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Mispricing, Mutual Fund Flows, and Corporate Buybacks

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Abstract

Using price pressure induced by mutual fund flows, I show that firms significantly adjust their repurchase activity in response to undervaluation. Repurchase behavior is captured both by the likelihood of announcing open market repurchase (OMR) programs and the quarterly amount repurchased. Leveraging the 2003 mutual fund trading scandal as a natural experiment, I provide causal evidence that flow-induced valuation shocks drive repurchase decisions, with instrumental variable estimates revealing stronger effects than standard regressions imply. Further analysis of long-run stock performance reveals that the well-documented buyback anomaly is primarily driven by repurchase announcements following periods of negative fund flows. These findings point to limits to arbitrage as a key explanation for the slow correction of undervaluation in repurchasing firms and demonstrate how fund flows influence both corporate repurchase decisions and the market's price response to those announcements.

1 Introduction

Announcements of open market share repurchase programs typically elicit favorable reactions from the market. A well-documented body of empirical evidence shows that firms experience significant abnormal stock returns around the announcement date of repurchase programs. Studies such as Comment and Jarrell (1991), Kahle (2002), Grullon and

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Michaely (2004), Leng and Noronha (2013), and Bhattacharya and E. Jacobsen (2016) consistently report positive cumulative abnormal returns (CARs) in short windows surrounding repurchase announcements. However, the underlying reason for this positive market reaction remains subject to ongoing debate.

Two primary hypotheses have emerged to explain the informational content of repurchase announcements. The first is the *undervaluation hypothesis*, which posits that managers announce share repurchases when they believe their firm's stock is undervalued. Because managers are presumed to have superior information about their firm's intrinsic value, the repurchase announcement serves as a signal to the market that the firm is undervalued. The second is the *free cash flow hypothesis*, which argues that repurchases serve as a mechanism to mitigate agency problems. Specifically, when firms generate more cash flow than they can invest in positive net present value (NPV) projects, repurchases reduce the likelihood of inefficient capital allocation. In this view, announcement of repurchase program signals firm's commitment to returning excess cash to shareholders rather than squandering it on value-destroying investments.

Empirical work has attempted to adjudicate between these two competing theories, yet findings remain mixed. Grullon and Michaely (2004) directly contrast the two hypotheses by examining both market reactions and subsequent firm performance. They find no evidence of post-announcement improvement in operating performance, but they observe stronger abnormal returns for firms with lower market-to-book ratios, which they interpret as support for the free cash flow hypothesis. Similarly, Wang et al. (2009), in a study of UK firms, report that announcements of actual repurchases also elicit positive market reactions, particularly for firms with low Tobin's Q, but find no relation between the size of the repurchase and the magnitude of the reaction. They argue this evidence is more consistent with the agency-based explanation and inconsistent with the signaling of undervaluation.

On the other hand, Lie (2005) finds improvements in operating performance following repurchase announcements, particularly among firms that follow through with

actual repurchases. This suggests that at least some announcing firms deliver stronger-than-expected results, potentially supporting the undervaluation view. Moreover, several studies have documented long-run stock price overperformance for repurchasing firms. Ikenberry et al. (1995) report average abnormal buy-and-hold returns of 12.1% over four years following repurchase announcements, with returns reaching 45.3% for high book-to-market firms. Peyer and Vermaelen (2009) confirm that such long-run overperformance has persisted in more recent periods. Survey evidence further supports the undervaluation hypothesis: in Brav et al. (2005), 86% of CFOs cited undervaluation as one of their primary motivations for initiating a repurchase program.

Despite these empirical efforts, the literature has not reached a consensus on the relative explanatory power of the undervaluation and free cash flow hypotheses. Part of the difficulty stems from the use of noisy and conceptually ambiguous proxies. For instance, Tobin's Q is commonly used as a proxy for investment opportunities, yet it is also employed as a measure of mispricing. The fact that firms with low Q exhibit stronger market reactions could be interpreted as evidence for either hypothesis. Similarly, studies assessing operating performance post-announcement have produced conflicting results, and more fundamentally, often evaluate performance relative to past trends or industry peers rather than against market expectations. If a firm is undervalued precisely because the market holds excessively pessimistic expectations, as long as such firm delivers better-than-expected performance with regard to the expectations at the time of the announcement, it is experiencing an improvement in operating performance from the perspective of the undervaluation hypothesis—even if it underperforms relative to its own past or to its peers.

The identification of suitable counterfactuals is another challenge. Studies often compare repurchasing firms to non-repurchasing firms with similar observable characteristics. However, under the undervaluation hypothesis, repurchasing firms are unique precisely because they are mispriced. This undermines the premise that matched firms are valid controls, as the very absence of a repurchase announcement may indicate that the control firm is not similarly undervalued. Finally, some interpretations in the liter-

ature are methodologically problematic. For example, Wang et al. (2009) argue that if repurchases signal managerial confidence, then larger repurchases should elicit stronger reactions. However, the alleviation of agency problems is not binary either, and one could similarly argue that larger repurchases should lead to a greater reduction in agency concerns. Therefore, the lack of a correlation between repurchase size and market reaction could just as well be viewed as inconsistent with the free cash flow hypothesis.

In sum, the existing literature has produced valuable insights but remains constrained by methodological limitations and reliance on noisy, often ambiguous proxies. In this paper, I examine how corporate share repurchase activity responds to misvaluation—specifically, whether firms adjust their repurchase behavior in response to transitory deviations of stock prices from fundamental value. Establishing a causal link between mispricing and repurchase activity requires identifying shocks that affect prices without simultaneously altering firm fundamentals.

To this end, I propose mutual fund flows as a source of exogenous variation in valuation pressure. A growing body of evidence shows that mutual fund flows can exert significant and persistent influence on asset prices. Coval and Stafford (2007) document that mutual fund outflows can induce price pressure on the shares of firms held in their portfolios, with effects that persist for multiple quarters. Related studies find similar phenomena in other asset markets, including bonds and convertibles (Ellul et al., 2011; Mitchell et al., 2007). At a broader level, mutual fund flows have been shown to distort market efficiency: Lou (2012) links mutual fund flow patterns to momentum effects, while Anton and Anton and Polk (2014) demonstrate that common ownership by mutual funds induces excess co-movement in stock prices.

Using this insight, I first document a robust negative relationship between mutual fund flow pressure and firm repurchase activity. Firms experiencing net outflows from their mutual fund shareholders in the prior quarter are significantly more likely to announce Open Market Repurchase (OMR) programs and to repurchase larger amounts in the subsequent quarter, even after controlling for firm characteristics known to influence

payout decisions.

While fund flows are not fully exogenous—since they may respond in part to change in firms' fundamentals—they do contain plausibly exogenous components, particularly when driven by external shocks that affect mutual fund inflows and outflows independently of the fundamentals of the firms in their portfolios. I exploit one such shock: the 2003 U.S. mutual fund trading scandal, which triggered sustained outflows from the implicated fund families due to reputational damage, rather than changes in the fundamentals of the firms they held. This setting provides a natural experiment for identifying the causal effect of flow-induced mispricing on repurchase decisions.

Using a difference-in-differences framework, I show that firms with greater pre-scandal exposure to the affected fund families exhibit a sharp and statistically significant increase in both OMR announcement rates and repurchase amounts following the scandal, relative to less-exposed firms. Instrumental variables analysis confirms that the flow effect is causal: the exogenous component of flow pressure, driven by scandal exposure, strongly predicts subsequent repurchase activity. The IV estimates are notably larger than their OLS counterparts, indicating that conventional regressions may understate the true effect due to endogeneity bias.

