Does Stock Mispricing Drive Firm Policies? Mutual Fund Fire Sales and Selection Bias

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Abstract

This paper examines whether stock mispricing, driven by mutual fund outflows, influences firm financial policies (i.e., investment, equity issuance, and payout). Using standard analytical techniques, I find that negative mispricing events cause firms to alter financial policies, but I also find that selection bias drives these results. Treatment firms alter financial policies compared to control firms even when no mispricing event occurs. After accounting for selection bias, the feedback effect between mispricing and firm policies disappears. I conclude that, although a feedback effect may exist between efficient market prices and firm policies, mutual fund flow-induced *mispricing* does not alter firm financial policies.

Keywords: Mutual Funds; Stock Prices; Firm Financial Policy
JEL classifications: G14; G23; G32

An important literature has developed that documents a feedback effect between stock market prices and firm actions. This literature rests on the theory that managers infer new information from stock prices and therefore stock prices influence firm decisions (Chen, Goldstein, and Jiang, 2006; Goldstein, Ozdenoren, and Yuan, 2013). The empirical challenge to testing this theory is that stock prices are endogenously determined. Clean identification requires a stock price change that is exogenous to firm fundamentals. Researchers have cleverly argued that trading, induced by large mutual fund flows, provides variation in the market prices of underlying firms. In addition, strategies that "randomize" trades within a mutual fund's portfolio of firms bolster the assertion that this variation is exogenous to firm value (Coval and Stafford, 2007; Edmans, Goldstein, and Jiang, 2012). Using this identification strategy, other papers find that stock mispricing influences takeover attempts, R&D expenditures, use of credit lines, equity issuance, and option grant timing (Edmans, Goldstein, and Jiang, 2012; Phillips and Zhdanov, 2013; Acharya, Almeida, Ippolito, and Perez, 2014; Khan, Kogan, and Serafeim, 2012; and Ali, Wei, and Zhou, 2013).

The objective of this paper is twofold. First, I show that mutual fund flow-induced mispricing influences firm financial policies (i.e., investment, equity issuance, and payout policy). Second, I show that selection bias ultimately drives these results. What we believe to be an exogenous shock is not as exogenous as we thought. After accounting for selection bias, the feedback effect between market mispricing and firm financial policies disappears.

I use flow-induced mispricing to test the hypothesis that a feedback effect exists between market mispricing and firm financial policies. Flow-induced mispricing events occur when a mutual fund receives a large outflow ($> 5\%$) that forces the fund manager to sell portfolio firms. I ignore a fund manager's exact selling activity, because it reflects information about firm value. Instead, I distribute the selling activity across all portfolio firms according to portfolio weights, as in the prior literature (e.g. Edmans, et al., 2012). The results indicate that stock mispricing causes firms to reduce annual investment by 0.25%, reduce equity issuance by 0.75%, and increase payout by 0.25%. The evidence suggests that market mispricing drives firm financial policies.

At first blush, these results are alarming. Firm financial policies, such as investment, account for nontrivial fluctuations in US GDP growth (Gabaix, 2011). If market mispricing – inefficient market prices – drives firm investment then stock market inefficiencies potentially influence the broader US economy.

However, there is strong likelihood that selection bias exists in this empirical strategy, despite the randomization method. First, mutual funds invest in some firms and avoid others. Firm characteristics that determine mutual fund ownership are partially unknown. Even among the subset of firms with mutual fund ownership, the firm characteristics that drive mispricing shocks are unknown. A consequence of these non-random partitions of the data is that firms with and without mispricing shocks potentially differ in both observable and unobservable firm characteristics.

I test the hypothesis that selection bias drives the link between stock mispricing and firm financial policies. Because both observable and unobservable characteristics potentially drive this selection bias, methods such as instrumental variables, Heckman (1976) selection models, and matching models cannot fully eliminate the bias. Instead, I address the problem using a method from Michaely, Rubin, and Vedrashko (2016) that borrows from the empirical research methodology in the medical and natural sciences (e.g., Chubak, Boudreau, Wirtz, McKnight, and Weiss, 2013; Braga, Farrokhyar, and Bhandari, 2012). This method first evaluates the severity of the selection bias problem. Then, even without knowing the relevant observed and unobserved firm characteristics that drive mispricing events, the method obtains an unbiased measure of the feedback effect.

Specifically, I use a two-step procedure to test whether selection bias is present. I split firms into two groups based on whether they had at least one mispricing event during the sample period (i.e., treatment firms). Then I compare the feedback effect on treatment firms to the effect on control firms during periods in which small fund outflows do not induce a mispricing event.[1] This test is comparable to exposing all firms to a placebo shock. Placebo shocks should not cause a feedback effect among treatment firms.

The results show that treatment firms exhibit a feedback effect when compared to control firms in response to placebo mispricing events. For example, the initial finding that firms reduce investment by 0.25% following mispricing events indicates a feedback effect; however, the same subset of firms reduces investment by twice as much, 0.50%, following *placebo* mispricing shocks. This result suggests that treatment firms differ from control firms and that there is nothing special about the effect of stock mispricing on firm investment. An analysis that does not account for non-random differences between treatment and control firms will mistakenly attribute differences in firm financial policies to a feedback effect.

I address the selection bias by estimating the feedback effect on a relatively homogeneous sub-sample of treatment firms (Michaely, et al., 2016). Treatment firms with the largest mispricing shocks (top 10% of mispricing shocks) have homogeneous observable firm characteristics prior to the shock.[2] This test uses *only* treatment firms such that treatment firms serve as their own counterfactuals. The method mitigates sample selection bias even when the source of the differences between the treatment and control firms is unknown. For example, consider the result that suggests that firms reduce equity issuance following mispricing events. Although this result is consistent with the feedback effect, it appears mechanically because the treatment firms are compared to observably different control firms – firms with no mutual fund ownership – and hence, firms that will never have a mispricing event. Repeating the test using only a homogeneous sub-sample of treatment firms shows that a feedback effect on equity issuance does not follow mispricing events. Thus, mispricing events do not cause a feedback effect on firm equity issuance. This method provides a less biased measure of the real effects of mispricing shocks on firm

[1] Small outflows do not force managers to sell large quantities of portfolio stocks.

[2] Within the full sample of treatment firms, I find significant heterogeneity in observable characteristics that are related to the severity of the mispricing shock. Firms with the largest shocks are younger, smaller, and have the worst performance in the year before the shock relative to firms with smaller price impacts.

financial policies.

The results show that the feedback effect on equity issuance and payout is not significantly affected by mispricing shocks. In contrast, the results demonstrate a feedback effect between stock mispricing and firm investment. One interpretation is that stock mispricing influences some firm financial policies and not others. Another interpretation is that selection bias exists even within the seemingly homogeneous treatment sample and drives the results. In fact, within the homogeneous subsample I find evidence that treatment firms reduce investment following both real and placebo mispricing shocks. This result suggests that selection bias may drive the investment feedback effect.

I explore sources of selection bias in this setting to understand better how to construct a truly homogeneous sub-sample of firms. Flow-induced mispricing shocks evolve from two layers of trading: funds first receive large outflows and then fund managers sell portfolio stocks. I find that each of these layers is correlated with firm characteristics. After controlling for past fund returns, past fund flows, and manager alpha, large outflows are more likely among funds that invest in small firms (e.g. small-cap funds) than for the average fund. Following large outflows, fund managers systematically sell larger firms with lower liquidity costs and retain firms with high liquidity costs and lower past returns. These results suggest that flow-induced mispricing events are biased towards observable firm characteristics including size, past performance, and liquidity.

I find that selection bias induces observable differences between treatment and control firms, both in terms of static, low frequency characteristics – size and leverage – and in terms of dynamic, high frequency trends, e.g. market returns and stock price volatility. Mispricing shocks affect larger, more liquid, and more profitable firms in the full sample. Within the set of treatment firms, the largest mispricing shocks affect firms with lower past returns and higher financial constraints. In this sub-sample, firm characteristics drive the size of the shocks. In addition, I find that the randomization trading strategy assigns firms with the lowest returns to the treatment sample, despite evidence that managers systematically avoid selling these firms. Abandoning the randomization strategy would remove this particular source of bias. However, this solution reintroduces the bias from information-based trading. Hence, the inherent selection bias in the flow-induced mispricing setting cannot be resolved fully and confounds estimates of the feedback effect.

This paper contributes to the intersection of the asset pricing and corporate finance literatures by studying the feedback effect between stock market prices and firm financial policy. The results show that mutual fund liquidity trading does not drive firm financial policies and thereby address growing concerns that large investment vehicles, such as ETFs and mutual funds, reduce market efficiency (Duffie, 2010; Coval and Stafford, 2007). The analysis contributes to the mutual fund literature by documenting that large outflows are more likely among small-cap funds and that fund managers minimize liquidity costs in times of distress. Finally, my results add to the causal inference methods literature by presenting an empirical method that preserves the useful features of the flow-induced mispricing setting while reducing the selection bias problem in estimates derived in this setting (Larcker and Rusticus, 2010; Roberts and Whited, 2013; Atanasov and Black, 2016).

II. Data and Methods

This study assembles a dataset that combines mutual fund holdings data and firm-level data for the period from 1980 to 2007.[3] At the mutual fund level, I merge the Center for Research in Security Prices (CRSP) Survivorship Bias Free Mutual Fund Database with the Thompson Financial CDA/Spectrum holdings database using the Wharton Research Data Services (WRDS) MFLinks file. Mutual funds must have holdings data in the CDA/Spectrum database and a valid link between the holdings data and the CRSP Mutual Funds database. The sample includes equity mutual funds and excludes sector mutual funds that specialize in specific industries (Edmans, et al., 2012). I identify index and target-date mutual funds by their fund names in the CRSP Mutual Funds database and by using the

[3]The sample period corresponds to the time period used in the prior literature to examine mutual fund trading and price pressure (Edmans, Goldstein, and Jiang, 2012; Lou, 2012). Moreover, this sample period excludes the confounding effects of the financial crisis on mutual funds, market prices, and firm policies.

CRSP index fund flag (Kacperczyk, Sialm, and Zheng, 2008).

Fund-level variables include total net assets (TNA), gross returns, net returns, and expense ratios. For mutual funds with multiple share classes reported by CRSP, TNA is the sum of TNA across all share classes. Net returns and expense ratios are TNA-weighted averages across all share classes. Gross returns for mutual funds are net monthly fund returns plus 1/12 of annual fees and expenses. Other fund characteristics, such as investment objective codes, equal the value from the share class with the largest total net assets.

I compute a firm's quarterly TNA as the sum of monthly asset flows net of merger assets in each calendar quarter. I compound the monthly returns to the quarterly level and calculate fund flows using differences in the return-adjusted quarterly TNA. Consistent with prior literature, I assume that flows occur at the end of each quarter and that investors reinvest dividends and capital appreciation distributions in the same fund. Mutual funds that are initiated have inflows equal to their initial TNA. Liquidated funds have outflows equal to their terminal TNA.

To calculate the increase in TNA due to fund mergers in quarter t, $MGN_{j,t}$, I approximate the date on which the merger occurs, because neither CRSP nor CDA/Spectrum reports the exact date of the merger. The last net asset value (NAV) report date of the target fund denotes the merger date. To avoid mismatches, I match a target fund to its acquirer from one month before its last NAV report date to five months after the date and calculate the flow, accounting for the merger, for each of the months in this window and select the month with the smallest absolute percentage flow as the event month (Lou, 2012).

I use the holdings data from CDA/Spectrum to compute the number of shares and value of each equity holding of each mutual fund as of the quarter end (Coval and Stafford, 2007). If the firm has an event that affects the number of shares outstanding, I use the CRSP monthly stock database to adjust the reported number of shares that the mutual fund holds to be current as of the mutual fund report date and assume that the manager does not trade between the report date and the quarter-end (Coval and Stafford, 2007). To control for data discrepancies between the CDA/Spectrum equity holdings and the CRSP database, I compute the difference between the TNA reported in the CRSP database (which includes the complete holdings) and in the CDA/Spectrum database (which includes only the reported stock holdings) and require that the TNAs do not differ by more than a factor of two (i.e., $0.5 < \frac{TNA_{CDA}}{TNA_{CRSP}} < 2$) (Lou, 2012). In addition, I require a minimum fund size of $1 million (Coval and Stafford, 2007).

Fund flows to fund j in quarter t represent the growth rate of the total net assets under management (TNA) after adjusting for the market appreciation of the mutual fund's assets ($R_{j,t}$) and new cash from fund mergers ($MGN_{j,t}$) (Lou, 2012; Chevalier and Ellison, 1997). The calculation for flows to fund j in quarter t is:

$$flow_{j,t} = TNA_{j,t} - TNA_{j,t-1} \times (1 + R_{j,t}) - MGN_{j,t}$$

$$FLOW_{j,t} = \frac{flow_{j,t}}{TNA_{j,t-1}}$$

Table 1 reports annual summary statistics for the sample of mutual funds as of December of each year. The full sample contains 29,552 fund-year observations with 3,388 distinct mutual funds. Table 1, Column 2 reports the number of equity mutual funds in each year along with summary statistics of fund characteristics. Over the sample period the number of mutual funds and the average fund size increases ten-fold. Furthermore, mutual fund ownership of the U.S. equity market has grown from a mere 2% in 1980 to 16% in 2006. These statistics are comparable to those reported in Lou (2012).

[Insert Table 1]

I construct a firm-level dataset that combines mutual fund and firm-level data between 1980 and 2007. The dataset includes all firms listed on Compustat that have non-missing price and returns data reported in the CRSP monthly file and excludes all financial (SIC code 6000-6999) and utilities (SIC codes 4900-4949) firms.

The dataset includes measures of firm financial policies that are potentially affected by market prices such as investment, payout, and equity financing and firm characteristics that are direct determinants of these firm policies such as firm size, profitability, cash flows, Tobin's Q, the Kaplan-Zingales financial constraint measure, and the Amihud Illiquidity measure (Hasbrouck, 2009; Goyenko, Holden, and Trzcinka, 2009). To measure the relative size of each mutual fund's position in the firm, I construct a firm-level Herfindahl-Hirschman Index (HHI) of mutual fund ownership.[4] Firms must have non-missing values for: cash flows, profits, returns, volatility, leverage, payout, equity issuance, capital expenditures, book assets, and market to book. The Appendix provides definitions of these variables. The Mispricing Shock variable, defined in Section III below, is a firm-level measure that represents mutual fund liquidity selling. Treatment denotes firm-years in which a firm has a non-zero value for this variable.

Table 2 reports summary statistics for the sample of firms for years between 1980 and 2007. The final dataset contains 111,312 firm-year observations. Between 1980 and 2007, institutional investors owned 25% of an average firm's shares outstanding and mutual funds owned roughly 8% of a firm's shares outstanding. The mean value of the Treatment variable indicates that in about half of the sample firm-years, firms experience flow-induced selling. All variables are winsorized at the 1% and 99% levels.

