1459	1129	1204	843	124	2	0.857	0.858
Jun-15	1873	1618	1528	1194	63	5	0.778	0.781
Dec-15	2166	1777	1849	1453	51	10	0.846	0.852
Jun-16	2520	1987	2097	915	809	12	0.868	0.874
Dec-16	3034	2357	2421	794	1249	14	0.867	0.873
Jun-17	3482	2692	2848	914	1476	12	0.888	0.892
Dec-17	3782	2931	3056	1183	1414	16	0.886	0.892
Jun-18	4036	3034	3185	1420	1269	15	0.890	0.895
Average (14~18)				1035	745	10	0.860	0.865
Average (09~18)				719	432	7	0.891	0.897

Table A2 Matching quality of the final sample

Variable	Average	Std.dev	Max	P99	P95	Median	P5	P1	Min
Distance_mean	0.0106	0.0287	0.4945	0.1491	0.0363	0.0035	0.0001	0	0
Distance_std	0.0171	0.0356	0.3414	0.2147	0.071	0.0069	0.0001	0	0

Appendix B 2004 SEC disclosure policy

Table B3. Change of window dressing efforts after the 2004 SEC disclosure policy

This table presents the change of window dressing effort by mutual funds after SEC increase mutual fund disclosure frequency in May 2004 using a Difference-in-Difference framework. The sample consists of U.S. active managed equity mutual funds between 1998 and 2008 that exist at the end of 2003. We separate the funds into two groups based on their disclosure frequency before 2004 following Dyakov, Harford, and Qiu (2021). Specifically, if the mutual funds disclose quarterly holdings less than 75% of time before 2004, then they are classified as the "Affected funds" group; otherwise, they belong to the control group. The dummy variable "Affected" indicates the group of the fund. Another dummy variable, "Policy", equals one if the quarters are after May 2004, and equals zero otherwise. The dependent variables are window dressing efforts measured by Rank Gap and Backward Holding Return Gap (BHRG) following Agarwal, Gay, and Ling (2014). Panels A and B show the results for Rank Gap and BHRG, respectively. Columns (1)-(3) use the whole sample period from 1998 to 2008. Columns (4)-(6) focus on the two years around the regulation. Columns (7)-(9) follow Dyakov, Harford, and Qiu (2021) and use the whole sample period, but exclude 2004, the year of implementation. In all three sample period specifications, we consider three different types of disclosures: disclosures in all quarters, semi-annual disclosures in June and December, as well as semi-annual disclosures in Quarters 2 & 4 since not all funds have a fiscal year ending in December. Time and fund fixed-effects are included in all specifications. *t*-statistics using cluster robust standard errors clustered at fund levels are reported in parentheses. Coefficients marked with ∗∗∗, ∗∗, and ∗ are significant at the 1%, 5%, and 10% level, respectively.

Panel A. Rank Gap

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	1998~2008			May 2003~May 2005			1998~2008 excl. 2004		
	All Qtrs	Jun.&Dec.	Qtr 2&4	All Qtrs	Jun.&Dec.	Qtr 2&4	All Qtrs	Jun.&Dec.	Qtr 2&4
Policy × Affected	-0.0005	-0.0014	-0.0003	0.0025	-0.0025	-0.0013	-0.0004	-0.0020	-0.0006
	(-0.21)	(-0.36)	(-0.08)	(0.60)	(-0.43)	(-0.25)	(-0.13)	(-0.46)	(-0.17)
Constant	-0.0005	-0.0010	-0.0008	-0.0012	-0.0008	-0.0008	-0.0008	-0.0013*	-0.0010
	(-0.85)	(-1.41)	(-0.91)	(-1.13)	(-0.78)	(-0.66)	(-1.15)	(-1.74)	(-1.14)
Time & Fund Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	50,252	20,206	25,522	12,313	4,559	6,080	43,937	17,930	22,322
R-squared	0.206	0.259	0.237	0.405	0.553	0.523	0.199	0.262	0.239

Panel B. BHRG

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	1998~2008			May 2003~May 2005			1998~2008 excl. 2004		
	All Qtrs	Jun.&Dec.	Qtr 2&4	All Qtrs	Jun.&Dec.	Qtr 2&4	All Qtrs	Jun.&Dec.	Qtr 2&4
Policy × Affected	-0.0005	-0.0000	0.0005	0.0018*	0.0025*	0.0020*	-0.0005	0.0002	0.0009
	(-0.46)	(-0.01)	(0.42)	(1.94)	(1.79)	(1.78)	(-0.42)	(0.11)	(0.63)
Constant	0.0073***	0.0088***	0.0085***	0.0080***	0.0106***	0.0100***	0.0072***	0.0087***	0.0085***
	(27.52)	(32.19)	(28.67)	(35.76)	(40.54)	(39.52)	(25.91)	(33.61)	(29.26)
Time & Fund Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	51,604	20,121	26,011	12,429	4,541	6,173	45,313	17,855	22,822
R-squared	0.476	0.512	0.497	0.663	0.725	0.720	0.478	0.522	0.506