Building on the finding that mutual fund flows causally affect repurchase activity—and recognizing that flows also constrain the arbitrage capacity of institutional investors—I further examine whether repurchase announcements are interpreted differently by the market depending on the flow environment in which they occur. Specifically, I separate OMR announcements into two groups: those made following quarters of negative or zero mutual fund flow, and those following positive flow. I then analyze the long-run stock price performance of each group over the 48 months following the announcement.

The results reveal a striking divergence. While both groups exhibit modest abnormal returns initially, the long-run outperformance is concentrated entirely among

firms announcing buybacks after experiencing fund outflows. These firms display significantly higher cumulative abnormal returns over three- and four-year horizons. This finding suggests that the well-documented "buyback anomaly"—persistent abnormal returns following repurchase announcements (Ikenberry et al., 1995; Peyer and Vermaelen, 2009) —is largely driven by a subset of announcements preceded by negative fund flows.

This insight offers a potential resolution to a longstanding puzzle. Peyer and Vermaelen (2009) show that a simple buy-and-hold strategy focusing on repurchasing firms delivers significant abnormal returns over a four-year horizon, a result that remains robust across time periods. They argue that the persistence of this anomaly, despite its simplicity and visibility, is difficult to reconcile with efficient markets. The findings in this paper suggest that mutual fund flow dynamics may impose a key limit to arbitrage. Flows are highly persistent—funds experiencing outflows are likely to experience poor flows and remain cash-constrained for several quarters. Consequently, these investors may be less able to act on undervaluation signals, such as repurchase announcements, thereby allowing mispricing to persist.

This mechanism aligns with the theoretical perspective of Pulvino (1998), who emphasizes that the price at which transactions occur depends critically on the presence and capacity of willing buyers. When institutional investors are constrained by redemption pressures, their ability to exploit mispricing—even when signaled by managerial actions—may be limited. Thus, mutual fund outflows may not only generate undervaluation but also delay its correction.

Further evidence supporting this view comes from an analysis of short-run announcement effects. In Table 9, I compare abnormal returns, trading volume, and turnover around the announcement day for each subgroup. Interestingly, while firms announcing after outflows exhibit stronger long-run performance, their announcements are met with significantly weaker immediate price and trading reactions. This muted response suggests that the market, particularly the constrained mutual fund segment, may be slower to process and act on the undervaluation signal in the presence of flow-induced

frictions.

This paper also contributes to the broader literature examining the real effects of financial markets on corporate behavior. A growing number of studies have explored how market frictions—particularly those stemming from institutional investor behavior—can influence firm decisions and outcomes. For instance, Edmans et al. (2012) exploit mutual fund redemptions as an instrument for price changes to study their impact on takeover activity, while Hau and Lai (2013) use equity fund fire sales during the 2007–2009 financial crisis to investigate how temporary underpricing affects corporate investment and employment. In this spirit, my findings demonstrate that variation in mutual fund flows exerts a significant influence on firms' repurchase behavior, highlighting how capital market dynamics can shape real corporate actions even in the absence of fundamental shocks.

2 Data

2.1 *Mutual Fund Data*

Quarterly mutual fund holdings are obtained from the Thomson Reuters CDA/Spectrum database for the period 1994–2020. This database compiles information from mandatory SEC filings and voluntary disclosures. Since holdings are typically reported at the end of a quarter but the effective report date may differ from the filing date, I follow standard practice and assume that managers do not trade between the report date and the quarter-end.

Additional fund-level characteristics—such as total net assets (TNA), net returns, and expense ratios—are obtained from the CRSP Survivorship-Bias-Free U.S. Mutual Fund Database. For funds with multiple share classes, I aggregate TNA across classes and compute TNA-weighted average returns. The CDA/Spectrum and CRSP datasets are linked via the MFLinks file. To ensure data quality, I restrict the sample to funds with TNA above $1 million and exclude fund-quarter observations where the TNA reported by CRSP and CDA/Spectrum differ by more than a factor of two.

Following prior literature (Chevalier and Ellison, 1997; Sirri and Tufano, 1998; Lou, 2012), I compute the net investment flow into fund i in quarter t as:

$$flow_{i,t} = \frac{TNA_{i,t} - TNA_{i,t-1}(1 + RET_{i,t}) - MGN_{i,t}}{TNA_{i,t-1}}, \tag{1}$$

where $RET_{i,t}$ is the net return of the fund, and $MGN_{i,t}$ captures the increase in assets due to mergers. Since exact merger dates are not reported, I use the last NAV report date of the target fund to approximate the merger timing, and assume flows occur at quarter-end. Inflows and outflows from fund initiations and liquidations are treated as equal to the fund's initial or final TNA, respectively.

To measure fund flow pressure at the firm level, I construct the Flow-Induced Trading (FIT) variable for firm j in quarter t:

$$FIT_{j,t} = \frac{\sum_i shares_{i,j,t-1} \cdot flow_{i,t}}{\sum_i shares_{i,j,t-1}}, \tag{2}$$

where $shares_{i,j,t-1}$ denotes the number of shares of firm j held by fund i at the end of quarter $t-1$. This variable captures the average flow-weighted pressure exerted by mutual funds holding the firm's stock.

2.2 *Repurchase Data*

Data on open market repurchase (OMR) program announcements are sourced from the Securities Data Corporation (SDC) Mergers, Acquisitions, and Repurchases database. I retain announcements for securities listed on the NYSE, NASDAQ, or AMEX, provided that corresponding return, accounting, and mutual fund holdings data are available from CRSP, COMPUSTAT, and CDA/Spectrum. These criteria yield a sample of 20,211 OMR announcements between 1994 and 2020.

To measure actual repurchase activity, I construct a firm-quarter level variable,

$QtrRepAmt_{j,t}$, defined as:

$$QtrRepAmt_{j,t} = \max(0, -net\_issue_{j,t}), \tag{3}$$

where $net\_issue_{j,t} = \log(adj\_SHROUT_{j,t}) - \log(adj\_SHROUT_{j,t-1})$ is the quarterly log change in split-adjusted shares outstanding. Thus, $QtrRepAmt$ captures repurchases by taking the negative of net issuance when firms reduce their outstanding shares and sets it to zero otherwise. This measure ensures that only quarters with net repurchase activity (i.e., a decline in shares outstanding) are counted as positive values, consistent with the goal of isolating actual buyback execution.

3 Empirical Findings

This section presents the core empirical analysis examining the relationship between mutual fund flows and corporate share repurchase activity. I begin by establishing baseline correlations using the Fama-MacBeth methodology, before turning to a natural experiment in the next section to investigate causality.

3.1 *Fund Flows and Corporate Repurchase Activity: Baseline Analysis*

I begin by analyzing whether mutual fund flows in the previous quarter influence a firm's repurchase behavior in the current quarter. Specifically, I examine two dimensions of repurchase activity. The first is the likelihood of announcing an Open Market Repurchase (OMR) program, captured by a binary indicator $OMR_{j,t}$ that equals 1 if firm j announces an OMR program in quarter t, and 0 otherwise. The second is the magnitude of actual share repurchases, measured by $QtrRepAmt_{j,t}$, defined as the maximum of zero and the negative of the winsorized quarterly log change in split-adjusted shares outstanding ($\max(0, -NetIssue_{j,t})$).

My key independent variable measures the trading pressure exerted on firm j due to mutual fund flows in the preceding quarter $(t-1)$. Following the literature, I construct

a measure of Flow-Induced Trading ($FIT_{j,t-1}$), which aggregates the individual flows of mutual funds weighted by their holdings in firm j as of the end of quarter $t-2$. From this, I derive two variables: (i) a binary indicator $FlowSign_{j,t-1}$, equal to 1 if $FIT_{j,t-1} > 0$ and 0 otherwise, capturing the direction of flow pressure; and (ii) a continuous variable $FlowLevel_{j,t-1}$, which normalizes $FIT_{j,t-1}$ cross-sectionally each quarter to have mean zero and unit variance, capturing the magnitude and direction of pressure relative to the market.