[Insert Table 2]

III. The Implied Mutual Fund Trade Variable Construction

I construct the flow-induced trading variable (Mispricing Shock) according to the description from Edmans, et al. (2012) and Phillips and Zhdanov (2013). The variable is a firm-specific change in mutual fund holdings over a calendar year based on a fund's previously disclosed investment portfolio, among funds with large outflows. Large outflows are outflows of 5% or more in a given quarter. Whereas smaller outflow shocks might be absorbed by a fund's cash position, "extreme" outflows are more likely to force managers to sell assets and cause a large, negative price impact on underlying firms.[5]

[4] The HHI approaches zero when a large number of mutual funds hold positions in a firm of relatively equal size and approaches its maximum of one when a single mutual fund controls all of the shares of the firm.

[5] See Coval and Stafford, 2007; Edmans, Goldstein, and Jiang, 2012; Khan, Kogan, and Serafeim, 2012.

(1) **Fund Level**

At the fund-level j, I define the following variables in each quarter t:

$FLOW_{j,t}$: $FLOW_{j,t} = \frac{TNA_{j,t}-(1-R_{j,t})\times TNA_{j,t-1}}{TNA_{j,t-1}}$ as defined in Section II.

$Outflows_{j,t} : \phi_{k,t} = TNA_{j,t} - (1+R_{j,t}) \times TNA_{j,t-1}$ where funds k are the subset of funds with large outflows (i.e., $FLOW_{j,t} \leq -5\%$).

$Holdings_{j,i,t} : h_{j,i,t} = \frac{P_{i,t}\times S_{j,i,t}}{TNA_{j,t}}$ where $P_{i,t}$ and $S_{j,i,t}$ are the share price of firm i in quarter t and the shares of firm i held by fund j in quarter t, respectively.

$Trades_{k,i,t} : T_{k,i,t} = \phi_{k,t} \times h_{k,i,t-1} = FLOW_{k,t} \times P_{i,t-1} \times S_{k,i,t-1}$.

$FLOW_{j,t}$ is the quarterly mutual fund flows for fund j in quarter t. $Outflows_{j,t}$ are large outflows. $Holdings_{j,i,t}$ measures the proportion of a fund's assets invested in each stock in its portfolio and $Trades_{k,i,t}$ uses the proportion of the fund's previously disclosed holdings in each firm to calculate managers' trades.

(2) **Firm Level**

At the firm-level, the following variables measure the total impact of mutual fund liquidity trading on the underlying firms i in each quarter t:

$Trading\ Volume(\$) : V_{i,t} = P_{i,t} \times x_{i,t}$ where $x_{i,t}$ = total shares of firm i traded in quarter t and $P_{i,t}$ is the price of firm i in quarter t.

$Mispricing\ Shock : Mispricing\ Shock_{i,t} = \sum_{k=1}^{K} \frac{T_{k,i,t}}{V_{i,t}} = \sum_{k=1}^{K} \frac{FLOW_{k,t}\times P_{i,t-1}\times S_{k,i,t-1}}{V_{i,t}}$

The annualized Mispricing Shock measure is the sum of $Mispricing\ Shock_{i,t}$ over the four quarters in a given calendar year. If a firm receives no mutual fund trading pressure in any of the four quarters of a year, then Mispricing Shock equals zero. The range of Mispricing Shock is a negative value with a maximum of zero. For ease of interpretation, I set the Mispricing Shock variable equal to its absolute value such that a higher value is associated with a higher level of stock mispricing for the firm-year observation.

IV. The Feedback Effect and Selection Bias

In this section, I test the hypothesis that flow-induced stock mispricing causes firms to adjust financial policies, i.e., investment, payout policy and equity issuance. Then, I screen for selection bias to determine if a selection problem drives these results.

I use the following regression specification to measure the effect of negative mispricing shocks on firm investment, equity financing, and payout:

$$Firm\ Financial\ Policy_{i,t} = \alpha_i + \gamma_t + \beta_1 Mispricing\ Shock_{i,t-1} + \beta_2 X_{i,t-1} + \varepsilon_{i,t}$$

where the dependent variable $Firm\ Financial\ Policy_{i,t}$ denotes either investment, equity financing, or payout for firm i in year t following the mispricing event. The coefficient β_1 measures the impact of stock mispricing on firm financial policies. $X_{i,t-1}$ is a vector of common determinants of financial policies used in the literature: firm size, measured in quantiles of book assets, firm risk, measured as returns volatility, Tobin's Q (i.e., market to book), annualized returns in the year prior to treatment, profitability, and firm leverage. The Appendix reports detailed variable definitions. Regression specifications include firm and year fixed effects, and standard errors that are clustered at the firm level.

Columns 1 - 3 of Table 3 report results of this regression on firm investment, equity financing, and payout, respectively. The coefficient on β_1 indicates that negative stock mispricing events cause firms to reduce investment and equity issuance, and to increase payout in the year following the event. In terms of economic magnitudes, market mispricing accounts for a reduction of 0.26% in annual firm investment (-0.0002 scaled by the sample average of 0.078). Over the sample period, these shocks would cause the average firm to reduce investment by $34 million. Aggregated over the full sample, with more than 56,000 mispricing events, these shocks cause an economically significant reduction of $70 billion per year. Columns 2 and 3 show that stock mispricing leads to a reduction of 0.73% in equity issuance and a 0.27% increase in payout. These results complement existing findings that market mispricing causes firms to alter firm policies (Khan, et al. 2012; Edmans, et al., 2012; and Phillips and Zhdanov, 2013).

[Insert Table 3]

The possibility of selection bias complicates the interpretation of these results. Such bias may be particularly acute in this setting because of the nature of flow-induced mispricing shocks. These shocks arise only among funds with large outflows and only among firms with mutual fund ownership. The firm characteristics that influence these outcomes are unknown and potentially introduce selection bias. When treatment and control groups differ in observable and unobservable characteristics that also influence firm financial policies, then selection bias is present.

Various methods exist to mitigate selection bias problems in empirical studies using observational data. Common methods include matching methods based on observable characteristics, the Heckman (1976) selection method, and regression estimation with firm characteristics as control variables to account for sample differences. In the flow-induced mispricing setting, these methods only partially resolve the problem because there are many unknown firm characteristics driving the distribution of the mispricing shocks, e.g. determinants of mutual fund ownership.

To test whether there is a selection bias problem in this setting, I use a two-step procedure proposed in Michaely, Rubin, and Vedrashko (2016). I split firms into two groups based on whether they had at least one mispricing event during the sample period (i.e., treatment firms). Then I identify firm-years in which mutual funds receive small outflows. Since small outflows do not force managers to sell large quantities of portfolio stocks, these outflows do not induce a mispricing event. Instead, these periods induce placebo mispricing events for treatment firms. I compare the feedback effect of treatment firms to that of control firms following placebo mispricing events. This test is analogous to exposing all firms to a placebo (a period in which there is no mispricing shock) such that the feedback effect should not differ between treatment and control, if mispricing events are the true drivers of the feedback effect. This procedure assesses whether selection bias is present in the flow-induced mispricing setting.

The test, reported in Table 4, uses the full sample of treatment and control firms but removes firm-year observations in which a treatment firm received an extreme mispricing shock.[6] Hence, treatment firms are in the sample only during years in which they experience a placebo mispricing shock. To define the placebo mispricing shocks, I identify the set of mutual funds that had "normal" outflows based on two definitions: outflows between 0% and 5% and outflows between 0% and 2%. This procedure is possible because over 75% of treatment firms have non-event years throughout the sample period. I repeat the main regression analysis using placebo mispricing shocks instead of real mispricing shocks.

Table 4 reports regression estimates of the feedback effect of placebo mispricing events on firm financial policies. Columns 1 - 3 (4 - 6) report how placebo mispricing events affect investment, equity issuance, and payout when the placebo events are driven by fund outflows between 0% and 5% (0% and 2%). The negative coefficient on Stock Mispricing in Column 1 indicates that treatment firms reduce investment even when they do not experience a mispricing shock. Likewise the positive and statistically significant coefficient on Stock Mispricing in Column 3 indicates that treatment firms also increase payout. The results in Columns 4 - 6 show that even when fund outflows are very small (0% to 2%), treatment firms reduce investment and increase payout. Because the shocks are placebos, the financial policies should not differ between treatment and control firms after the placebo shocks. The fact that they do differ suggests that firm characteristics, rather than mispricing events, drive the feedback effect.

[Insert Table 4]

These findings suggest that the results in Table 3 are subject to selection bias. To calculate an unbiased estimate of the feedback effect in this empirical setting, the analysis

[6]Extreme mispricing shocks are those that are in the top decile of shocks across the full sample period. Section VI describes these shocks in detail.

must address the selection bias problem. The remainder of this paper explores the origins of selection bias, e.g., firm characteristics that drive large fund outflows and large mispricing events, and then estimates the feedback effect using a homogeneous sub-sample of treatment firms.

V. Large Mutual Fund Outflows

This section examines whether large fund outflows are correlated with firm characteristics. Part A explores whether a link between large outflows and fund investment styles drives a correlation between large outflows and firm characteristics. Part B examines the correlation between fund managers' trades and firm characteristics following large outflow events. Additional tests explore how trading randomization strategies alleviate or exacerbate selection bias in this setting.

V.A. Large Outflows and Firm Characteristics

Large fund outflows drive mispricing shocks in the flow-driven mispricing setting. The appeal of using large outflows as an exogenous shock to firms is that outflows force fund managers to sell portfolio firms that they otherwise would not. The identifying assumption is that large outflows are uncorrelated with individual firm characteristics within a fund's portfolio such that the resulting mispricing events are exogenous to firm characteristics.

In practice, mutual fund regulations require that funds commit to broad investment strategies that correlate explicitly with firm characteristics. For example, a fund with a "small-cap growth" strategy invests in small, high growth firms relative to the average firm. If large outflows are correlated with fund investment strategies and thereby firm characteristics, large outflows lead to selection bias.

The following analysis tests the hypothesis that large fund outflows are correlated with the investment strategies of mutual funds. Mutual funds in the sample invest in one of nine broad U.S. equity strategies: Domestic Income, Domestic Hedged, Domestic Growth, Domestic Growth and Income, Domestic Large Cap, Domestic Mid Cap, Domestic Small Cap, Domestic Micro Cap, and Domestic Fund (no style specified). The sample excludes funds that only invest in specific sectors, such as gold, oil, and other specific industries to mitigate the influence of industry-specific, business cycle waves on large outflows (Edmans, et al., 2012).

I estimate whether fund investment strategies increase a fund's likelihood of large fund outflows:

$$\Pr(\text{Outflow}>5\%) = \alpha_t + \beta_1 \text{ Past Alpha} + \beta_2 \text{ Past Returns} + \beta_3 \text{ Past Flows} + \beta_4 \text{ Index Fund} + \beta_5 \text{ Fund Size} + \gamma_j \text{ Fund Investment Objective}_j + \varepsilon_{j,t},$$

where the dependent variable is an indicator variable equal to one if the fund receives large outflows (>5%) in a given quarter (t) and zero, otherwise. The independent variables include the past four quarters of fund flows ($FLOW_{j,t-1}$ through $FLOW_{j,t-4}$), the monthly Carhart four-factor fund alpha computed from the fund's returns in the previous year, and the cumulative market-adjusted fund return in the previous year. Index Fund is an indicator variable equal to one if the fund is an index fund and zero, otherwise. Fund size is the natural log of the quarterly TNA from the prior quarter. Fund Investment Objective is an indicator variable denoting a fund's investment strategy. The omitted category in the regression is Domestic Growth, which represents over 40% (22,057/51,917) of fund-quarter observations in the sample. The specification includes year-quarter fixed effects and standard errors clustered by investment objective.

Table 5, Column 1 shows that funds with higher alphas, higher past returns, and positive past flows are less likely to experience large outflows, consistent with previous findings in the literature. The results in Column 2 show that after controlling for these characteristics, a fund's firm-specific investment strategy is a significant predictor of large outflows.[7] For example, Micro Cap funds, which target firms with small market capitalizations, are 10%

[7] In addition, Index funds are less likely to receive large outflow shocks. When index funds receive outflows, they liquidate their portfolio in proportion to holdings to imitate the underlying index, by construction. This result suggests that funds with large outflows are less likely to follow a pure index strategy.

more likely to experience large outflows compared to Domestic Growth funds. On average, firms with small market capitalization are not only smaller, but they also have higher financial constraints and lower market liquidity compared to other firms. These firm characteristics drive firm financial policies, independently of market mispricing. Hence, the tendency for large outflows to target specific fund investment strategies introduces selection bias in the empirical setting.

[Insert Table 5]

V.B. Portfolio Trading and Firm Characteristics

A second potential source of selection bias comes from the trading strategies of mutual fund managers following large outflow events. Because a manager's exact selling activity reflects information about firm value, researchers propose a randomization strategy to remove information-based trading. Specifically, the strategy ignores actual trading activity and instead, distributes the outflows across all portfolio firms in proportion to portfolio weights (e.g. Edmans, et al., 2012). This strategy bolsters the claim that mutual fund trades are exogenous to firm value, but it may introduce a different selection problem if managers systematically sell only firms with specific characteristics.

Managers tend to buy and sell portfolio firms proportionally under normal circumstances (Lou, 2012). However, managers may systematically avoid selling firms with high liquidity costs in response to large outflows (Alexander, Cici, and Gibson, 2007; Brown, Carlin, and Lobo, 2010; Duffie and Ziegler, 2003). By assigning illiquid firms to the treatment group when they are excluded from actual treatment, randomization strategies may introduce selection bias into the treatment sample. For example, suppose that mutual fund trading does not cause mispricing among firms that mutual fund managers sell. However, suppose that the firms that mutual funds do not sell are illiquid and poorly performing. If the randomization strategy includes these untreated, but poorly performing firms in the treatment group, the strategy may erroneously introduce negative returns trends that look like mispricing.

I test the hypothesis that managers follow a proportional selling strategy when they receive large capital outflows using the following regression specification:

$$trade_{i,j,t} = \alpha_t + \beta_1 flow_{j,t} + \beta_2 X + \beta_3 flow_{j,t} \times X + \beta_4 Z + \beta_5 flow_{j,t} \times Z + \varepsilon_{j,t}$$

where the dependent variable, $trade_{i,j,t}$, is the percentage trading in stock i by fund j in quarter t and fund j must have outflows $>5\%$. In the regression model, the coefficient on fund flows, $flow_{j,t}$, measures the degree to which managers trade in proportion to outflows. If managers trade proportionally then the coefficient on $flow_{j,t}$ should equal one and the coefficients on the control variables should equal zero. The coefficients on variables in the vectors X and Z reflect trading that is attributed to a fund manager's discretion. X is the vector of control variables for fund characteristics: the ownership share of mutual fund j in stock i ($own_{i,j,t-1}$), the Amihud Illiquidity measure to control for individual firm liquidity costs ($liqcost_{i,t-1}$), the portfolio-weighted average ownership share ($own_{j,t-1}$), and fund-level liquidity costs ($liqcost_{j,t-1}$). Z is a vector of firm characteristics that includes lagged annual returns ($returns_{i,t-1}$), lagged annual volatility ($volatility_{i,t-1}$), the Kaplan-Zingales measure of financial constraints ($finconstraint_{i,t-1}$), market-to-book ($MkttoBook_{i,t-1}$), and firm size ($size_{i,t-1}$). The interactions of these variables with fund flows denote the incremental effect of these characteristics on trading, conditional on the magnitude of outflows. The Appendix reports detailed variable definitions. Year-quarter fixed effects, t, control for market-wide fluctuations over time. Standard errors are clustered at the fund level.