I control for a standard set of firm characteristics known to influence payout and financing decisions, measured at the end of quarter $t-1$. These include mutual fund ownership ($Own_{j,t-1}$), the book-to-market ratio ($BM_{j,t-1}$), the ratio of cash flow to total debt ($Cash_{j,t-1}$), the debt-to-assets ratio ($Debt_{j,t-1}$), firm size decile ($Size_{j,t-1}$), and prior-quarter excess stock return ($ExRet_{j,t-1}$). Except for $Size_{j,t-1}$ (a decile rank from 1 to 10) and $ExRet_{j,t-1}$ (already adjusted for market returns), all continuous variables—along with $FlowLevel_{j,t-1}$—are normalized cross-sectionally each quarter to have mean zero and standard deviation one.

To estimate the average relationship between fund flows and repurchase activity over the sample period (1994–2020), I implement the two-step Fama-MacBeth procedure (Fama and MacBeth, 1973). In the first step, I run quarterly cross-sectional regressions. For the binary outcome $OMR_{j,t}$, I estimate a Probit model; for the continuous outcome $QtrRepAmt_{j,t}$, I estimate an OLS model. The general specification is:

$$Outcome_{j,t} = \alpha_t + \beta_t FlowMeasure_{j,t-1} + \boldsymbol{\gamma} t' Controls j, t-1 + \epsilon_{j,t} \tag{4}$$

where $Outcome_{j,t}$ is either $OMR_{j,t}$ or $QtrRepAmt_{j,t}$, and $FlowMeasure_{j,t-1}$ denotes either $FlowSign_{j,t-1}$ or $FlowLevel_{j,t-1}$. Coefficients α_t, β_t, and $\boldsymbol{\gamma}_t$ are estimated separately each quarter.

In the second step, I compute time-series averages of the estimated coefficients. For the OLS regressions, I report the mean of the quarterly coefficients. For the Probit regressions, I first compute the Average Marginal Effect (AME) for each variable in each quarter, then report the time-series average of these AMEs. I assess statistical signifi-

cance using Newey-West standard errors with four lags, accounting for serial correlation in the quarterly estimates.

Table 1 presents the Fama-MacBeth Probit results for the likelihood of announcing an OMR. Across all specifications (Columns 1–6), both $FlowSign$ and $FlowLevel$ are strongly statistically significant. In Column (3), which includes the full set of controls, the AME on $FlowSign$ implies that firms experiencing negative mutual fund flows in the prior quarter ($FlowSign = 0$) are 0.52 percentage points more likely to announce an OMR than those experiencing positive flows. Given the unconditional probability of an OMR announcement in the sample is approximately 4.5%, this effect represents an increase of over 11% relative to the baseline, suggesting a meaningful economic impact. Similarly, the AME on $FlowLevel$ in Column (6) implies that a one standard deviation decrease in flow pressure increases the likelihood of an OMR announcement by 0.37 percentage points.

Table 2 presents the Fama-MacBeth OLS results for the amount of shares repurchased. Consistent with the OMR results, firms experiencing weaker or negative flow pressure repurchase significantly more in the following quarter. In Column (3), the coefficient on $FlowSign$ is -0.116 (t-stat = -4.44), implying that negative flow pressure is associated with a 0.116 unit increase in quarterly repurchase amount. Given the average quarterly repurchase amount is 0.58% (with a standard deviation of 1.18%), this represents roughly 20% of the mean and 10% of the standard deviation—again indicating an economically substantial effect. In Column (6), a one standard deviation decline in $FlowLevel$ is associated with a 0.096 increase in repurchase amount (t-stat = -5.23).

The control variables display expected patterns. Higher cash flow ($Cash$) is strongly associated with both a higher probability of announcing an OMR and larger repurchase amounts. Larger firms ($Size$) are more likely to repurchase shares, while more highly leveraged firms ($Debt$) are less likely to do so—consistent with financial constraint explanations. Firms with lower prior-quarter returns ($ExRet$) are more likely to announce OMRs and repurchase more. The book-to-market ratio (BM) is positively

related to repurchase amounts, and marginally associated with OMR announcements. Mutual fund ownership (Own) is positively related to repurchase activity in simple specifications, but its effect becomes statistically insignificant once the full set of controls is included (Columns 3 and 6), suggesting that other firm characteristics absorb much of its explanatory power.

Together, the Fama-MacBeth results in Tables 1 and 2 provide strong preliminary evidence of a negative relationship between prior-quarter mutual fund flow pressure and both the likelihood and magnitude of corporate repurchases in the following quarter, even after controlling for a comprehensive set of firm characteristics. In the next section, I address endogeneity concerns and assess the causal effect of fund flow pressure using a natural experiment.

3.2 *Causal Inference: The 2003 Mutual Fund Scandal*

While the preceding Fama-MacBeth analysis documents robust correlations between mutual fund flows and corporate share repurchase activity, interpreting these relationships as causal is complicated by endogeneity concerns. In particular, mutual fund flows may not be orthogonal to the underlying fundamentals or growth prospects of the firms held in their portfolios. This concern is amplified by the fact that mutual funds often specialize along well-defined dimensions—such as investment style (e.g., value versus growth), firm size (e.g., small-cap versus large-cap), or industry focus (e.g., technology, healthcare, or semiconductors). These specializations can cause flow shocks to be systematically related to changing firm fundamentals.

To illustrate, consider a scenario where firms in a particular industry—such as semiconductors—experience an increase in expected growth opportunities, for instance due to breakthroughs in AI-related technologies. In a well-functioning capital market, this shift in fundamentals should trigger a reallocation of capital toward that sector, leading to inflows into mutual funds that specialize in semiconductor stocks. At the same time, semiconductor firms anticipating stronger future investment opportunities may reduce their payout activity, including share repurchases, in order to preserve capital

for positive-NPV projects. In this setting, one might observe a negative correlation between mutual fund inflows and repurchase activity—not because flows themselves are causing firms to repurchase less, but because both are driven by a third factor: improved firm fundamentals. Therefore, to credibly estimate the causal effect of fund flows on repurchases, it is essential to identify a source of flow variation that is exogenous to contemporaneous changes in firm characteristics.

To address this issue, I exploit a natural experiment stemming from the 2003 U.S. mutual fund scandal. In September 2003, several major fund families were implicated in illegal trading practices, including market timing and late trading. Over the following month, 25 fund families settled regulatory charges. The scandal triggered large, sustained investor withdrawals from the implicated fund families—outflows driven by reputational concerns, rather than the fundamentals of their portfolio firms. As documented by Kisin (2011), these funds experienced outflows averaging 14.1% in the first year and 24.3% within two years, with redemptions continuing through 2006. In contrast, non-implicated funds saw continued asset growth. These scandal-driven outflows provide plausibly exogenous variation in mutual fund flow pressure.

To measure firm-level exposure to this shock, I construct a scandal exposure variable based on mutual fund holdings at the end of Q3 2003. For each firm j, I calculate $Exposure_j$ as the fraction of its mutual fund–owned shares held by scandal-implicated fund families. Specifically, this is defined as the number of shares in firm j held by scandal-implicated funds divided by the total number of shares in firm j held by all mutual funds at that time. I then define a binary indicator, $HighlyExposed_j$, equal to 1 if $Exposure_j$ is above the cross-sectional median, and 0 otherwise. This classification is fixed based on ownership at the time of the scandal and allows me to compare firms differentially affected by scandal-induced outflows.