The results in Table 6 show that managers do not follow a proportional selling strategy in response to large outflows. The coefficient on $flow_{j,t}$ of 0.71 in Column 1 means that managers liquidate proportionally 71 cents of each dollar following large outflows, leaving 29 cents that managers liquidate strategically. In Columns 2 - 4, the negative and significant coefficient on $flow_{j,t} \times liqcost_{i,t-1}$ shows that managers avoid selling firms with high liquidity costs as outflows become larger.

[Insert Table 6]

Columns 2 through 4 report that firm characteristics, other than liquidity, are correlated with manager trading strategies. The positive and significant coefficient on $MkttoBook_{i,t-1}$ suggests that managers are more likely to sell firms with growth opportunities. The negative and significant coefficient on $size_{i,t-1}$ means that, after controlling for liquidity costs, fund managers are more likely to sell smaller firms.

Taken together, these results reveal two sources of selection bias in this empirical setting. First, large outflows are more likely among funds that invest in smaller firms. Because the fund portfolio is biased towards smaller firms, a "randomization" strategy does not mitigate this form of selection bias towards small firms. Second, "randomization" strategies introduce selection bias by assigning illiquid firms to the treatment group despite evidence that they are unlikely to be treated.

VI. Selection Bias and Firm Characteristics

I assess whether treatment and control firms are observably different as a result of selection bias. First, I test the hypothesis that observable firm characteristics predict treatment, i.e., a mispricing event. Then, I explore whether the intensity of mispricing shocks is correlated with firm characteristics.

Table 7 summarizes firm characteristics of treatment and control firms, in the year prior to a mispricing shock. Columns 2 and 3 report statistics for control firm-years ($MispricingShock = 0$) and treatment firm-years ($MispricingShock > 0$), respectively and Column 4 reports p-values from tests of differences-in-means. The table summarizes static firm characteristics in levels, such as size and leverage, and dynamic, high frequency firm characteristics, such as market returns and returns volatility, as month over month changes during the past 12 months. Additional characteristics include firm age, the Kaplan-Zingales measure of financial constraints, profitability (ROA), cash flows, Tobin's Q, the Amihud Illiquidity measure, and a firm's fraction of institutional ownership.

[Insert Table 7]

In the year prior to a mispricing event, treatment and control firms are observably different. Treatment firms have almost three times as much mutual fund and institutional ownership relative to control firms. In fact, of the 14,297 unique firms in the sample, 4,138 (29%) firms have no mutual fund ownership over the full sample period, meaning that 29% of firms have zero probability of a mispricing shock. This is a problem because unobservable firm characteristics determine institutional investment in one firm and not in another. And differences in institutional ownership, i.e. mutual fund ownership, not only drive the probability that a firm has a mispricing event, but also drive differences in both observable and unobservable firm characteristics such as payout, corporate governance, liquidity, and investment (Crane, Michenaud, and Weston, 2016; Grossman and Hart, 1980; Kisin, 2011; Shivdasani, 1993).

In addition, there are other differences both in terms of static firm characteristics - treatment firms are larger and less financially constrained - and dynamic firm characteristics - treatment firms have higher past returns and lower volatility. This selection problem can bias estimates of the feedback effect. The estimates reflect firm differences rather than market pricing effects. For example, treatment firms differ from control firms in terms of book to market, size, past returns, operating profits, and asset growth. These characteristics independently and directly influence equity issuance (Asquith and Mullins, 1986; DeAngelo, DeAngelo, and Stulz, 2010; Jenter, 2005; Loughran and Ritter, 1995; and Fama and French, 2005).

In light of the results in Table 7, I explore whether past returns predict mispricing events. I compare treatment and control firm returns using the abnormal returns of each treatment firm's monthly return over the benchmark of the CRSP equal-weighted index returns, as in Coval and Stafford (2007). I split treatment firms into two groups: those with extreme flow-driven mispricing estimates (in the top 10%) and the remaining mispricing event firms (non-extreme mispricing firms). Extreme events are the firm-month observations in which the quarterly mispricing is in the top decile of quarterly mispricing over the full sample period (1980 - 2007).[8] In each event month, I calculate the average abnormal returns (AARs) and compute cumulative average abnormal returns (CAARs) as the abnormal returns over the period beginning 12 months prior to the event and extending 24 months following the event (Coval and Stafford, 2007; Edmans, et al. 2012). There are three event-months for each event due to the quarterly frequency of mutual fund holdings reports. Test statistics are calculated using event time fixed effects with standard errors clustered by month to control for potential cross-sectional dependence in the monthly abnormal returns (Coval and Stafford, 2007).

Table 8 reports these statistics for extreme mispricing events (Columns 1-3) and non-extreme mispricing events (Columns 4-6). A comparison of the abnormal returns in Column 1 to those in Column 4, reveals that the returns of extreme event firms are systematically lower prior to a mispricing event (Column 1). Following mispricing events, extreme event firms experience large, negative, and statistically significant abnormal returns (-6%) during the event quarter. In contrast, the remaining event firms experience positive and statistically significant abnormal returns during the event quarter and negative abnormal returns only in the two quarters after the event (Column 5). These results show that past returns not only predict selection into the treatment group, but also predict the *intensity* of treatment among treatment firms.

[Insert Table 8]

Figure 1 illustrates the returns patterns. Panel A plots the CAARs for the extreme event firms and Panel B plots the CAARs for the rest of the event firms. Extreme events are followed by large price impacts (-6%) during an event quarter, such that the strongest price reaction comes from the largest shocks. Surprisingly, Panel B shows no price reduction following flow-induced trading among the rest of the event firms.

[8] This approach is consistent with the method in Coval and Stafford (2007) and Edmans, et al. (2012), in which the extreme events are used to document price pressure effects.

[Insert Figure 1]

I test the hypothesis that firm characteristics predict treatment and the intensity of treatment. I estimate the likelihood of treatment (or extreme treatment) as a function of firm characteristics in the following regression specification:

$$\Pr(Mispricing_{i,t} > 0) = \alpha_i + \gamma_t + \beta_1 \text{ MF Own (\%)} + \beta_2 \text{ MF Own (HHI)} + \beta_3 \text{ Size} + \beta_4 \text{ Age} + \beta_5 \text{ Market to Book} + \beta_6 \text{ Cash Flows} + \beta_7 \text{ Returns} + \beta_8 \text{ Financial Constraints} + \beta_9 \text{ Volatility} + \beta_{10} \text{ Liquidity} + \varepsilon_{j,t}$$

The model includes firm characteristics that determine firm financial policies directly, including: the market to book ratio, cash flows, size, age, past firm returns, return volatility, and liquidity in the year prior to the Mispricing Shock. The model includes two control variables for the degree of mutual fund ownership of the firm (MF Own (%)) and the concentration of mutual fund ownership (MF Own (HHI)). The model includes firm and year fixed effects and standard errors, clustered at the 3-digit SIC level.

[Insert Table 9]

Table 9 shows that firm characteristics predict treatment within the full sample (Column 1) and the intensity of treatment within the treatment subsample (Column 2). Firms in the treatment sample are larger, older, and have higher returns in the year prior to treatment than control firms. The opposite is true for extreme event firms. These firms are smaller, younger, and have lower past returns than other treatment firms.

Hence, selection bias leads to sample heterogeneity, even within the treatment sample. Moreover, selection bias is directly related to firm financial policies; these firm characteristics are significant determinants of equity issuance, investment expenditures, and payout (Fazzari, Hubbard, and Petersen, 1988; Miller and Rock, 1985; Subrahmanyam and Titman, 2001; Fee, Hadlock, and Pierce, 2009; Anton and Polk, 2014; Bharath, Jayaraman, and Nagar, 2013; Chen, Jegadeesh, and Wermers, 2000; Edmans, Fang, and Zur, 2013).

Section VII. Feedback Effects in a Homogeneous Sample

This selection problem leads to biased estimates of the feedback effect in the flow-induced mispricing setting. To obtain unbiased estimates, I use a homogeneous sample of firms to test the hypothesis that there is a feedback effect between stock mispricing and firm policies (Michaely, et al., 2016).

Section VI documented that the extreme event firms are a more homogeneous sub-sample within the sample of treatment firms in terms of past returns, size, etc. Intuitively, in an analysis using only this sub-sample, the control group consists of the event firms themselves, during periods when firms do not experience an extreme event. By using extreme event firms as their own counterfactuals, the method "matches" the sample of treatment and control firms on both observable and unobservable fixed characteristics.

I construct the homogeneous sub-sample of firms as the set of firms with an extreme mispricing event during the sample period and combining the time series of firm-years for only these firms over the full sample period. I use this sub-sample to measure the feedback effect of negative mispricing shocks on firm investment, equity financing, and payout in the following regression specification:

$$Firm\,Financial\,Policy_{i,t} = \alpha_i + \gamma_t + \beta_1 Mispricing\,Shock_{i,t-1} + \beta_2 Event_{i,t-1} + \beta_3 X_{i,t-1} + \varepsilon_{i,t}$$

where the dependent variable $Firm\,Financial\,Policy_{i,t}$ measures investment, equity financing, and payout following the mispricing event. To control for differences between treatment and control firms leading up to the mispricing shock, I include a dummy variable to denote event firm-years, $Event_{i,t-1}$. The coefficient β_1 measures the impact of stock mispricing on firm financial policies after controlling for firm differences in the year of the shock. $X_{i,t-1}$ is a vector of control variables as discussed in Section VI. The Appendix reports detailed variable definitions. Regression specifications include firm and year fixed effects, and standard errors clustered at the firm level.

The results in Table 10 show that stock mispricing events do not induce a feedback effect on equity issuance or payout policy (Columns 2 and 3). The coefficient on β_1 is statistically insignificant. After mitigating selection bias in the flow-induced mispricing setting, the feedback effect disappears. However, β_1 in Column 1 shows a feedback effect between stock mispricing and firm investment in the homogeneous sub-sample. One interpretation of this result is that there is, indeed, a feedback effect. Another interpretation is that selection bias, even within this homogeneous sub-sample, drives the result.

[Insert Table 10]

I test for selection problems within the homogeneous sub-sample of firms using the placebo analysis introduced in Section IV. Specifically, I identify firm-years in this sub-sample in which mutual funds receive small outflows. I remove firm-year observations in which a treatment firm received a real mispricing shock. Hence, treatment firms are in the sample only during years in which they experience a placebo mispricing shock. To define the placebo mispricing event years, I identify the set of mutual funds that had "normal" outflows, i.e., outflows between 0% and 5% and outflows between 0% and 2%. I repeat the main regression analysis but use placebo mispricing shocks instead of the real mispricing shocks, and compare the feedback effect of placebo treatment firms to that of control firms during periods in which mutual funds receive small fund outflows.

[Insert Table 11]

Table 11 reports the results of this analysis. The coefficient β_1 in Columns 1 and 2 provides evidence that placebo mispricing events cause firms to lower investment and equity issuance. These results point to selection bias, even in the homogeneous firm sample, and bring into question whether selection bias drives the estimated feedback effect between stock mispricing and firm investment documented in Table 10.

One possible way that selection bias could arise, even among the extreme mispricing event firms, is via the trading "randomization" method. This method assigns trading activity to all portfolio firms but the analysis in Section V showed that managers do not necessarily sell all portfolio firms. In fact, managers may systematically *never* sell some portfolio firms, such that some treatment firms never experience real selling pressure from mutual funds. In this scenario, both firm types are included in the homogeneous sample, but firms with real selling pressure may differ in both observable and unobservable ways from firms that funds never sell.

On one hand, it is possible to remove this selection bias by using the sample of treatment firms that only receive real mutual fund selling activity. However, this strategy reintroduces the information-based trading that the randomization method seeks to avoid. Hence, this particular source of selection bias cannot be resolved in the flow-induced mispricing setting.

The combination of results in Tables 10 and 11 shows that using a homogeneous treatment sample reduces bias in the estimates of a feedback effect. An empirical strategy that combines placebo shocks with homogeneous subsample analysis provides less-biased estimates of feedback effects while preserving the useful features of the flow-induced mispricing setting. Using this strategy, the results in this paper show no evidence of a feedback effect for payout policy and equity issuance, and at most, weak evidence of a feedback effect for investment.

VIII. Conclusion

The stock market is increasingly dominated by large investment vehicles, such as mutual funds and exchange traded funds. This trend has created concern that sudden liquidity needs of these investment vehicles may temporarily reduce market efficiency by pushing stock prices away from fundamental value. Indeed, an empirical literature shows that mutual fund liquidity trading leads to stock mispricing (Chen, Noranha, and Singhal, 2004; Mitchell, Pulvino, and Stafford, 2004; and Coval and Stafford, 2007). A potential side effect of price inefficiencies, if a feedback effect exists, is that inefficient stock prices may influence firm policies.

The analysis in this paper examines the effects of mutual fund flow-induced mispricing events on three financial policies: investment, equity issuance, and payout. The initial results provide compelling evidence of a feedback effect - stock mispricing drives changes in these firm policies. However, further analysis reveals evidence of selection bias in this setting such that treatment firms exhibit a feedback effect even when they experience no mispricing shock.

I explore the sources of this selection problem and document two potential sources. First, large mutual fund outflows, the flows that induce mispricing events, systematically target funds that hold small firms, thereby biasing the mispricing shock towards small firms. Second, fund managers systematically sell the more liquid firms in their portfolios of small firms, biasing the shock towards small firms with specific firm characteristics. This selection bias leads to observable and unobservable differences between treatment and control firms. Moreover, even within the sample of treatment firms, those that have the most severe mispricing events differ from the other treatment firms.

Within the sample of treatment firms, I use a homogeneous sub-sample of treatment firms to test the feedback effect. These results suggest that selection bias, rather than stock mispricing, drives the estimated feedback effect. Although a feedback effect may exist between market prices and firm policies, flow-induced market mispricing does not alter firm policies that potentially affect the broader US economy.

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Appendix: Variable Definitions

Variable	Data Definition
Age	The years from a firm's first appearance in CRSP
Amihud	Illiquidity measure per Amihud (2002); yearly average of the square root of (Price x Vol)/Return
Asset Growth	log(book assets(#6)) - log(lagged book assets(#6))
Beta Asset	Beta on the market factor in a Fama-French three-factor model using daily data from CRSP, and then unlevered
Capital Expenditures	capital expenditures (#128)/lagged book assets (#6)
Cash Flows	(income before extraordinary items (#21) + depreciation (#14))/lagged book assets(#6)
Dividends	dividends(#21)/lagged book assets(#6)
Financial Constraints	Kaplan Zingales measure of financial constraints
Inst Own (%)	Fraction of a firm's total shares outstanding owned by institutional investors
Inst Own (HHI)	Herfindahl-Hirschman Index of the concentration of institutional ownership of shares outstanding
Investment	capital expenditures (#128)/lagged book assets (#6)
Issuance	(change in common equity (#60) + change in deferred taxes (#74) - change in retained earnings (#36))/lagged common equity (#60)
Leverage	(Long term debt (#9) + current liabilities (#34) - cash (#1))/(assets (#6))
Market to Book	(book assets (#6) + Market Equity - Common Equity (#60) - Deferred Taxes (#74))/(book assets (#6))
MF Own (%)	Fraction of a firm's total shares outstanding owned by mutual funds
MF Own (HHI)	Herfindahl-Hirschman Index of the concentration of mutual fund ownership of shares outstanding
Mispricing Shock	abs(implied trading volume from mutual funds with outflows of 5% or more)/total trading volume
Mispricing Shock Indicator	equal to 1 if Mispricing Shock > 0, equal to 0 if Mispricing Shock $= 0$
Payout	(dividends (#21) + repurchases (#115) - sale of common and preferred stock (#108))/lagged book assets (#6); zero if numerator is zero or missing, and one if numerator>0 and denominator=0.
R&D	R&D expense (#46)/Sales (#12); zero if missing
Repurchases	(repurchases (#115) - sale of common and preferred stock (#108))/lagged (book assets (#6)
Returns	Cumulative monthly stock returns over the prior year (CRSP monthly file)
ROA	gross operating income (#13)/lagged book assets (#6)
Sales Rank	Rank of sales (#12) among all Compustat firms in a given year, ranging from zero to one
Size (ME)	ln(price (#199) * shares outstanding (#25) at fiscal year end)
Size (Assets)	ln(book assets (#6))
Size (Asset Quintiles)	quintiles of book assets (#6)
Tobin's Q	(price (#199) * shares outstanding (#25)+long term debt +short term debt)/ (long term debt +short term debt+book equity)
Volatility	standard deviation of daily stock returns over the past year

Table 1: Summary of Mutual Funds

Table 1 reports fund statistics for the mutual fund dataset that spans 1980-2007. The annual statistics are for US equity mutual funds as of December of each year. The CRSP survivorship-bias-free mutual fund database records mutual fund size, monthly returns, and flows. Thompson Financial CDA/Spectrum database records fund holdings data. Number of Funds is the number of mutual funds in the sample at the end of each year; TNA is the total net assets for the average fund, reported in millions of dollars; total equity holdings is the value of the equity holdings in each mutual fund using the stock price and holdings as of December reported in millions of dollars; % market held is the percentage of the value of the US equity market that is held by the mutual funds in the sample.

Year	Number of Funds	($ Million) TNA	($ Million) Total Equity Holdings	Fraction Market Held
1980	217	163.484	142.384	.02
1981	219	149.562	125.057	.017
1982	221	181.801	150.131	.018
1983	226	249.199	210.048	.024
1984	254	246.531	202.599	.026
1985	279	301.674	243.05	.027
1986	308	346.497	273.881	.028
1987	352	336.5	277.582	.035
1988	388	329.802	271.618	.031
1989	438	385.235	308.184	.032
1990	456	351.792	283.239	.034
1991	550	450.785	371.608	.037
1992	566	556.848	447.317	.048
1993	747	597.335	482.777	.047
1994	939	544.714	444.552	.054
1995	1070	737.246	607.596	.058
1996	1086	937.971	794.413	.068
1997	1342	1130.29	981.853	.079
1998	1444	1294.258	1157.854	.089
1999	1635	1472.733	1359.912	.085
2000	1768	1411.238	1285.334	.098
2001	2005	1072.424	989.148	.087
2002	2133	832.407	766.714	.112
2003	2195	1102.233	999.053	.122
2004	2204	1263.603	1107.771	.143
2005	2244	1408.811	1272.499	.143
2006	2109	1651.544	1496.092	.16
2007	2279	1603.545	1454.561	.159
Mean	1102	783.228	688.324	.07

Table 2: Summary of Firms

This table presents summary statistics for the full sample of firms between 1980 and 2007. Columns 1 through 4 report the mean, median, standard deviation, and number of observations for each variable. All data are obtained from Compustat and CRSP. The dataset includes all firms listed on Compustat that have non-missing price and returns data reported in the CRSP monthly file. The sample excludes all financial (SIC code 6000-6999) and utilities (SIC codes 4900-4949) firms. In addition, firms must have non-missing values for: cash flows, profits, returns, volatility, leverage, payout, equity issuance, capital expenditures, book assets, and market to book. All variables are winsorized at the 1% and 99% levels.

Variable	Mean	Median	Std Dev	Number of Obs
Financial Constraints (KZ)	2.438	1.231	4.993	111,312
Cash Flows (%)	0.053	0.081	0.186	111,312
ROA (%)	0.099	0.121	0.196	111,312
Returns (%)	-0.015	0.039	0.520	111,312
Volatility	0.035	0.030	0.021	111,312
Tobin's Q	1.851	1.301	1.620	111,312
Leverage (%)	0.854	0.405	1.589	111,312
Asset Growth (%)	0.110	0.073	0.290	111,312
Dividends (%)	0.010	0.000	0.019	111,312
Repurchases (%)	0.010	0.000	0.029	111,312
Age (Years)	16.546	12.000	14.279	111,312
Issuance (%)	0.191	0.017	0.647	111,312
Cap Ex (%)	0.078	0.049	0.097	111,312
Payout (%)	0.404	0.000	0.487	111,312
Size (ln(Assets))($)	5.185	5.017	2.259	111,312
Size (ln(ME))($)	5.005	4.870	2.242	111,312
Mispricing Shock	1.085	0.003	2.565	111,312
Treatment Firm-Year	0.505	1.000	0.500	111,312
Inst Own (%)	0.247	0.116	0.291	111,312
MF Own (%)	0.084	0.024	0.118	111,312
Inst Own (HHI)	0.154	0.059	0.232	111,312
MF Own (HHI)	0.172	0.055	0.261	111,312

Table 3: The Effects of Market Prices on Firm Financial Policies (using Large Mutual Fund Outflows)

This table reports the results from a regression of firm financial policies on the Mispricing Shock. The sample consists of annual firm-level data between 1980 and 2007. The dependent variables are investment, equity issuance, and payout policy. Investment is capital expenditures scaled by lagged assets, payout is total dividends and repurchases scaled by lagged assets, and issuance is the change in common equity and change in deferred taxes less the change in retained earnings scaled by lagged common equity. Stock Mispricing Shock is an annual measure of implied mutual fund trading in each firm from funds that receive large outflows $\geq$ 5% in a quarter. Control variables include firm size, volatility, Tobin's Q, returns, profitability, and leverage and are defined in the Appendix. The coefficient on Mispricing Shock measures the relative change in firm policies due to exogenous stock mispricing. Regressions include firm and year fixed effects. Robust standard errors are clustered at the firm level. *t*-statistics are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels.

	Large Outflows (>5%)		
	Investment	Issuance	Payout
	(1)	(2)	(3)
Mispricing Shock	-0.0002**	-0.0014**	0.0011**
	(-2.12)	(-2.17)	(2.10)
Size	-0.0121***	-0.1336***	0.0410***
	(-14.10)	(-22.03)	(10.94)
Volatility	-0.2207***	0.5882***	-1.3998***
	(-8.19)	(2.60)	(-14.71)
Tobin's Q	0.0116***	0.1432***	0.0043***
	(27.11)	(34.47)	(4.82)
Returns (%)	0.0135***	0.2067***	0.0092***
	(23.26)	(34.69)	(5.49)
ROA (%)	0.0582***	-0.4408***	0.1085***
	(17.73)	(-14.42)	(11.83)
Leverage (%)	-0.0044***	0.1259***	-0.0186***
	(-13.09)	(22.19)	(-13.04)
R-squared	0.592	0.460	0.826
Number of Observations	106,029	106,545	106,545
Number of Clusters	14,164	14,208	14,208
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes

Table 4: The Effects of Market Prices on Firm Financial Policies (using placebo Mispricing Shocks)

This table reports the results from a regression of firm financial policies on placebo mispricing shocks. The sample consists of annual firm-level data between 1980 and 2007. The dependent variables are investment, equity issuance, and payout policy. Investment is capital expenditures scaled by lagged assets, payout is total dividends and repurchases scaled by lagged assets, and issuance is the change in common equity and change in deferred taxes less the change in retained earnings scaled by lagged common equity. Mispricing Shock is a placebo mispricing shock based on an annual measure of implied mutual fund trading in each firm from funds that receive small outflows $\leq$ 5% (Columns 1-3) and $\leq$ 2% (Columns 4-6) in a quarter. Control variables include firm size, volatility, Tobin's Q, returns, profitability, and leverage and are defined in the Appendix. The coefficient on Mispricing Shock measures the relative change in firm policies due to placebo stock mispricing. Regressions include firm and year fixed effects. Robust standard errors are clustered at the firm level. *t*-statistics are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels.

	5% Outflows			2% Outflows		
	Investment	Issuance	Payout	Investment	Issuance	Payout
	(1)	(2)	(3)	(4)	(5)	(6)
Mispricing Shock	-0.0007**	-0.0060***	0.0030*	-0.0029**	-0.0246***	0.0108
	(-2.05)	(-2.82)	(1.66)	(-2.08)	(-2.77)	(1.55)
Size	-0.0114***	-0.1479***	0.0334***	-0.0114***	-0.1478***	0.0333***
	(-11.56)	(-20.57)	(9.47)	(-11.55)	(-20.55)	(9.47)
Volatility	-0.2162***	0.8644***	-1.3665***	-0.2163***	0.8661***	-1.3678***
	(-7.22)	(3.47)	(-14.62)	(-7.22)	(3.48)	(-14.61)
Tobin's Q	0.0115***	0.1448***	0.0033***	0.0115***	0.1448***	0.0033***
	(25.02)	(31.77)	(4.03)	(25.03)	(31.77)	(4.01)
Returns	0.0149***	0.2138***	0.0095***	0.0150***	0.2138***	0.0095***
	(21.93)	(31.02)	(5.51)	(21.94)	(31.03)	(5.49)
ROA	0.0513***	-0.4439***	0.1065***	0.0512***	-0.4440***	0.1064***
	(14.59)	(-12.93)	(12.21)	(14.58)	(-12.93)	(12.21)
Leverage	-0.0039***	0.1197***	-0.0133***	-0.0039***	0.1197***	-0.0133***
	(-11.71)	(20.48)	(-11.19)	(-11.71)	(20.48)	(-11.20)
R-squared	0.588	0.477	0.848	0.588	0.477	0.848
Number of Observations	85,867	91,109	94,374	85,867	91,109	94,374
Number of Clusters	14,279	14,587	15,039	14,279	14,587	15,039
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Table 5: Predicting Mutual Fund Flows

This table reports forecasting regressions of mutual fund flows for the sample of US Equity Mutual funds between 1980 and 2007. The regressions predict asset flows to mutual fund j in quarter t. The dependent variable is an outflow indicator, equal to one if the fund receives outflows of 5% or more and zero, otherwise. Independent variables include $alpha_{j,t-1}$, the monthly Carhart four-factor alpha, $Adj.Return_{j,t-1}$, the cumulative market-adjusted fund return, and lagged capital flows in the previous four quarters, $Flow_{j,t-1}$ through $Flow_{j,t-4}$. Additional variables include $Index_j$ which is an indicator variable that denotes if the fund is index or actively managed. $Size_{j,t-1}$ is lagged quarterly TNA in dollars. Fund objective indicator variables control for a fund's investment style. The omitted category in the regression is Domestic Growth. Robust standard errors are clustered at the fund level. t-statistics are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

	Outflow Indicator (Flow $\leq$ -5%) (1)	Outflow Indicator (Flow $\leq$ -5%) (2)
Alpha	-2.8351**	-2.8974**
	(-3.25)	(-3.18)
Adj Return (%)	-0.6291***	-0.6116***
	(-7.26)	(-7.38)
Flow (%) (t-1)	-0.0690	-0.0705*
	(-1.85)	(-1.98)
Flow (%) (t-2)	-0.0265*	-0.0280*
	(-1.97)	(-2.00)
Flow (%) (t-3)	-0.0105	-0.0118
	(-1.15)	(-1.46)
Flow (%) (t-4)	-0.0005**	-0.0006**
	(-2.55)	(-2.63)
Index Indicator		-0.0773***
		(-4.59)
Size (ln(TNA))		-0.0250***
		(-18.24)
Income (U.S.)		-0.0117***
		(-4.61)
Hedged (U.S.)		0.0604***
		(11.66)
Growth & Income (U.S.)		-0.0144***
		(-48.65)
Large Cap (U.S.)		-0.0183
		(-1.12)
Mid Cap (U.S.)		0.0291***
		(33.01)
Small Cap (U.S.)		0.0371***
		(20.91)
Micro Cap (U.S.)		0.1028***
		(44.19)
U.S. (no style)		0.2282***
		(33.00)
R-squared	0.091	0.112
Number of Observations	51,917	51,917
Number of Clusters	9	9
Year-Quarter FE	Yes	Yes
Cluster Variable	Fund Style	Fund Style

Table 6: Predicting Mutual Fund Manager Trades

This table reports regression analyses of mutual fund trading in response to large capital outflows (> 5% outflows). The dependent variable in all specifications is the percentage change in shares held by fund j in stock i from quarters $t-1$ to t with stock split adjustments. The main independent variable of interest is the coefficient on $flow_{j,t}$ as defined in Section II. Control variables reflect trading costs and other firm characteristics which include: $own_{i,j,t-1}$, the ownership share of mutual fund j in stock i, $liqcost_{i,t-1}$, the Amihud Illiquidity measure, and the portfolio-weighted average ownership share, $own_{j,t-1}$. Other control variables include: lagged annual returns ($returns_{i,t-1}$), lagged annual volatility ($volatility_{i,t-1}$), the Kaplan-Zingales measure of financial constraints ($finconstraint_{i,t-1}$), market-to-book ($MkttoBook_{i,t-1}$), and firm size ($size_{i,t-1}$). The coefficients are estimated using panel OLS with year-quarter fixed effects. Robust standard errors are clustered at the fund level. t-statistics are reported in parentheses.