I begin by visually assessing whether firms with high and low scandal exposure exhibited similar repurchase behavior prior to the shock. Figures 1 and 2 plot the average OMR announcement rates and average quarterly repurchase amounts, respectively, for

the two groups. In the pre-scandal period (before the dashed vertical line), the two groups not only exhibit parallel trends but also display nearly identical levels—suggesting a strong form of pre-treatment comparability. Following the scandal, both groups show an increase in repurchase activity, but the increase is substantially more pronounced for firms with high exposure to the scandal-implicated funds. This results in a clear divergence in both OMR rates and repurchase amounts between the two groups. Over time, the gap gradually narrows, consistent with the temporary nature of the scandal-induced shock. These patterns provide strong visual support for the parallel trends assumption and the validity of the scandal as a quasi-experimental shock.

I next formalize this analysis using a Difference-in-Differences (DiD) approach. My estimating equation is:

$$\begin{aligned} Outcome_{j,t} = \beta_0 + \beta_1 HighlyExposed_j + \beta_2 PostScandal_t \\ + \beta_3 (HighlyExposed_j \times PostScandal_t) + \delta' Controls_{j,t-1} + \theta_t + \nu_{j,t} \end{aligned} \quad (5)$$

The outcome variable, $Outcome_{j,t}$, is either the binary $OMR_{j,t}$ indicator or the continuous $QtrRepAmt_{j,t}$. The indicator $PostScandal_t$ equals 1 in post-scandal quarters (2003q4 onward) and 0 otherwise. The interaction term captures the differential change in outcomes for highly exposed firms after the scandal. Control variables are identical to those used in the baseline analysis, and I include quarter fixed effects (θ_t) in some specifications. Standard errors are clustered at the firm level.

I estimate this model using quarterly data from 2000q1 to 2006q4, providing a sufficient pre- and post-scandal window. When the outcome is $QtrRepAmt_{j,t}$, I use OLS. When the outcome is $OMR_{j,t}$, I use a Probit model and report the average marginal effect for the interaction term. Tables 3 and 4 present results for OMR announcements and repurchase amounts, respectively. Each table includes four specifications: (1) core DiD terms only, (2) adds mutual fund ownership (Own), (3) includes the full control set, and (4) adds quarter fixed effects.

In Table 3, the AME of the interaction term in the full specification is 0.0172 (z = 5.48), indicating that highly exposed firms were 1.72 percentage points more likely to announce an OMR after the scandal relative to the low-exposure group. Given a baseline OMR rate of approximately 4.5%, this effect is economically meaningful. The estimate is stable across all specifications. In Table 4, the full-specification coefficient is 0.1045 (t = 6.86), implying that the average quarterly repurchase amount increased by over 0.10 units for highly exposed firms. Again, the result is highly statistically and economically significant, and consistent across specifications.

Together, these findings provide compelling causal evidence that the scandal-induced outflows had a substantial effect on firms' repurchase behavior, both in terms of the likelihood of announcing buybacks and the scale of repurchases undertaken. The stability of these estimates across all specifications in both tables further suggests that the results are robust to the inclusion of a comprehensive set of firm characteristics and common time trends.

While DiD isolates the effect of scandal exposure and is useful in establishing the causal link, it does not directly quantify the impact of fund flows. To estimate the causal effect of flows themselves, I employ an instrumental variable (IV) approach, using $HighlyExposed_j$ as an instrument for $FlowSign_{j,t-1}$. I estimate 2SLS regressions for $QtrRepAmt_{j,t}$ and IV Probit models for $OMR_{j,t}$, focusing on the post-scandal window (2003q4–2006q4). This window allows me to leverage the exogenous variation induced by the scandal while acknowledging the likely temporary nature of the shock. Controls and time fixed effects match those used in the DiD analysis, and standard errors are again clustered at the firm level.

Table 5 presents the first-stage results. Across all specifications, the coefficient on the $HighlyExposed_j$ indicator is negative and highly statistically significant, indicating that firms with greater exposure to scandal-implicated funds were significantly less likely to experience positive mutual fund flow in the quarters following the scandal. This confirms that $HighlyExposed_j$ is a strong and relevant instrument for $FlowSign_{j,t-1}$.

The F-statistics for the excluded instrument exceed the conventional threshold of 10 in all specifications, ranging from 26.94 to 104.45, thereby alleviating concerns about weak instrument bias and reinforcing the validity of my identification strategy.

Tables 6 and 7 present the second-stage estimates from the IV regressions, alongside their non-IV counterparts. In both cases, the IV coefficients on *FlowSign* are negative and statistically significant, indicating that negative fund flow pressure leads to an increase in repurchase activity. More importantly, the IV estimates are substantially larger in magnitude than the corresponding Probit and OLS coefficients, suggesting that the baseline models understate the true causal effect.

In Table 6, which reports Average Marginal Effects (AMEs) for the binary OMR outcome, the IV Probit estimate in Column 7 is -0.0343 (z = -4.16). This implies that experiencing positive flow—instrumented by exogenous variation from scandal exposure—reduces the likelihood of announcing an OMR program by 3.43 percentage points. This effect is over three times larger than the corresponding AME from the standard Probit model in Column 8, which is -0.0093. Relative to the sample's unconditional OMR rate of approximately 4.5%, the IV estimate reflects a highly economically meaningful response.

A similar pattern emerges in Table 7, which presents results for the continuous repurchase amount. The IV coefficient in Column 7 is -0.3582, compared to just -0.0532 in the corresponding OLS specification in Column 8. This large discrepancy again underscores the importance of accounting for endogeneity: the IV strategy isolates exogenous variation in flows due to the scandal, while OLS estimates likely suffer from attenuation bias or omitted variables that confound flow and repurchase behavior.

Taken together, the IV results provide strong evidence that firms respond significantly more to exogenous flow pressure than standard regressions suggest. The consistent increase in effect size across both outcomes—OMR announcements and repurchase amounts—highlights the substantial and economically relevant role that mutual

fund flows play in shaping corporate payout policy. These findings reinforce the central insight that endogeneity in observed flows can mask the true magnitude of firms' flow-responsiveness, which becomes apparent once exogenous variation is isolated using the 2003 mutual fund scandal.

3.3 *Long-Run Performance Following OMR Announcements*

The preceding analyses provide causal evidence that mutual fund outflows increase the likelihood and scale of firms' open market repurchase (OMR) activity. These findings raise a natural follow-up question: do firms that announce repurchase programs following negative fund flows exhibit stronger undervaluation, and if so, does this manifest in superior long-run stock performance?

There are two key reasons to expect such a pattern. First, if negative flows contribute to greater mispricing, then repurchases following outflows may be targeting more undervalued shares. Second, because mutual fund flows are highly persistent (Lou, 2012), funds experiencing outflows are likely to remain cash-constrained in subsequent quarters. This limits their capacity to respond to repurchase signals in the near term, which in turn may delay price correction and extend the return window. Thus, firms announcing OMRs after experiencing negative flows might display stronger long-run abnormal returns as prices gradually revert to fundamentals.

To examine this, I divide my sample of OMR announcements into two groups based on the sign of the prior-quarter fund flow: those preceded by negative ($FlowSign = 0$) and those preceded by positive flow ($FlowSign = 1$). I then track long-run abnormal returns over a 48-month window following the announcement month.

Following Peyer and Vermaelen (2009), I use the Fama-French three-factor model along with Ibbotson's Returns Across Time and Securities (RATS) methodology to estimate abnormal returns. For each month τ in event time ($\tau = 1, \ldots, 48$), I run a cross-sectional regression across all firms that reach that event month:

$$R_{j,t} - R_{f,t} = a_\tau + b_\tau(R_{m,t} - R_{f,t}) + c_\tau SMB_t + d_\tau HML_t + \epsilon_{j,t} \tag{6}$$

Here, $R_{j,t}$ is the return on stock j in calendar month t, and $R_{f,t}$ is the risk-free rate. The estimated intercept a_τ represents the average abnormal return in event month τ. I calculate Cumulative Abnormal Returns (CARs) over various windows by summing these monthly alphas: $CAR[1, 12]$, $CAR[1, 24]$, $CAR[1, 36]$, and $CAR[1, 48]$.