	$trade_{i,j,t}$	$trade_{i,j,t}$	$trade_{i,j,t}$	$trade_{i,j,t}$
	(1)	(2)	(3)	(4)
$Intercept$	0.032***	0.047***	0.021*	0.159***
	(3.420)	(4.890)	(1.880)	(6.930)
$flow_{j,t}$	0.714***	0.909***	0.839***	1.177***
	(17.790)	(18.700)	(9.380)	(5.850)
$own_{i,j,t-1}$		-0.119***	-0.125***	-0.143***
		(-17.560)	(-17.190)	(-17.210)
$flow_{j,t} \times own_{i,j,t-1}$		-0.022	-0.038	-0.086
		(-0.330)	(-0.520)	(-1.070)
$liqcost_{i,t-1}$		0.000	0.000	0.001
		(1.490)	(0.470)	(1.240)
$flow_{j,t} \times liqcost_{i,t-1}$		-41.623***	-24.120***	-16.690***
		(-8.410)	(-6.040)	(-4.350)
$ownj, t-1$		0.123***	0.121***	0.124***
		(8.760)	(8.370)	(8.280)
$flow_{j,t} \times own_{j,t-1}$		0.026	0.037	0.051
		(0.180)	(0.260)	(0.350)
$liqcost_{j,t-1}$		-0.057	-0.088**	-0.151***
		(-1.390)	(-2.010)	(-3.390)
$flow_{j,t} \times liqcost_{j,t-1}$		-0.672**	-0.930**	-1.160***
		(-1.990)	(-2.530)	(-3.060)
$volatility_{i,t-1}$			1.274***	0.473
			(4.010)	(1.440)
$flow_{j,t} \times volatility_{i,t-1}$			0.605	-1.813
			(0.200)	(-0.570)
$returns_{i,t-1}$			-0.039***	-0.047***
			(-7.100)	(-8.440)
$flow_{j,t} \times returns_{i,t-1}$			-0.033	-0.049
			(-0.710)	(-1.050)
$FinConstraint_{i,t-1}$				0.000
				(0.510)
$flow_{j,t} \times FinConstraint_{i,t-1}$				0.000
				(0.540)
$MkttoBook_{i,t-1}$				0.002**
				(2.380)
$flow_{j,t} \times MkttoBook_{i,t-1}$				0.007
				(0.860)
$Size_{i,t-1}$				-0.014***
				(-6.920)
$flow_{j,t} \times size_{i,t-1}$				-0.035*
				(-1.800)
Adjusted R^2 (%)	0.021	0.032	0.034	0.036
Number of Observations	815,967	815,967	783,342	758,471

Table 7: Summary of Firms

This table presents summary statistics for sample firms between 1980 and 2007. The first column reports data for the full sample of firms. The second and third columns summarize data by firm-years in which firms experienced a Mispricing Shock (Column 2) and firm-years in which firms did not experience a Mispricing Shock. Column 4 reports p-values of differences in means tests between the two subsamples, with standard errors clustered at the firm level. All data are obtained from Compustat and CRSP. The dataset includes all firms listed on Compustat that have non-missing price and returns data reported in the CRSP monthly file. The sample excludes all financial (SIC code 6000-6999) and utilities (SIC codes 4900-4949) firms. In addition, firms must have non-missing values for: cash flows, profits, returns, volatility, leverage, payout, equity issuance, capital expenditures, book assets, and market to book. All variables are winsorized at the 1% and 99% levels.

Mean (t-1)	Full Sample	Mispricing Shock = 0	Mispricing Shock > 0	p-value
	(1)	(2)	(3)	(2)-(3)
Financial Constraints (KZ)	2.438	2.953	1.932	(0.00)
Cash Flows (%)	0.053	0.026	0.079	(0.00)
ROA (%)	0.099	0.064	0.133	(0.00)
Returns (%)	-0.015	-0.023	-0.007	(0.00)
Volatility	0.035	0.039	0.032	(0.00)
Tobin's Q	1.851	1.742	1.958	(0.00)
Leverage (%)	0.854	1.020	0.691	(0.00)
Asset Growth (%)	0.110	0.094	0.126	(0.00)
Dividends (%)	0.010	0.010	0.010	(0.67)
Repurchases (%)	0.010	0.006	0.014	(0.00)
Age (Years)	16.546	14.032	19.010	(0.00)
Issuance (%)	0.191	0.235	0.148	(0.00)
Cap Ex (%)	0.078	0.074	0.082	(0.00)
Payout (%)	0.404	0.389	0.419	(0.00)
Size (ln(Assets))($)	5.185	4.628	5.731	(0.00)
Size (ln(ME))($)	5.005	4.257	5.739	(0.00)
Mispricing Shock	1.085	0.000	2.149	(0.00)
Inst Own (%)	0.247	0.132	0.359	(0.00)
MF Own (%)	0.084	0.049	0.117	(0.00)
Inst Own (HHI)	0.154	0.217	0.091	(0.00)
MF Own (HHI)	0.172	0.199	0.145	(0.00)
Number of Observations	111,312	55,107	56,205	

Table 8: Monthly Cumulative Average Abnormal Returns around Mispricing Events

The table reports the average abnormal returns, the cumulative average abnormal returns, and test statistics for extreme mispricing event firms and non-extreme mispricing event firms, respectively. Cumulative average abnormal returns (CAARs) are measured as monthly returns in excess of the CRSP equal-weighted average return in each month. Mispricing Shock is a firm-level measure of the percentage of firm trading volume that is due to implied mutual fund trades from mutual funds that receive outflows of 5% or more during a given quarter. The extreme Mispricing Shock events are firm-months in which firms receive the highest Mispricing Shocks (top 10%) during the full sample period (1980 - 2007). Test statistics are calculated using event time fixed effects with standard errors clustered by month, giving equal weight to each monthly observation, rather than to each individual firm-month observation.

	Extreme Events			All Events (excluding Extreme Events)		
Event Time (t)	AAR (%)	t-statistic	CAAR (%)	AAR (%)	t-statistic	CAAR (%)
	(1)	(2)	(3)	(4)	(5)	(6)
-14	-0.224	1.590	-0.224	0.440	1.590	0.440
-13	0.055	4.970	-0.168	1.160	4.970	1.598
-12	0.389	4.550	0.222	1.078	4.550	2.667
-11	-0.354	1.160	-0.133	0.315	1.160	2.968
-10	0.081	5.320	-0.051	1.093	5.320	4.049
-9	0.471	4.400	0.420	1.048	4.400	5.076
-8	-0.494	1.110	-0.075	0.303	1.110	5.354
-7	-0.132	4.950	-0.208	0.953	4.950	6.286
-6	0.375	3.570	0.168	0.866	3.570	7.125
-5	-0.517	0.090	-0.349	0.023	0.090	7.119
-4	-0.377	3.200	-0.726	0.640	3.200	7.759
-3	0.035	2.790	-0.691	0.598	2.790	8.357
-2	-2.010	0.470	-2.701	0.105	0.470	8.462
-1	-1.629	3.120	-4.329	0.747	3.120	9.209
0	-0.802	2.500	-5.131	0.516	2.500	9.725
1	-0.614	-2.400	-5.745	-0.530	-2.400	9.195
2	-0.091	0.140	-5.836	0.029	0.140	9.224
3	0.210	0.730	-5.626	0.137	0.730	9.361
4	-0.202	-2.360	-5.828	-0.550	-2.360	8.811
5	0.097	0.890	-5.731	0.180	0.890	8.991
6	0.156	0.340	-5.576	0.065	0.340	9.057
7	-0.088	-1.680	-5.668	-0.397	-1.680	8.654
8	0.424	1.100	-5.250	0.227	1.100	8.877
9	0.249	-0.510	-5.027	-0.090	-0.510	8.784
10	-0.606	-0.830	-5.631	-0.193	-0.830	8.586
11	0.265	1.080	-5.416	0.228	1.080	8.839
12	0.734	0.000	-4.736	0.001	0.000	8.878
13	-0.618	-0.940	-5.365	-0.214	-0.940	8.675
14	0.477	1.330	-4.885	0.260	1.330	8.951
15	0.615	0.240	-4.259	0.043	0.240	9.033
16	-0.017	-1.330	-4.252	-0.319	-1.330	8.736
17	0.459	1.670	-3.774	0.307	1.670	9.105
18	0.612	0.400	-3.134	0.073	0.400	9.302
19	0.091	-0.570	-2.984	-0.139	-0.570	9.232
20	0.725	1.530	-2.155	0.311	1.530	9.595
21	0.639	-0.010	-1.452	-0.002	-0.010	9.692
22	-0.362	-0.120	-1.812	-0.028	-0.120	9.776
23	0.553	1.640	-1.186	0.313	1.640	10.180
24	0.786	0.470	-0.334	0.082	0.470	10.366

Table 9: Predicting Mispricing Shocks

This table reports results from regressions in which an indicator variable for a Mispricing Shock is regressed on firm characteristics within the full sample of firm-year observations (Column 1) and the extreme Mispricing Shock indicator variable is regressed on firm characteristics within the subsample of Mispricing Shock event firm-year observations (Column 2). The Mispricing Shock is an annual measure of implied mutual fund trading in each firm from funds that receive outflows $\geq 5\%$ in a quarter. The independent variables include $MF\ Own(\%)_{i,t-1}$, the fraction of shares held by mutual funds, $MF\ Own(HHI)_{i,t-1}$, the concentration of mutual fund ownership, $Firm\ Size_{i,t-1}$, the natural log of book assets, $Firm\ Age_{i,t-1}$, the years from first appearance in CRSP, $Market\ to\ Book_{i,t-1}$, $Cash\ Flows_{i,t-1}$, $Returns_{i,t-1}$, and annualized monthly returns. Regressions include firm and year fixed effects and robust standard errors are clustered at the 3-digit industry level. t-statistics are reported in parenthesis. *, **, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

Variables (t-1)	Mispricing Shock Indicator (1)	Extreme Mispricing Event Indicator (2)
MF Own (%)	0.098***	0.621***
	(3.75)	(15.68)
MF Own (HHI)	-0.006	-0.004
	(-0.92)	(-0.22)
Size (ln(Assets))($)	0.076***	-0.032***
	(12.84)	(-4.91)
Age (Years)	0.013***	-0.020***
	(6.35)	(-4.54)
Tobin's Q	0.019***	-0.014***
	(14.68)	(-3.87)
Cash Flows (%)	0.102***	-0.103***
	(7.57)	(-5.12)
Returns (%)	0.016***	-0.063***
	(4.53)	(-9.05)
Financial Constraints (KZ)	-0.003***	0.000
	(-8.95)	(0.14)
Volatility	-1.545***	-1.850***
	(-11.01)	(-6.72)
R-squared	0.716	0.382
Number of Observations	106,545	52,858
Number of Clusters	277	268
Firm FE	Yes	Yes
Year FE	Yes	Yes
Cluster Variable	3 digit SIC	3 digit SIC
Sample of Firms	Full Sample	Firm-years with Mispricing Shock 0

Table 10: The Effects of Market Prices on Firm Financial Policies in a Homogeneous Subsample (using Large Mutual Fund Outflows)

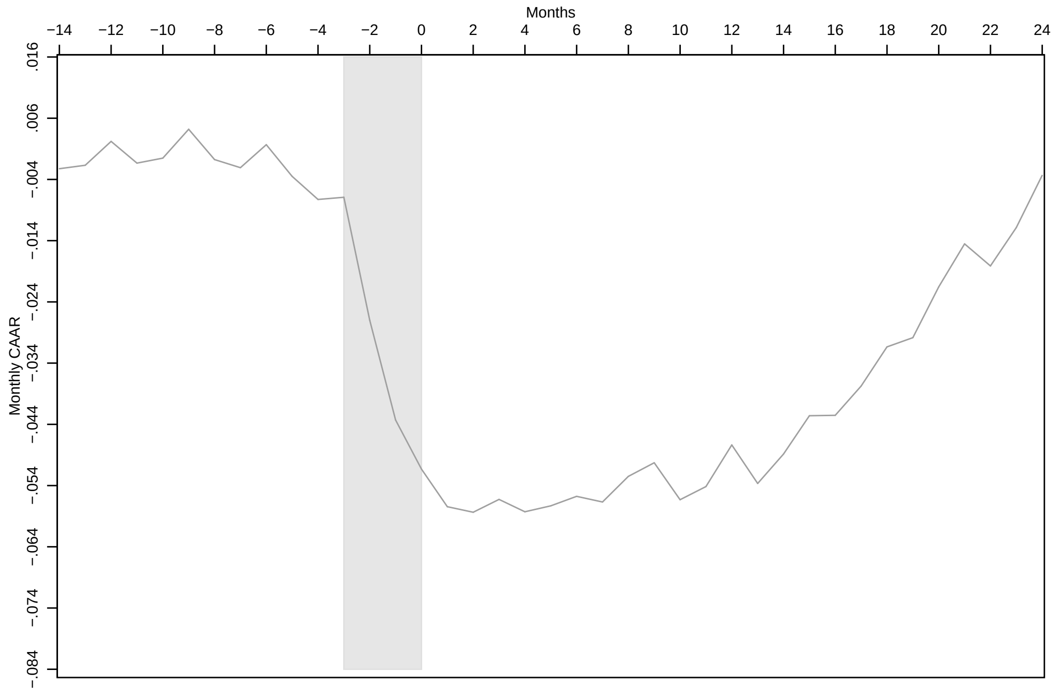
This table reports the results from a regression of firm financial policies on the Mispricing Shock. The subsample consists of firm-level data for firms with an extreme mispricing event (top 10% during the full sample period) between 1980 and 2007. The dependent variables are investment, equity issuance, and payout policy. Investment is capital expenditures scaled by lagged assets, payout is total dividends and repurchases scaled by lagged assets, and issuance is the change in common equity and change in deferred taxes less the change in retained earnings scaled by lagged common equity. Stock Mispricing Shock is an annual measure of implied mutual fund trading in each firm from funds that receive large outflows $\geq$ 5% in a quarter. Control variables include firm size, volatility, Tobin's Q, returns, profitability, and leverage and are defined in the Appendix. The coefficient on Mispricing Shock measures the relative change in firm policies due to exogenous stock mispricing. Regressions include firm and year fixed effects. Robust standard errors are clustered at the firm level. *t*-statistics are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels.