Table 8 reports CARs separately for the $FlowSign = 0$ and $FlowSign = 1$ subgroups. A striking pattern emerges. In the short run (first 12 months), firms announcing after positive flows outperform slightly, with a CAR of 2.87% (t = 2.09) versus 0.84% (t=0.82) for the negative-flow group, possibly reflecting momentum effects from recent inflows (Lou, 2012). However, over longer horizons, the pattern reverses. By 36 months, the negative-flow group shows a highly significant CAR of 10.76% (t = 3.27), compared to an insignificant 5.63% for the positive-flow group. At 48 months, the gap widens further: 14.33% (t = 3.87) versus 6.16% (t = 1.49).

These results suggest that long-run buyback-related outperformance is concentrated among firms announcing after negative or zero flows. This provides new insight into the "buyback anomaly" (Ikenberry et al., 1995; Peyer and Vermaelen, 2009), indicating that the effect is not uniform but driven by a subset of announcements associated with prior outflows. This may help explain the anomaly's persistence: if the mispricing stems from investor redemptions and those investors are constrained from quickly responding to the repurchase signal, arbitrage is delayed and long-run returns persist.

While firms announcing after negative flows eventually deliver stronger long-run returns, the presence of constrained mutual fund owners raises the possibility that the immediate market reaction to their announcements may be more muted relative to firms announcing after positive flows. To investigate this further, I examine market reactions in the days surrounding the OMR announcement. I calculate three metrics over the [-1, +2] event window: (1) $CAR[-1, +2]$, based on daily excess returns; (2) *Abnormal Volume*,

defined as the difference between the average of $\log(1 + \text{Volume})$ over the event window and its average over the pre-event window [-252, -1]; and (3) *Abnormal Turnover*, defined as the difference between the average of $\log(\text{Turnover} + c)$ over the event window and the corresponding average over the pre-event window, where Turnover is daily volume divided by shares outstanding, and $c = 0.0001275$ is a small constant added to accommodate zero-turnover days (Bhattacharya and E. Jacobsen, 2016).

Table 9 presents these results. Both flow subgroups show statistically significant positive reactions in price and trading activity. However, announcements following positive flows exhibit significantly stronger immediate effects: the mean CAR[-1,+2] is 1.15 percentage points higher, and abnormal volume and turnover are also significantly larger.

This contrast highlights the dual role of fund flows. Negative flows may induce undervaluation and limit arbitrage, setting the stage for stronger long-run performance. Yet positive flows appear to enable a more vigorous short-term reaction, possibly due to better liquidity or fewer constraints on institutional investors. These results underscore that the flow environment not only shapes repurchase decisions but also affects how quickly and strongly the market responds to those decisions.

4 Conclusion

This paper revisits the longstanding question of why share repurchase announcements elicit positive market reactions, and what information they convey. While prior literature has debated the relative merits of the undervaluation and free cash flow hypotheses, empirical identification has been hindered by noisy proxies and ambiguous methodologies. In this paper, I offer a new empirical strategy based on institutional fund flows to study how firms adjust repurchase activity in response to shifts in valuation.

Using measures of flow-induced trading pressure, I show that firms experiencing negative mutual fund flows in the prior quarter are significantly more likely to announce OMR programs and to repurchase larger amounts of shares. To establish causality, I exploit the 2003 U.S. mutual fund trading scandal as a natural experiment. Firms more

exposed to scandal-affected funds experienced sharp, exogenous outflows, enabling a difference-in-differences and instrumental variables (IV) strategy. The IV analysis provides several important insights. First, the causal effect of fund flows on repurchase activity is substantially larger than suggested by standard OLS and Probit estimates, reaffirming concerns about endogeneity in conventional regressions. Second, the magnitude of the response to exogenous flow shocks is economically significant. For example, in the fully specified IV model with controls and time fixed effects, firms repurchase 0.358 percentage points more of their shares outstanding when they experience negative fund flows in the prior quarter. This large response underscores the idea that firms are highly sensitive to flow-induced valuation pressures — particularly when those pressures are disconnected from fundamentals, as is the case in my natural experiment. These findings confirm that flow-driven mispricing meaningfully shapes corporate payout decisions.

I also document striking differences in long-run stock performance following repurchase announcements, depending on the prior-quarter flow environment. Firms that announced buybacks after experiencing outflows earn significantly higher abnormal returns over the subsequent four years than those announcing after inflows. However, despite this stronger long-run performance, the short-run market reaction and trading intensity around announcement day are significantly weaker for the outflow group. This contrast underscores a key insight: mutual fund flows not only generate valuation pressure but also constrain the ability of these investors to respond to repurchase signals. These findings help explain the persistence of the buyback anomaly and point to limits to arbitrage as a central factor in the slow correction of mispricing.

Taken together, this paper contributes to the literature on corporate finance and asset pricing by offering new evidence on how valuation shocks shape firm behavior, and how investor frictions influence the market's response to corporate signals. It also adds to the broader literature on the real effects of financial markets, showing that flow-driven price distortions can meaningfully impact corporate payout policy and subsequent price dynamics.

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5 Tables and Figures

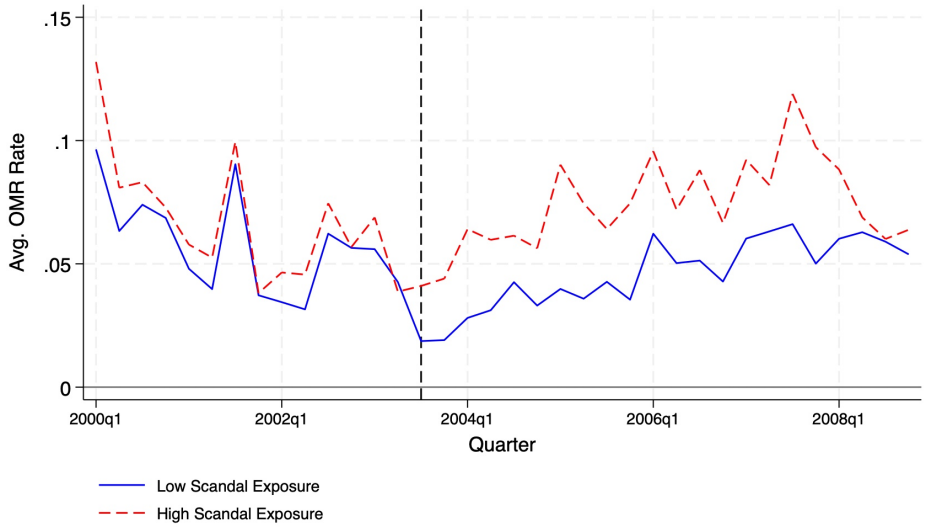

Figure 1: OMR Announcement Rate by Scandal Exposure Group

This figure plots the average quarterly open market repurchase (OMR) announcement rate—defined as the fraction of firms announcing an OMR—for firms with high scandal exposure ($HighlyExposed = 1$, dashed red line) and low scandal exposure ($HighlyExposed = 0$, solid blue line). Scandal exposure is based on mutual fund ownership by implicated fund families as of Q3 2003. The vertical dashed line marks the scandal quarter (Q3 2003).