	Large Outflows (>5%)		
	Investment	Issuance	Payout
	(1)	(2)	(3)
Mispricing Shock	-0.0002**	-0.0010	0.0007
	(-2.50)	(-1.46)	(1.32)
Treatment Firm-Year (non-zero Mispricing Shock)	0.0029***	-0.0142*	0.0104**
	(2.86)	(-1.73)	(2.33)
Size	-0.0130***	-0.1172***	0.0446***
	(-13.12)	(-17.84)	(9.48)
Volatility	-0.2481***	-0.0269	-1.7873***
	(-7.15)	(-0.09)	(-12.12)
Tobin's Q	0.0116***	0.1412***	0.0056***
	(21.57)	(26.31)	(4.28)
Returns (%)	0.0126***	0.1972***	0.0101***
	(18.54)	(28.08)	(4.31)
ROA (%)	0.0741***	-0.4345***	0.1191***
	(17.82)	(-10.81)	(9.10)
Leverage (%)	-0.0049***	0.1198***	-0.0233***
	(-11.53)	(16.26)	(-11.41)
R-squared	0.589	0.383	0.798
Number of Observations	63,054	63,248	63,248
Number of Clusters	5,988	5,991	5,991
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes

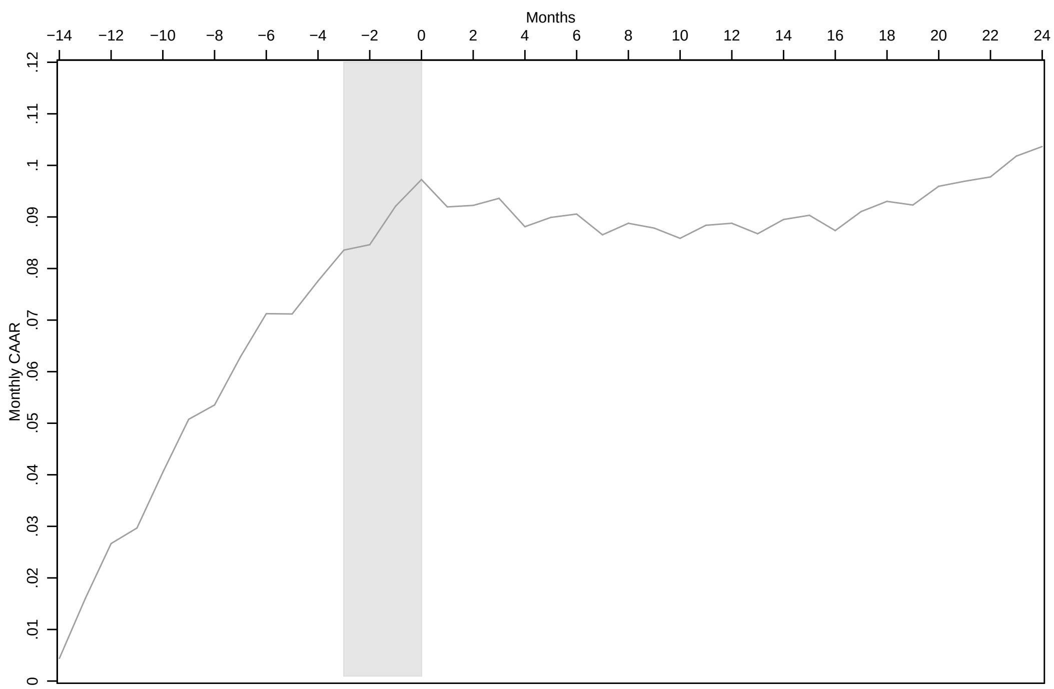
Table 11: The Effects of Market Prices on Firm Financial Policies in a Homogeneous Subsample (using Placebo Mispricing Shocks)

This table reports the results from a regression of firm financial policies on placebo mispricing shocks. The subsample consists of firm-level data for firms with an extreme mispricing event (top 10% during the full sample period) between 1980 and 2007. The dependent variables are investment, equity issuance, and payout policy. Investment is capital expenditures scaled by lagged assets, payout is total dividends and repurchases scaled by lagged assets, and issuance is the change in common equity and change in deferred taxes less the change in retained earnings scaled by lagged common equity. Mispricing Shock is a placebo mispricing shock based on an annual measure of implied mutual fund trading in each firm from funds that receive small outflows $\leq$ 5% (Columns 1-3) and $\leq$ 2% (Columns 4-6) in a quarter. Control variables include firm size, volatility, Tobin's Q, returns, profitability, and leverage and are defined in the Appendix. The coefficient on Mispricing Shock measures the relative change in firm policies due to placebo stock mispricing. Regressions include firm and year fixed effects. Robust standard errors are clustered at the firm level. *t*-statistics are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels.

	5% Outflows			2% Outflows		
	Investment	Issuance	Payout	Investment	Issuance	Payout
	(1)	(2)	(3)	(4)	(5)	(6)
Mispricing Shock	-0.0008**	-0.0087***	0.0014	-0.0030**	-0.0310***	0.0096
	(-2.14)	(-3.47)	(0.75)	(-2.01)	(-3.14)	(1.28)
Treatment Firm-Year (non-zero Mispricing Shock)	0.0036**	0.0167	0.0252***	0.0025*	0.0000	0.0180***
	(2.01)	(1.26)	(3.67)	(1.78)	(0.00)	(3.38)
Size	-0.0123***	-0.1418***	0.0368***	-0.0123***	-0.1402***	0.0367***
	(-9.95)	(-15.50)	(7.31)	(-9.87)	(-15.29)	(7.26)
Volatility	-0.2505***	0.0635	-1.4006***	-0.2515***	0.0402	-1.4081***
	(-5.47)	(0.17)	(-8.92)	(-5.47)	(0.11)	(-8.97)
Tobin's Q	0.0116***	0.1437***	0.0049***	0.0116***	0.1437***	0.0049***
	(18.36)	(22.65)	(3.61)	(18.34)	(22.65)	(3.58)
Returns	0.0145***	0.2180***	0.0112***	0.0145***	0.2179***	0.0111***
	(15.77)	(22.45)	(4.12)	(15.76)	(22.40)	(4.06)
ROA	0.0677***	-0.4339***	0.1148***	0.0678***	-0.4321***	0.1160***
	(13.52)	(-8.60)	(8.48)	(13.54)	(-8.56)	(8.55)
Leverage	-0.0042***	0.1273***	-0.0183***	-0.0042***	0.1272***	-0.0183***
	(-8.57)	(13.30)	(-9.58)	(-8.57)	(13.28)	(-9.63)
R-squared	0.582	0.421	0.814	0.582	0.421	0.814
Number of Observations	39,356	39,108	39,845	39,356	39,108	39,845
Number of Clusters	5,551	5,521	5,562	5,551	5,521	5,562
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes



Extreme Events



All Events - excluding Extreme Events

Figure 1: Cumulative Average Abnormal Returns
Figure 1 depicts the cumulative average abnormal returns (CAARs) over the 36 months surrounding a mutual fund price pressure event. The CAARs are the difference between the firm's monthly return and the CRSP equal-weighted index returns. The extreme events represent the highest Mispricing Shocks (top 10%) during the full sample period (1980 - 2007). Panel 1a traces out the CAARs for the sample of extreme events. Panel 1b includes all events, excluding extreme events, over the event quarter.

that market mispricing drives firm financial policies.

At first blush, these results are alarming. Firm financial policies, such as investment, account for nontrivial fluctuations in US GDP growth (Gabaix, 2011). If market mispricing – inefficient market prices – drives firm investment then stock market inefficiencies potentially influence the broader US economy.

However, there is strong likelihood that selection bias exists in this empirical strategy, despite the randomization method. First, mutual funds invest in some firms and avoid others. Firm characteristics that determine mutual fund ownership are partially unknown. Even among the subset of firms with mutual fund ownership, the firm characteristics that drive mispricing shocks are unknown. A consequence of these non-random partitions of the data is that firms with and without mispricing shocks potentially differ in both observable and unobservable firm characteristics.

I test the hypothesis that selection bias drives the link between stock mispricing and firm financial policies. Because both observable and unobservable characteristics potentially drive this selection bias, methods such as instrumental variables, Heckman (1976) selection models, and matching models cannot fully eliminate the bias. Instead, I address the problem using a method from Michaely, Rubin, and Vedrashko (2016) that borrows from the empirical research methodology in the medical and natural sciences (e.g., Chubak, Boudreau, Wirtz, McKnight, and Weiss, 2013; Braga, Farrokhyar, and Bhandari, 2012). This method first evaluates the severity of the selection bias problem. Then, even without knowing the relevant observed and unobserved firm characteristics that drive mispricing events, the method obtains an unbiased measure of the feedback effect.

Specifically, I use a two-step procedure to test whether selection bias is present. I split firms into two groups based on whether they had at least one mispricing event during the sample period (i.e., treatment firms). Then I compare the feedback effect on treatment firms to the effect on control firms during periods in which small fund outflows do not induce a mispricing event.[1] This test is comparable to exposing all firms to a placebo shock. Placebo shocks should not cause a feedback effect among treatment firms.

The results show that treatment firms exhibit a feedback effect when compared to control firms in response to placebo mispricing events. For example, the initial finding that firms reduce investment by 0.25% following mispricing events indicates a feedback effect; however, the same subset of firms reduces investment by twice as much, 0.50%, following *placebo* mispricing shocks. This result suggests that treatment firms differ from control firms and that there is nothing special about the effect of stock mispricing on firm investment. An analysis that does not account for non-random differences between treatment and control firms will mistakenly attribute differences in firm financial policies to a feedback effect.

I address the selection bias by estimating the feedback effect on a relatively homogeneous sub-sample of treatment firms (Michaely, et al., 2016). Treatment firms with the largest mispricing shocks (top 10% of mispricing shocks) have homogeneous observable firm characteristics prior to the shock.[2] This test uses *only* treatment firms such that treatment firms serve as their own counterfactuals. The method mitigates sample selection bias even when the source of the differences between the treatment and control firms is unknown. For example, consider the result that suggests that firms reduce equity issuance following mispricing events. Although this result is consistent with the feedback effect, it appears mechanically because the treatment firms are compared to observably different control firms – firms with no mutual fund ownership – and hence, firms that will never have a mispricing event. Repeating the test using only a homogeneous sub-sample of treatment firms shows that a feedback effect on equity issuance does not follow mispricing events. Thus, mispricing events do not cause a feedback effect on firm equity issuance. This method provides a less biased measure of the real effects of mispricing shocks on firm

[1] Small outflows do not force managers to sell large quantities of portfolio stocks.

[2] Within the full sample of treatment firms, I find significant heterogeneity in observable characteristics that are related to the severity of the mispricing shock. Firms with the largest shocks are younger, smaller, and have the worst performance in the year before the shock relative to firms with smaller price impacts.

financial policies.

The results show that the feedback effect on equity issuance and payout is not significantly affected by mispricing shocks. In contrast, the results demonstrate a feedback effect between stock mispricing and firm investment. One interpretation is that stock mispricing influences some firm financial policies and not others. Another interpretation is that selection bias exists even within the seemingly homogeneous treatment sample and drives the results. In fact, within the homogeneous subsample I find evidence that treatment firms reduce investment following both real and placebo mispricing shocks. This result suggests that selection bias may drive the investment feedback effect.

I explore sources of selection bias in this setting to understand better how to construct a truly homogeneous sub-sample of firms. Flow-induced mispricing shocks evolve from two layers of trading: funds first receive large outflows and then fund managers sell portfolio stocks. I find that each of these layers is correlated with firm characteristics. After controlling for past fund returns, past fund flows, and manager alpha, large outflows are more likely among funds that invest in small firms (e.g. small-cap funds) than for the average fund. Following large outflows, fund managers systematically sell larger firms with lower liquidity costs and retain firms with high liquidity costs and lower past returns. These results suggest that flow-induced mispricing events are biased towards observable firm characteristics including size, past performance, and liquidity.

I find that selection bias induces observable differences between treatment and control firms, both in terms of static, low frequency characteristics – size and leverage – and in terms of dynamic, high frequency trends, e.g. market returns and stock price volatility. Mispricing shocks affect larger, more liquid, and more profitable firms in the full sample. Within the set of treatment firms, the largest mispricing shocks affect firms with lower past returns and higher financial constraints. In this sub-sample, firm characteristics drive the size of the shocks. In addition, I find that the randomization trading strategy assigns firms with the lowest returns to the treatment sample, despite evidence that managers systematically avoid selling these firms. Abandoning the randomization strategy would remove this particular source of bias. However, this solution reintroduces the bias from information-based trading. Hence, the inherent selection bias in the flow-induced mispricing setting cannot be resolved fully and confounds estimates of the feedback effect.

This paper contributes to the intersection of the asset pricing and corporate finance literatures by studying the feedback effect between stock market prices and firm financial policy. The results show that mutual fund liquidity trading does not drive firm financial policies and thereby address growing concerns that large investment vehicles, such as ETFs and mutual funds, reduce market efficiency (Duffie, 2010; Coval and Stafford, 2007). The analysis contributes to the mutual fund literature by documenting that large outflows are more likely among small-cap funds and that fund managers minimize liquidity costs in times of distress. Finally, my results add to the causal inference methods literature by presenting an empirical method that preserves the useful features of the flow-induced mispricing setting while reducing the selection bias problem in estimates derived in this setting (Larcker and Rusticus, 2010; Roberts and Whited, 2013; Atanasov and Black, 2016).

II. Data and Methods

This study assembles a dataset that combines mutual fund holdings data and firm-level data for the period from 1980 to 2007.[3] At the mutual fund level, I merge the Center for Research in Security Prices (CRSP) Survivorship Bias Free Mutual Fund Database with the Thompson Financial CDA/Spectrum holdings database using the Wharton Research Data Services (WRDS) MFLinks file. Mutual funds must have holdings data in the CDA/Spectrum database and a valid link between the holdings data and the CRSP Mutual Funds database. The sample includes equity mutual funds and excludes sector mutual funds that specialize in specific industries (Edmans, et al., 2012). I identify index and target-date mutual funds by their fund names in the CRSP Mutual Funds database and by using the

[3]The sample period corresponds to the time period used in the prior literature to examine mutual fund trading and price pressure (Edmans, Goldstein, and Jiang, 2012; Lou, 2012). Moreover, this sample period excludes the confounding effects of the financial crisis on mutual funds, market prices, and firm policies.

CRSP index fund flag (Kacperczyk, Sialm, and Zheng, 2008).

Fund-level variables include total net assets (TNA), gross returns, net returns, and expense ratios. For mutual funds with multiple share classes reported by CRSP, TNA is the sum of TNA across all share classes. Net returns and expense ratios are TNA-weighted averages across all share classes. Gross returns for mutual funds are net monthly fund returns plus 1/12 of annual fees and expenses. Other fund characteristics, such as investment objective codes, equal the value from the share class with the largest total net assets.

I compute a firm's quarterly TNA as the sum of monthly asset flows net of merger assets in each calendar quarter. I compound the monthly returns to the quarterly level and calculate fund flows using differences in the return-adjusted quarterly TNA. Consistent with prior literature, I assume that flows occur at the end of each quarter and that investors reinvest dividends and capital appreciation distributions in the same fund. Mutual funds that are initiated have inflows equal to their initial TNA. Liquidated funds have outflows equal to their terminal TNA.