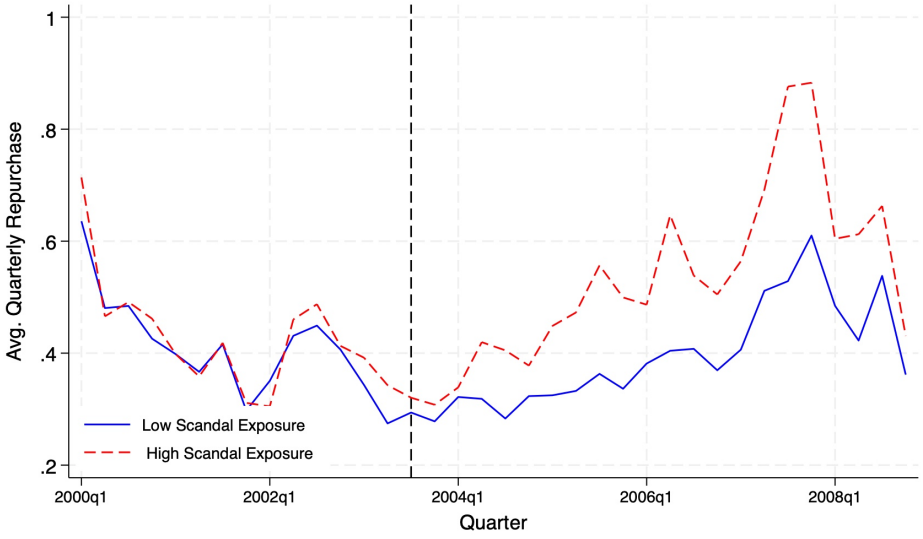

Figure 2: Average Quarterly Repurchase by Scandal Exposure Group

This figure plots the average quarterly share repurchase amount for firms with high scandal exposure ($HighlyExposed = 1$, dashed red line) and low scandal exposure ($HighlyExposed = 0$, solid blue line). Scandal exposure is based on mutual fund ownership by implicated fund families as of Q3 2003. The vertical dashed line marks the scandal quarter (Q3 2003).

Table 1: Fama-MacBeth Regressions of OMR Announcement Likelihood on Fund Flows

This table presents Fama and MacBeth (1973) estimates examining the relationship between prior-quarter mutual fund flow pressure and the likelihood of announcing an Open Market Repurchase (OMR) program during the period 1994–2020. The dependent variable, OMR, is a binary indicator equal to 1 if a firm announces an OMR program in a given quarter, and 0 otherwise. I follow a two-step procedure. First, a cross-sectional Probit regression is estimated each quarter. Second, I compute the Average Marginal Effect (AME) of each variable within each quarterly regression. The table reports the time-series average of these AMEs. Columns (1)–(3) use a binary flow pressure measure, $FlowSign$, equal to 1 for positive prior-quarter flow and 0 otherwise. Columns (4)–(6) use the continuous measure $FlowLevel$, which captures the standardized magnitude of prior-quarter flow pressure. Control variables include mutual fund ownership (Own), book-to-market ratio (BM), cash flow to debt ratio ($Cash$), debt to assets ratio ($Debt$), size decile ($Size$), and prior-quarter excess return ($ExRet$). All continuous control variables and $FlowLevel$ are standardized each quarter to have mean zero and standard deviation one. $Size$ is ranked from 1 to 10; $ExRet$ is the firm's return minus the market return. Reported test statistics (z-values) are based on Newey-West (1987) standard errors using 4 lags. Significance levels: * p<0.10, ** p<0.05, *** p<0.01.

Dependent Variable:	*FlowSign*			*FlowLevel*		
	OMR Announcement (OMR)					
	(1)	(2)	(3)	(4)	(5)	(6)
FlowSign	-0.00643***	-0.00569***	-0.00521***			
	(-9.67)	(-6.29)	(-5.52)			
FlowLevel				-0.00481***	-0.00374***	-0.00366***
				(-10.53)	(-7.33)	(-5.42)
Own		0.01185***	0.00049		0.01181***	0.00055
		(36.89)	(1.17)		(36.80)	(1.30)
BM			0.00084*			0.00083*
			(1.88)			(1.85)
Cash			0.01599***			0.01601***
			(27.12)			(27.14)
Debt			-0.00778***			-0.00777***
			(-17.00)			(-16.98)
Size			0.00793***			0.00790***
			(49.00)			(48.83)
ExRet			-0.01616***			-0.01670***
			(-10.70)			(-11.09)
Total Obs	427,185	400,372	354,847	427,185	400,372	354,847

Table 2: Fama-MacBeth Regressions of Quarterly Share Repurchase Amount on Fund Flows

This table reports Fama and MacBeth (1973) estimates examining the relationship between mutual fund flow pressure in the prior quarter and the amount of share repurchases in the current quarter. The dependent variable, *QtrRepAmt*, is defined as the maximum of zero and the negative of the quarterly log change in split-adjusted shares outstanding.Columns (1)–(3) use a binary indicator of flow direction (*FlowSign*); Columns (4)–(6) use a continuous standardized flow measure (*FlowLevel*). Control variables include mutual fund ownership (*Own*), book-to-market ratio (*BM*), cash flow to debt (*Cash*), debt to assets (*Debt*), size decile (*Size*), and prior-quarter excess return (*ExRet*). All continuous variables are normalized quarterly; *Size* ranges from 1 to 10, and *ExRet* is the firm's return minus the market return. Reported coefficients are time-series averages of quarterly OLS estimates. Test statistics (t-values) are based on Newey-West (1987) standard errors with 4 lags. Significance levels: * p<0.10, ** p<0.05, *** p<0.01.

Dependent Variable:	*FlowSign*			*FlowLevel*		
	Quarterly Repurchase Amount					
	(1)	(2)	(3)	(4)	(5)	(6)
FlowSign	-0.211***	-0.158**	-0.116***			
	(-7.06)	(-6.05)	(-4.44)			
FlowLevel				-0.128***	-0.108***	-0.096***
				(-6.29)	(-5.32)	(-5.23)
Own		0.181***	0.004		0.185***	0.004
		(3.81)	(0.17)		(3.72)	(0.18)
BM			0.272***			0.272***
			(11.42)			(11.43)
Cash			0.424***			0.422***
			(8.96)			(9.00)
Debt			-0.111***			-0.111***
			(-7.42)			(-7.40)
Size			0.095***			0.096***
			(5.89)			(5.89)
ExRet			-0.467***			-0.461***
			(-6.90)			(-6.90)
Constant	0.603***	0.624***	0.473***	0.576***	0.582***	0.391***
	(11.64)	(11.99)	(9.78)	(15.11)	(15.11)	(9.89)
Total Obs	427,185	400,372	354,847	427,185	400,372	354,847

Table 3: Difference-in-Differences: Effect of Scandal Exposure on OMR Announcement Likelihood

This table presents Difference-in-Differences (DiD) estimates from pooled Probit regressions examining the effect of exposure to the 2003 mutual fund scandal on the likelihood of announcing an Open Market Repurchase (OMR) program (OMR). The sample covers the period from 2000q1 to 2006q4. OMR is a binary variable equal to 1 if a firm announces an OMR in a given quarter, and 0 otherwise. $HighlyExposed$ is a dummy equal to 1 for firms with above-median mutual fund ownership by scandal-implicated fund families in Q3 2003. $PostScandal$ equals 1 for quarters from 2003q4 onward. The table reports Average Marginal Effects (AMEs) calculated post-estimation. Column (1) includes only the DiD variables. Column (2) adds normalized mutual fund ownership (Own). Column (3) includes the full set of normalized controls: Own, BM, $Cash$, $Debt$, as well as $Size$ decile and prior-quarter excess return ($ExRet$). Column (4) adds time fixed effects (quarter dummies) to the full specification in Column (3). All control variables are lagged by one quarter. Standard errors are clustered at the firm level. Test statistics (z-values) are shown in parentheses. Significance levels: * p<0.10, ** p<0.05, *** p<0.01.