To calculate the increase in TNA due to fund mergers in quarter t, $MGN_{j,t}$, I approximate the date on which the merger occurs, because neither CRSP nor CDA/Spectrum reports the exact date of the merger. The last net asset value (NAV) report date of the target fund denotes the merger date. To avoid mismatches, I match a target fund to its acquirer from one month before its last NAV report date to five months after the date and calculate the flow, accounting for the merger, for each of the months in this window and select the month with the smallest absolute percentage flow as the event month (Lou, 2012).

I use the holdings data from CDA/Spectrum to compute the number of shares and value of each equity holding of each mutual fund as of the quarter end (Coval and Stafford, 2007). If the firm has an event that affects the number of shares outstanding, I use the CRSP monthly stock database to adjust the reported number of shares that the mutual fund holds to be current as of the mutual fund report date and assume that the manager does not trade between the report date and the quarter-end (Coval and Stafford, 2007). To control for data discrepancies between the CDA/Spectrum equity holdings and the CRSP database, I compute the difference between the TNA reported in the CRSP database (which includes the complete holdings) and in the CDA/Spectrum database (which includes only the reported stock holdings) and require that the TNAs do not differ by more than a factor of two (i.e., 0.5$< \frac{TNA_{CDA}}{TNA_{CRSP}} <$2) (Lou, 2012). In addition, I require a minimum fund size of $1 million (Coval and Stafford, 2007).

Fund flows to fund j in quarter t represent the growth rate of the total net assets under management (TNA) after adjusting for the market appreciation of the mutual fund's assets ($R_{j,t}$) and new cash from fund mergers ($MGN_{j,t}$) (Lou, 2012; Chevalier and Ellison, 1997). The calculation for flows to fund j in quarter t is:

$$flow_{j,t} = TNA_{j,t} - TNA_{j,t-1} \times (1+R_{j,t}) - MGN_{j,t}$$

$$FLOW_{j,t} = \frac{flow_{j,t}}{TNA_{j,t-1}}$$

Table 1 reports annual summary statistics for the sample of mutual funds as of December of each year. The full sample contains 29,552 fund-year observations with 3,388 distinct mutual funds. Table 1, Column 2 reports the number of equity mutual funds in each year along with summary statistics of fund characteristics. Over the sample period the number of mutual funds and the average fund size increases ten-fold. Furthermore, mutual fund ownership of the U.S. equity market has grown from a mere 2% in 1980 to 16% in 2006. These statistics are comparable to those reported in Lou (2012).

[Insert Table 1]

I construct a firm-level dataset that combines mutual fund and firm-level data between 1980 and 2007. The dataset includes all firms listed on Compustat that have non-missing price and returns data reported in the CRSP monthly file and excludes all financial (SIC code 6000-6999) and utilities (SIC codes 4900-4949) firms.

The dataset includes measures of firm financial policies that are potentially affected by market prices such as investment, payout, and equity financing and firm characteristics that are direct determinants of these firm policies such as firm size, profitability, cash flows, Tobin's Q, the Kaplan-Zingales financial constraint measure, and the Amihud Illiquidity measure (Hasbrouck, 2009; Goyenko, Holden, and Trzcinka, 2009). To measure the relative size of each mutual fund's position in the firm, I construct a firm-level Herfindahl-Hirschman Index (HHI) of mutual fund ownership.[4] Firms must have non-missing values for: cash flows, profits, returns, volatility, leverage, payout, equity issuance, capital expenditures, book assets, and market to book. The Appendix provides definitions of these variables. The Mispricing Shock variable, defined in Section III below, is a firm-level measure that represents mutual fund liquidity selling. Treatment denotes firm-years in which a firm has a non-zero value for this variable.

Table 2 reports summary statistics for the sample of firms for years between 1980 and 2007. The final dataset contains 111,312 firm-year observations. Between 1980 and 2007, institutional investors owned 25% of an average firm's shares outstanding and mutual funds owned roughly 8% of a firm's shares outstanding. The mean value of the Treatment variable indicates that in about half of the sample firm-years, firms experience flow-induced selling. All variables are winsorized at the 1% and 99% levels.

[Insert Table 2]

III. The Implied Mutual Fund Trade Variable Construction

I construct the flow-induced trading variable (Mispricing Shock) according to the description from Edmans, et al. (2012) and Phillips and Zhdanov (2013). The variable is a firm-specific change in mutual fund holdings over a calendar year based on a fund's previously disclosed investment portfolio, among funds with large outflows. Large outflows are outflows of 5% or more in a given quarter. Whereas smaller outflow shocks might be absorbed by a fund's cash position, "extreme" outflows are more likely to force managers to sell assets and cause a large, negative price impact on underlying firms.[5]

[4]The HHI approaches zero when a large number of mutual funds hold positions in a firm of relatively equal size and approaches its maximum of one when a single mutual fund controls all of the shares of the firm.

[5]See Coval and Stafford, 2007; Edmans, Goldstein, and Jiang, 2012; Khan, Kogan, and Serafeim, 2012.

(1) **Fund Level**

At the fund-level j, I define the following variables in each quarter t:

$FLOW_{j,t}$: $FLOW_{j,t} = \frac{TNA_{j,t}-(1-R_{j,t})\times TNA_{j,t-1}}{TNA_{j,t-1}}$ as defined in Section II.

$Outflows_{j,t} : \phi_{k,t} = TNA_{j,t} - (1 + R_{j,t}) \times TNA_{j,t-1}$ where funds k are the subset of funds with large outflows (i.e., $FLOW_{j,t} \leq -5\%$).

$Holdings_{j,i,t} : h_{j,i,t} = \frac{P_{i,t}\times S_{j,i,t}}{TNA_{j,t}}$ where $P_{i,t}$ and $S_{j,i,t}$ are the share price of firm i in quarter t and the shares of firm i held by fund j in quarter t, respectively.

$Trades_{k,i,t} : T_{k,i,t} = \phi_{k,t} \times h_{k,i,t-1} = FLOW_{k,t} \times P_{i,t-1} \times S_{k,i,t-1}$.

$FLOW_{j,t}$ is the quarterly mutual fund flows for fund j in quarter t. $Outflows_{j,t}$ are large outflows. $Holdings_{j,i,t}$ measures the proportion of a fund's assets invested in each stock in its portfolio and $Trades_{k,i,t}$ uses the proportion of the fund's previously disclosed holdings in each firm to calculate managers' trades.

(2) **Firm Level**

At the firm-level, the following variables measure the total impact of mutual fund liquidity trading on the underlying firms i in each quarter t:

$Trading\ Volume(\$) : V_{i,t} = P_{i,t} \times x_{i,t}$ where $x_{i,t}$ = total shares of firm i traded in quarter t and $P_{i,t}$ is the price of firm i in quarter t.

$Mispricing\ Shock : Mispricing\ Shock_{i,t} = \sum_{k=1}^{K} \frac{T_{k,i,t}}{V_{i,t}} = \sum_{k=1}^{K} \frac{FLOW_{k,t}\times P_{i,t-1}\times S_{k,i,t-1}}{V_{i,t}}$

The annualized Mispricing Shock measure is the sum of $Mispricing\ Shock_{i,t}$ over the four quarters in a given calendar year. If a firm receives no mutual fund trading pressure in any of the four quarters of a year, then Mispricing Shock equals zero. The range of Mispricing Shock is a negative value with a maximum of zero. For ease of interpretation, I set the Mispricing Shock variable equal to its absolute value such that a higher value is associated with a higher level of stock mispricing for the firm-year observation.

IV. The Feedback Effect and Selection Bias

In this section, I test the hypothesis that flow-induced stock mispricing causes firms to adjust financial policies, i.e., investment, payout policy and equity issuance. Then, I screen for selection bias to determine if a selection problem drives these results.

I use the following regression specification to measure the effect of negative mispricing shocks on firm investment, equity financing, and payout:

$$Firm\ Financial\ Policy_{i,t} = \alpha_i + \gamma_t + \beta_1 Mispricing\ Shock_{i,t-1} + \beta_2 X_{i,t-1} + \varepsilon_{i,t}$$

where the dependent variable $Firm\ Financial\ Policy_{i,t}$ denotes either investment, equity financing, or payout for firm i in year t following the mispricing event. The coefficient β_1 measures the impact of stock mispricing on firm financial policies. $X_{i,t-1}$ is a vector of common determinants of financial policies used in the literature: firm size, measured in quantiles of book assets, firm risk, measured as returns volatility, Tobin's Q (i.e., market to book), annualized returns in the year prior to treatment, profitability, and firm leverage. The Appendix reports detailed variable definitions. Regression specifications include firm and year fixed effects, and standard errors that are clustered at the firm level.

Columns 1 - 3 of Table 3 report results of this regression on firm investment, equity financing, and payout, respectively. The coefficient on β_1 indicates that negative stock mispricing events cause firms to reduce investment and equity issuance, and to increase payout in the year following the event. In terms of economic magnitudes, market mispricing accounts for a reduction of 0.26% in annual firm investment (-0.0002 scaled by the sample average of 0.078). Over the sample period, these shocks would cause the average firm to reduce investment by $34 million. Aggregated over the full sample, with more than 56,000 mispricing events, these shocks cause an economically significant reduction of $70 billion per year. Columns 2 and 3 show that stock mispricing leads to a reduction of 0.73% in equity issuance and a 0.27% increase in payout. These results complement existing findings that market mispricing causes firms to alter firm policies (Khan, et al. 2012; Edmans, et al., 2012; and Phillips and Zhdanov, 2013).

[Insert Table 3]

The possibility of selection bias complicates the interpretation of these results. Such bias may be particularly acute in this setting because of the nature of flow-induced mispricing shocks. These shocks arise only among funds with large outflows and only among firms with mutual fund ownership. The firm characteristics that influence these outcomes are unknown and potentially introduce selection bias. When treatment and control groups differ in observable and unobservable characteristics that also influence firm financial policies, then selection bias is present.

Various methods exist to mitigate selection bias problems in empirical studies using observational data. Common methods include matching methods based on observable characteristics, the Heckman (1976) selection method, and regression estimation with firm characteristics as control variables to account for sample differences. In the flow-induced mispricing setting, these methods only partially resolve the problem because there are many unknown firm characteristics driving the distribution of the mispricing shocks, e.g. determinants of mutual fund ownership.

To test whether there is a selection bias problem in this setting, I use a two-step procedure proposed in Michaely, Rubin, and Vedrashko (2016). I split firms into two groups based on whether they had at least one mispricing event during the sample period (i.e., treatment firms). Then I identify firm-years in which mutual funds receive small outflows. Since small outflows do not force managers to sell large quantities of portfolio stocks, these outflows do not induce a mispricing event. Instead, these periods induce placebo mispricing events for treatment firms. I compare the feedback effect of treatment firms to that of control firms following placebo mispricing events. This test is analogous to exposing all firms to a placebo (a period in which there is no mispricing shock) such that the feedback effect should not differ between treatment and control, if mispricing events are the true drivers of the feedback effect. This procedure assesses whether selection bias is present in the flow-induced mispricing setting.

The test, reported in Table 4, uses the full sample of treatment and control firms but removes firm-year observations in which a treatment firm received an extreme mispricing shock.[6] Hence, treatment firms are in the sample only during years in which they experience a placebo mispricing shock. To define the placebo mispricing shocks, I identify the set of mutual funds that had "normal" outflows based on two definitions: outflows between 0% and 5% and outflows between 0% and 2%. This procedure is possible because over 75% of treatment firms have non-event years throughout the sample period. I repeat the main regression analysis using placebo mispricing shocks instead of real mispricing shocks.

Table 4 reports regression estimates of the feedback effect of placebo mispricing events on firm financial policies. Columns 1 - 3 (4 - 6) report how placebo mispricing events affect investment, equity issuance, and payout when the placebo events are driven by fund outflows between 0% and 5% (0% and 2%). The negative coefficient on Stock Mispricing in Column 1 indicates that treatment firms reduce investment even when they do not experience a mispricing shock. Likewise the positive and statistically significant coefficient on Stock Mispricing in Column 3 indicates that treatment firms also increase payout. The results in Columns 4 - 6 show that even when fund outflows are very small (0% to 2%), treatment firms reduce investment and increase payout. Because the shocks are placebos, the financial policies should not differ between treatment and control firms after the placebo shocks. The fact that they do differ suggests that firm characteristics, rather than mispricing events, drive the feedback effect.

[Insert Table 4]

These findings suggest that the results in Table 3 are subject to selection bias. To calculate an unbiased estimate of the feedback effect in this empirical setting, the analysis

[6] Extreme mispricing shocks are those that are in the top decile of shocks across the full sample period. Section VI describes these shocks in detail.

must address the selection bias problem. The remainder of this paper explores the origins of selection bias, e.g., firm characteristics that drive large fund outflows and large mispricing events, and then estimates the feedback effect using a homogeneous sub-sample of treatment firms.

V. Large Mutual Fund Outflows

This section examines whether large fund outflows are correlated with firm characteristics. Part A explores whether a link between large outflows and fund investment styles drives a correlation between large outflows and firm characteristics. Part B examines the correlation between fund managers' trades and firm characteristics following large outflow events. Additional tests explore how trading randomization strategies alleviate or exacerbate selection bias in this setting.

V.A. Large Outflows and Firm Characteristics

Large fund outflows drive mispricing shocks in the flow-driven mispricing setting. The appeal of using large outflows as an exogenous shock to firms is that outflows force fund managers to sell portfolio firms that they otherwise would not. The identifying assumption is that large outflows are uncorrelated with individual firm characteristics within a fund's portfolio such that the resulting mispricing events are exogenous to firm characteristics.

In practice, mutual fund regulations require that funds commit to broad investment strategies that correlate explicitly with firm characteristics. For example, a fund with a "small-cap growth" strategy invests in small, high growth firms relative to the average firm. If large outflows are correlated with fund investment strategies and thereby firm characteristics, large outflows lead to selection bias.

The following analysis tests the hypothesis that large fund outflows are correlated with the investment strategies of mutual funds. Mutual funds in the sample invest in one of nine broad U.S. equity strategies: Domestic Income, Domestic Hedged, Domestic Growth, Domestic Growth and Income, Domestic Large Cap, Domestic Mid Cap, Domestic Small Cap, Domestic Micro Cap, and Domestic Fund (no style specified). The sample excludes funds that only invest in specific sectors, such as gold, oil, and other specific industries to mitigate the influence of industry-specific, business cycle waves on large outflows (Edmans, et al., 2012).