Dependent Variable:	OMR Announcement (OMR)			
	(1)	(2)	(3)	(4)
$HighlyExposed \times PostScandal$	0.01667***	0.01547***	0.01642***	0.01723***
	(4.60)	(4.50)	(5.21)	(5.48)
$HighlyExposed$	0.02104***	0.01583***	-0.00170	-0.00186
	(9.15)	(6.53)	(-0.65)	(-0.71)
$PostScandal$	0.00873***	0.00705***	0.01014***	0.00865***
	(5.41)	(4.42)	(5.37)	(4.83)
Own		0.00801***	-0.00190*	-0.00152
		(8.28)	(-1.70)	(-1.36)
BM			-0.00352***	-0.00379***
			(-2.65)	(-2.84)
$Cash$			0.01553***	0.01546***
			(10.17)	(10.13)
$Debt$			-0.01034***	-0.01022***
			(-7.47)	(-7.36)
$Size$			0.00959***	0.00946***
			(18.58)	(18.23)
$ExRet$			-0.01556***	-0.01734***
			(-4.64)	(-4.61)
Time Fixed Effects	No	No	No	Yes
Observations	97,233	90,822	84,796	84,796

Table 4: Difference-in-Differences: Effect of Scandal Exposure on Quarterly Share Repurchase Amount

This table presents Difference-in-Differences (DiD) estimates from pooled OLS regressions examining the effect of exposure to the 2003 mutual fund scandal on quarterly share repurchase amounts (*QtrRepAmt*). The sample covers the period from 2000q1 to 2006q4. *HighlyExposed* is a dummy equal to 1 for firms with above-median mutual fund ownership by scandal-implicated fund families in Q3 2003. *PostScandal* equals 1 for quarters from 2003q4 onward. The coefficient of interest is the interaction term $HighlyExposed \times PostScandal$, which captures the differential change in repurchase behavior for the high-exposure group after the scandal. Column (1) includes only the DiD variables. Column (2) adds normalized mutual fund ownership (*Own*). Column (3) includes the full set of normalized controls: *Own*, *BM*, *Cash*, *Debt*, along with *Size* decile and prior-quarter excess return (*ExRet*). Column (4) adds time fixed effects (quarter dummies) to the full specification in Column (3). All control variables are lagged by one quarter. Standard errors are clustered at the firm level. Test statistics (t-values) are shown in parentheses. Significance levels: * p<0.10, ** p<0.05, *** p<0.01.

Dependent Variable:	Quarterly Repurchase Amount			
	(1)	(2)	(3)	(4)
$HighlyExposed \times PostScandal$	0.0930***	0.0921***	0.0974***	0.1045***
	(6.60)	(6.54)	(6.41)	(6.86)
$HighlyExposed$	0.0249**	0.0152	-0.0420***	-0.0474***
	(2.16)	(1.25)	(-3.14)	(-3.54)
$PostScandal$	-0.0539***	-0.0561***	-0.0673***	-0.3264***
	(-5.71)	(-5.98)	(-6.38)	(-10.50)
Own		0.0151***	-0.0101**	-0.0099**
		(3.51)	(-2.10)	(-2.05)
BM			0.0247***	0.0212***
			(5.07)	(4.36)
$Cash$			0.0528***	0.0515***
			(14.44)	(14.08)
$Debt$			-0.0183***	-0.0182***
			(-3.38)	(-3.37)
$Size$			0.0265***	0.0257***
			(12.39)	(11.95)
$ExRet$			-0.0242***	0.0046
			(-2.93)	(0.52)
Constant	0.3932***	0.3816***	0.2823***	.584011***
	(47.09)	(43.47)	(18.95)	(20.54)
Time Fixed Effects	No	No	No	Yes
Observations	97,233	90,822	84,796	84,796

Table 5: IV First Stage: Predicting Fund Flow Sign with Scandal Exposure

This table presents the first-stage OLS regressions from the Instrumental Variable (IV) analysis, covering the period from 2003q4 to 2006q4. The dependent variable is *FlowSign*, a binary indicator equal to 1 if the firm experienced positive net fund flow in the prior quarter, and 0 otherwise. The key independent variable is the instrument, *HighlyExposed*, a dummy equal to 1 for firms with above-median mutual fund ownership by scandal-implicated fund families in Q3 2003. Column (1) includes only the instrument. Column (2) adds normalized mutual fund ownership (*Own*). Column (3) includes the full set of normalized controls: *Own*, *BM*, *Cash*, *Debt*, *Size* decile, and prior-quarter excess return (*ExRet*). Column (4) adds time fixed effects (quarter dummies) to the specification in Column (3). Control variables are lagged by one quarter. *Size* ranges from 1 to 10. *ExRet* is defined as the firm's raw return minus the market return. Standard errors are clustered at the firm level. Test statistics (t-values) are shown in parentheses. The reported F-statistic tests the significance of the excluded instrument (*HighlyExposed*). Significance levels: * p<0.10, ** p<0.05, *** p<0.01.

Dependent Variable:	Flow Sign (*FlowSign*)			
	(1)	(2)	(3)	(4)
HighlyExposed (Instrument)	-0.07058***	-0.03886***	-0.04201***	-0.04616***
	(-10.22)	(-5.32)	(-5.19)	(-5.79)
Own		-0.04552***	-0.05230***	-0.05563***
		(-13.17)	(-13.50)	(-14.63)
BM			0.02662***	0.04103***
			(7.30)	(11.34)
Cash			-0.01261***	-0.00958**
			(-3.14)	(-2.39)
Debt			0.02173***	0.01619***
			(5.18)	(3.92)
Size			0.00393**	0.00753***
			(2.42)	(4.66)
ExRet			0.12663***	0.08059***
			(11.74)	(7.36)
Constant	0.64577***	0.68731***	0.61266***	0.54305***
	(129.53)	(124.18)	(55.34)	(38.07)
Time Fixed Effects	No	No	No	Yes
F-statistic (Excluded Instrument)	104.45	28.30	26.94	33.52
Observations	44,956	41,632	39,213	39,213

Table 6: IV Probit and Probit Regressions of OMR Announcement Likelihood on Fund Flow Sign

This table presents Average Marginal Effects (AMEs) from second-stage IV Probit regressions and corresponding standard Probit models estimating the effect of prior-quarter fund flow sign ($FlowSign$) on the likelihood of announcing an Open Market Repurchase (OMR) program. The sample period is 2003q4 to 2006q4. OMR is a binary variable equal to 1 if a firm announces an OMR in a given quarter, and 0 otherwise. $FlowSign$ is a binary variable equal to 1 if the firm experienced positive net fund flow in the prior quarter, and 0 otherwise; it is treated as endogenous in the IV Probit models. The instrument for $FlowSign$ is $HighlyExposed$, a dummy equal to 1 for firms with above-median mutual fund ownership by scandal-implicated fund families in Q3 2003 (see Table 5). Columns (1), (3), (5), and (7) report IV Probit estimates; Columns (2), (4), (6), and (8) report corresponding Probit estimates. Columns (1)–(2) include no controls; (3)–(4) add normalized mutual fund ownership (Own); (5)–(6) add the full set of normalized controls (Own, BM, $Cash$, $Debt$), $Size$ decile, and prior-quarter excess return ($ExRet$); and (7)–(8) further include time fixed effects (quarter dummies). All control variables are lagged one quarter. Standard errors are clustered at the firm level. Test statistics (z-values) are reported in parentheses. Significance levels: * p<0.10, ** p<0.05, *** p<0.01.

	(1) IV Probit	(2) Probit	(3) IV Probit	(4) Probit	(5) IV Probit	(6) Probit	(7) IV Probit	(8) Probit
FlowSign	-0.0476***	-0.01395***	-0.0512***	-0.01038***	-0.0321***	-0.01136***	-0.0343***	-0.00926***
	(-7.15)	(-6.11)	(-8.04)	(-4.55)	(-3.92)	(-3.77)	(-4.16)	(-3.29)
Own			-0.0105	0.01668***	0.0026	-0.00076	0.0031	-0.00083
			(-1.43)	(15.38)	(0.52)	(-0.56)	(0.58)	(-0.64)
BM					-0.0034	-0.00195	-0.0022	-0.00181
					(-1.28)	(-1.32)	(-1.04)	(-1.09)
Cash					0.0231***	0.02226***	0.0212***	0.02107***
					(9.24)	(9.55)	(8.77)	(8.83)
Debt					-0.0116***	-0.01028***	-0.0110***	-0.01019***
					(-4.10)	(-6.54)	(-4.05)	(-6.41)
Size					0.0132***	0.01324***	0.01323***	0.01321***
					(18.62)	(24.18)	(18.71)	(23.95)
ExRet					-0.0407***	-0.03314***	0.0419***	-0.03308***
					(-3.27)	(-4.60)	(-3.36)	(-4.49)
Time Fixed Effects	No	No	No	No	No	No	Yes	Yes
Observations	44,956	44,956	41,632	41,632	39,213	39,213	39,213	39,213

Table 7: IV (2SLS) and OLS Regressions of Quarterly Share Repurchase Amount on Fund Flow Sign

This table presents second-stage IV (2SLS) and corresponding OLS estimates for the effect of prior-quarter fund flow sign (*FlowSign*) on quarterly share repurchase amounts (*QtrRepAmt*). The sample period is 2003q4 to 2006q4. *QtrRepAmt* is defined as the maximum of zero and the negative of the quarterly log change in split-adjusted shares outstanding. *FlowSign* is a binary variable equal to 1 if the firm experienced positive net fund flow in the prior quarter, and 0 otherwise; it is treated as endogenous in the IV specifications. The instrument used in the first stage (see Table 5) is *HighlyExposed*, a dummy equal to 1 for firms with above-median mutual fund ownership by scandal-implicated fund families in Q3 2003. Columns (1), (3), (5), and (7) report IV (2SLS) estimates; Columns (2), (4), (6), and (8) report corresponding OLS estimates. Columns (1)–(2) include no controls; (3)–(4) add normalized mutual fund ownership (*Own*); (5)–(6) include the full set of normalized controls (*Own*, *BM*, *Cash*, *Debt*), *Size* decile, and prior-quarter excess return (*ExRet*); and (7)–(8) add time fixed effects (quarter dummies) to the full specification. All control variables are lagged one quarter. Both IV and OLS regressions are estimated on the same sample within each specification pair. Standard errors are clustered at the firm level. Test statistics (t-values) are reported in parentheses. Significance levels: * p<0.10, ** p<0.05, *** p<0.01.

	(1) IV	(2) OLS	(3) IV	(4) OLS	(5) IV	(6) OLS	(7) IV	(8) OLS
FlowSign	-0.5706***	-0.0690***	-0.7070***	-0.0572***	-0.3139***	-0.0621***	-0.3582***	-0.0532***
	(-9.09)	(-8.72)	(-12.14)	(-7.20)	(-5.89)	(-7.25)	(-5.11)	(-3.62)
Own			-0.0645**	0.0528***	-0.0206	-0.0065	-0.0252	-0.0057
			(-2.08)	(13.76)	(-0.96)	(-1.40)	(-1.19)	(-1.22)
BM					0.0214**	0.0152***	0.0223*	0.0097**
					(1.99)	(3.52)	(1.58)	(2.24)
Cash					0.0483***	0.0517***	0.0476***	0.0511***
					(6.97)	(10.26)	(7.79)	(10.17)
Debt					-0.0243**	-0.0299***	-0.0229**	-0.0283***
					(-2.22)	(-6.27)	(-2.45)	(-5.96)
Size					0.0430***	0.0427***	0.0432***	0.0417***
					(15.01)	(24.66)	(13.18)	(24.05)
ExRet					-0.0089	-0.0408**	-0.0137	-0.0400*
					(-0.19)	(-2.08)	(-0.44)	(-1.95)
Constant	0.7423***	0.4443***	0.8879***	0.3693***	0.3661*	0.2114***	0.4159**	0.1183**
	(9.80)	(19.01)	(5.01)	(17.89)	(1.69)	(14.84)	(2.35)	(5.92)
Time Fixed Effects	No	No	No	No	No	No	Yes	Yes
Observations	44,956	44,956	41,632	41,632	39,213	39,213	39,213	39,213

Table 8: Long-Run Abnormal Returns Following OMR Announcements by Prior Fund Flow Sign

This table reports Cumulative Abnormal Returns (CARs), in percent, over various horizons following Open Market Repurchase (OMR) announcements made between 1994 and 2020. The sample is split based on the sign of mutual fund flow ($FlowSign$) in the quarter preceding the announcement: $FlowSign = 0$ indicates non-positive flow, and $FlowSign = 1$ indicates positive flow. Abnormal returns are estimated monthly using the Fama et al. (1993) three-factor model and the RATS (Returns Across Time and Securities) methodology. CARs are computed by summing the monthly abnormal returns (a_τ) across the event window $[1, T]$ months following the announcement. Reported t-statistics, shown in parentheses, are based on the time series of monthly alphas and computed using the square root of the sum of squared standard errors of the alphas. Significance levels: * p<0.10, ** p<0.05, *** p<0.01.

	$FlowSign = 0$		$FlowSign = 1$	
Event Window (Months Post-Ann.)	CAR (%) (1)	t-stat (2)	CAR (%) (3)	t-stat (4)
$[1, 12]$	0.84	(0.82)	2.87**	(2.09)
$[1, 24]$	4.29**	(1.98)	4.16*	(1.92)
$[1, 36]$	10.76***	(3.27)	5.63	(1.63)
$[1, 48]$	14.33***	(3.87)	6.16	(1.49)
Observations (Announcements)	9983		8399	

Table 9: Short-Run Announcement Effects by Prior Fund Flow Sign

This table compares short-run market reactions around Open Market Repurchase (OMR) announcements made between 1994 and 2020, splitting the sample based on the sign of mutual fund flow ($FlowSign$) in the quarter preceding the announcement. Three event-window measures are evaluated over the [-1, +2] day window relative to the announcement day (day 0): Cumulative Abnormal Return (CAR), Abnormal Volume, and Abnormal Turnover. CAR is computed as the sum of daily excess returns (stock return minus the value-weighted market return). Abnormal Volume is defined as the average log(1+Volume) during the event window minus its average over the pre-event window [-252, -1]. Abnormal Turnover is calculated analogously using log(Turnover + 0.0001275), following Bhattacharya and E. Jacobsen (2016). The table reports both the mean and median for each measure by flow group ($FlowSign = 0$ vs. $FlowSign = 1$). The 'Difference' columns show the gap in means and medians between groups. P-values for statistical significance are reported in parentheses: within-group tests assess whether mean/median differs from zero (t-test or Wilcoxon signed-rank); between-group tests assess equality of means/medians (two-sample t-test or Wilcoxon rank-sum). Asterisks on reported values denote significance based on p-values: * p<0.10, ** p<0.05, *** p<0.01.

	$FlowSign = 0$		$FlowSign = 1$		Difference	
Measure	Mean	Median	Mean	Median	Mean	Median
	(1)	(2)	(3)	(4)	(5)	(6)
CAR [-1, +2] (%)	1.97***	1.62***	3.12***	2.01***	1.15***	0.35***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.001]
Abnormal Volume	0.12***	0.08**	0.16***	0.11***	0.04**	0.03***
	[0.003]	[0.011]	[0.000]	[0.001]	[0.012]	[0.003]
Abnormal Turnover	0.10**	0.08**	0.13***	0.10***	0.03**	0.02*
	[0.023]	[0.015]	[0.007]	[0.004]	[0.048]	[0.064]
Observations (Announcements)	9,983		8,399			