I estimate whether fund investment strategies increase a fund's likelihood of large fund outflows:

$$\Pr(\text{Outflow}>5\%) = \alpha_t + \beta_1 \text{ Past Alpha} + \beta_2 \text{ Past Returns} + \beta_3 \text{ Past Flows} + \beta_4 \text{ Index Fund} + \beta_5 \text{ Fund Size} + \gamma_j \text{ Fund Investment Objective}_j + \varepsilon_{j,t},$$

where the dependent variable is an indicator variable equal to one if the fund receives large outflows (>5%) in a given quarter (t) and zero, otherwise. The independent variables include the past four quarters of fund flows ($FLOW_{j,t-1}$ through $FLOW_{j,t-4}$), the monthly Carhart four-factor fund alpha computed from the fund's returns in the previous year, and the cumulative market-adjusted fund return in the previous year. Index Fund is an indicator variable equal to one if the fund is an index fund and zero, otherwise. Fund size is the natural log of the quarterly TNA from the prior quarter. Fund Investment Objective is an indicator variable denoting a fund's investment strategy. The omitted category in the regression is Domestic Growth, which represents over 40% (22,057/51,917) of fund-quarter observations in the sample. The specification includes year-quarter fixed effects and standard errors clustered by investment objective.

Table 5, Column 1 shows that funds with higher alphas, higher past returns, and positive past flows are less likely to experience large outflows, consistent with previous findings in the literature. The results in Column 2 show that after controlling for these characteristics, a fund's firm-specific investment strategy is a significant predictor of large outflows.[7] For example, Micro Cap funds, which target firms with small market capitalizations, are 10%

[7] In addition, Index funds are less likely to receive large outflow shocks. When index funds receive outflows, they liquidate their portfolio in proportion to holdings to imitate the underlying index, by construction. This result suggests that funds with large outflows are less likely to follow a pure index strategy.

more likely to experience large outflows compared to Domestic Growth funds. On average, firms with small market capitalization are not only smaller, but they also have higher financial constraints and lower market liquidity compared to other firms. These firm characteristics drive firm financial policies, independently of market mispricing. Hence, the tendency for large outflows to target specific fund investment strategies introduces selection bias in the empirical setting.

[Insert Table 5]

V.B. Portfolio Trading and Firm Characteristics

A second potential source of selection bias comes from the trading strategies of mutual fund managers following large outflow events. Because a manager's exact selling activity reflects information about firm value, researchers propose a randomization strategy to remove information-based trading. Specifically, the strategy ignores actual trading activity and instead, distributes the outflows across all portfolio firms in proportion to portfolio weights (e.g. Edmans, et al., 2012). This strategy bolsters the claim that mutual fund trades are exogenous to firm value, but it may introduce a different selection problem if managers systematically sell only firms with specific characteristics.

Managers tend to buy and sell portfolio firms proportionally under normal circumstances (Lou, 2012). However, managers may systematically avoid selling firms with high liquidity costs in response to large outflows (Alexander, Cici, and Gibson, 2007; Brown, Carlin, and Lobo, 2010; Duffie and Ziegler, 2003). By assigning illiquid firms to the treatment group when they are excluded from actual treatment, randomization strategies may introduce selection bias into the treatment sample. For example, suppose that mutual fund trading does not cause mispricing among firms that mutual fund managers sell. However, suppose that the firms that mutual funds do not sell are illiquid and poorly performing. If the randomization strategy includes these untreated, but poorly performing firms in the treatment group, the strategy may erroneously introduce negative returns trends that look like mispricing.

I test the hypothesis that managers follow a proportional selling strategy when they receive large capital outflows using the following regression specification:

$$trade_{i,j,t} = \alpha_t + \beta_1 flow_{j,t} + \beta_2 X + \beta_3 flow_{j,t} \times X + \beta_4 Z + \beta_5 flow_{j,t} \times Z + \varepsilon_{j,t}$$

where the dependent variable, $trade_{i,j,t}$, is the percentage trading in stock i by fund j in quarter t and fund j must have outflows $>5\%$. In the regression model, the coefficient on fund flows, $flow_{j,t}$, measures the degree to which managers trade in proportion to outflows. If managers trade proportionally then the coefficient on $flow_{j,t}$ should equal one and the coefficients on the control variables should equal zero. The coefficients on variables in the vectors X and Z reflect trading that is attributed to a fund manager's discretion. X is the vector of control variables for fund characteristics: the ownership share of mutual fund j in stock i ($own_{i,j,t-1}$), the Amihud Illiquidity measure to control for individual firm liquidity costs ($liqcost_{i,t-1}$), the portfolio-weighted average ownership share ($own_{j,t-1}$), and fund-level liquidity costs ($liqcost_{j,t-1}$). Z is a vector of firm characteristics that includes lagged annual returns ($returns_{i,t-1}$), lagged annual volatility ($volatility_{i,t-1}$), the Kaplan-Zingales measure of financial constraints ($finconstraint_{i,t-1}$), market-to-book ($MkttoBook_{i,t-1}$), and firm size ($size_{i,t-1}$). The interactions of these variables with fund flows denote the incremental effect of these characteristics on trading, conditional on the magnitude of outflows. The Appendix reports detailed variable definitions. Year-quarter fixed effects, t, control for market-wide fluctuations over time. Standard errors are clustered at the fund level.

The results in Table 6 show that managers do not follow a proportional selling strategy in response to large outflows. The coefficient on $flow_{j,t}$ of 0.71 in Column 1 means that managers liquidate proportionally 71 cents of each dollar following large outflows, leaving 29 cents that managers liquidate strategically. In Columns 2 - 4, the negative and significant coefficient on $flow_{j,t} \times liqcost_{i,t-1}$ shows that managers avoid selling firms with high liquidity costs as outflows become larger.

[Insert Table 6]

Columns 2 through 4 report that firm characteristics, other than liquidity, are correlated with manager trading strategies. The positive and significant coefficient on $MkttoBook_{i,t-1}$ suggests that managers are more likely to sell firms with growth opportunities. The negative and significant coefficient on $size_{i,t-1}$ means that, after controlling for liquidity costs, fund managers are more likely to sell smaller firms.

Taken together, these results reveal two sources of selection bias in this empirical setting. First, large outflows are more likely among funds that invest in smaller firms. Because the fund portfolio is biased towards smaller firms, a "randomization" strategy does not mitigate this form of selection bias towards small firms. Second, "randomization" strategies introduce selection bias by assigning illiquid firms to the treatment group despite evidence that they are unlikely to be treated.

VI. Selection Bias and Firm Characteristics

I assess whether treatment and control firms are observably different as a result of selection bias. First, I test the hypothesis that observable firm characteristics predict treatment, i.e., a mispricing event. Then, I explore whether the intensity of mispricing shocks is correlated with firm characteristics.

Table 7 summarizes firm characteristics of treatment and control firms, in the year prior to a mispricing shock. Columns 2 and 3 report statistics for control firm-years ($MispricingShock = 0$) and treatment firm-years ($MispricingShock > 0$), respectively and Column 4 reports p-values from tests of differences-in-means. The table summarizes static firm characteristics in levels, such as size and leverage, and dynamic, high frequency firm characteristics, such as market returns and returns volatility, as month over month changes during the past 12 months. Additional characteristics include firm age, the Kaplan-Zingales measure of financial constraints, profitability (ROA), cash flows, Tobin's Q, the Amihud Illiquidity measure, and a firm's fraction of institutional ownership.

[Insert Table 7]

In the year prior to a mispricing event, treatment and control firms are observably different. Treatment firms have almost three times as much mutual fund and institutional ownership relative to control firms. In fact, of the 14,297 unique firms in the sample, 4,138 (29%) firms have no mutual fund ownership over the full sample period, meaning that 29% of firms have zero probability of a mispricing shock. This is a problem because unobservable firm characteristics determine institutional investment in one firm and not in another. And differences in institutional ownership, i.e. mutual fund ownership, not only drive the probability that a firm has a mispricing event, but also drive differences in both observable and unobservable firm characteristics such as payout, corporate governance, liquidity, and investment (Crane, Michenaud, and Weston, 2016; Grossman and Hart, 1980; Kisin, 2011; Shivdasani, 1993).

In addition, there are other differences both in terms of static firm characteristics - treatment firms are larger and less financially constrained - and dynamic firm characteristics - treatment firms have higher past returns and lower volatility. This selection problem can bias estimates of the feedback effect. The estimates reflect firm differences rather than market pricing effects. For example, treatment firms differ from control firms in terms of book to market, size, past returns, operating profits, and asset growth. These characteristics independently and directly influence equity issuance (Asquith and Mullins, 1986; DeAngelo, DeAngelo, and Stulz, 2010; Jenter, 2005; Loughran and Ritter, 1995; and Fama and French, 2005).

In light of the results in Table 7, I explore whether past returns predict mispricing events. I compare treatment and control firm returns using the abnormal returns of each treatment firm's monthly return over the benchmark of the CRSP equal-weighted index returns, as in Coval and Stafford (2007). I split treatment firms into two groups: those with extreme flow-driven mispricing estimates (in the top 10%) and the remaining mispricing event firms (non-extreme mispricing firms). Extreme events are the firm-month observations in which the quarterly mispricing is in the top decile of quarterly mispricing over the full sample period (1980 - 2007).[8] In each event month, I calculate the average abnormal returns (AARs) and compute cumulative average abnormal returns (CAARs) as the abnormal returns over the period beginning 12 months prior to the event and extending 24 months following the event (Coval and Stafford, 2007; Edmans, et al. 2012). There are three event-months for each event due to the quarterly frequency of mutual fund holdings reports. Test statistics are calculated using event time fixed effects with standard errors clustered by month to control for potential cross-sectional dependence in the monthly abnormal returns (Coval and Stafford, 2007).

Table 8 reports these statistics for extreme mispricing events (Columns 1-3) and non-extreme mispricing events (Columns 4-6). A comparison of the abnormal returns in Column 1 to those in Column 4, reveals that the returns of extreme event firms are systematically lower prior to a mispricing event (Column 1). Following mispricing events, extreme event firms experience large, negative, and statistically significant abnormal returns (-6%) during the event quarter. In contrast, the remaining event firms experience positive and statistically significant abnormal returns during the event quarter and negative abnormal returns only in the two quarters after the event (Column 5). These results show that past returns not only predict selection into the treatment group, but also predict the *intensity* of treatment among treatment firms.

[Insert Table 8]

Figure 1 illustrates the returns patterns. Panel A plots the CAARs for the extreme event firms and Panel B plots the CAARs for the rest of the event firms. Extreme events are followed by large price impacts (-6%) during an event quarter, such that the strongest price reaction comes from the largest shocks. Surprisingly, Panel B shows no price reduction following flow-induced trading among the rest of the event firms.

[8]This approach is consistent with the method in Coval and Stafford (2007) and Edmans, et al. (2012), in which the extreme events are used to document price pressure effects.

[Insert Figure 1]

I test the hypothesis that firm characteristics predict treatment and the intensity of treatment. I estimate the likelihood of treatment (or extreme treatment) as a function of firm characteristics in the following regression specification:

$$\Pr(Mispricing_{i,t} > 0) = \alpha_i + \gamma_t + \beta_1 \text{ MF Own (\%)} + \beta_2 \text{ MF Own (HHI)} + \beta_3 \text{ Size} + \beta_4 \text{ Age} + \beta_5 \text{ Market to Book} + \beta_6 \text{ Cash Flows} + \beta_7 \text{ Returns} + \beta_8 \text{ Financial Constraints} + \beta_9 \text{ Volatility} + \beta_{10} \text{ Liquidity} + \varepsilon_{j,t}$$

The model includes firm characteristics that determine firm financial policies directly, including: the market to book ratio, cash flows, size, age, past firm returns, return volatility, and liquidity in the year prior to the Mispricing Shock. The model includes two control variables for the degree of mutual fund ownership of the firm (MF Own (%)) and the concentration of mutual fund ownership (MF Own (HHI)). The model includes firm and year fixed effects and standard errors, clustered at the 3-digit SIC level.

[Insert Table 9]

Table 9 shows that firm characteristics predict treatment within the full sample (Column 1) and the intensity of treatment within the treatment subsample (Column 2). Firms in the treatment sample are larger, older, and have higher returns in the year prior to treatment than control firms. The opposite is true for extreme event firms. These firms are smaller, younger, and have lower past returns than other treatment firms.

Hence, selection bias leads to sample heterogeneity, even within the treatment sample. Moreover, selection bias is directly related to firm financial policies; these firm characteristics are significant determinants of equity issuance, investment expenditures, and payout (Fazzari, Hubbard, and Petersen, 1988; Miller and Rock, 1985; Subrahmanyam and Titman, 2001; Fee, Hadlock, and Pierce, 2009; Anton and Polk, 2014; Bharath, Jayaraman, and Nagar, 2013; Chen, Jegadeesh, and Wermers, 2000; Edmans, Fang, and Zur, 2013).

Section VII. Feedback Effects in a Homogeneous Sample

This selection problem leads to biased estimates of the feedback effect in the flow-induced mispricing setting. To obtain unbiased estimates, I use a homogeneous sample of firms to test the hypothesis that there is a feedback effect between stock mispricing and firm policies (Michaely, et al., 2016).

Section VI documented that the extreme event firms are a more homogeneous sub-sample within the sample of treatment firms in terms of past returns, size, etc. Intuitively, in an analysis using only this sub-sample, the control group consists of the event firms themselves, during periods when firms do not experience an extreme event. By using extreme event firms as their own counterfactuals, the method "matches" the sample of treatment and control firms on both observable and unobservable fixed characteristics.

I construct the homogeneous sub-sample of firms as the set of firms with an extreme mispricing event during the sample period and combining the time series of firm-years for only these firms over the full sample period. I use this sub-sample to measure the feedback effect of negative mispricing shocks on firm investment, equity financing, and payout in the following regression specification:

$$Firm\,Financial\,Policy_{i,t} = \alpha_i + \gamma_t + \beta_1 Mispricing\,Shock_{i,t-1} + \beta_2 Event_{i,t-1} + \beta_3 X_{i,t-1} + \varepsilon_{i,t}$$

where the dependent variable $Firm\,Financial\,Policy_{i,t}$ measures investment, equity financing, and payout following the mispricing event. To control for differences between treatment and control firms leading up to the mispricing shock, I include a dummy variable to denote event firm-years, $Event_{i,t-1}$. The coefficient β_1 measures the impact of stock mispricing on firm financial policies after controlling for firm differences in the year of the shock. $X_{i,t-1}$ is a vector of control variables as discussed in Section VI. The Appendix reports detailed variable definitions. Regression specifications include firm and year fixed effects, and standard errors clustered at the firm level.

The results in Table 10 show that stock mispricing events do not induce a feedback effect on equity issuance or payout policy (Columns 2 and 3). The coefficient on β_1 is statistically insignificant. After mitigating selection bias in the flow-induced mispricing setting, the feedback effect disappears. However, β_1 in Column 1 shows a feedback effect between stock mispricing and firm investment in the homogeneous sub-sample. One interpretation of this result is that there is, indeed, a feedback effect. Another interpretation is that selection bias, even within this homogeneous sub-sample, drives the result.

[Insert Table 10]

I test for selection problems within the homogeneous sub-sample of firms using the placebo analysis introduced in Section IV. Specifically, I identify firm-years in this sub-sample in which mutual funds receive small outflows. I remove firm-year observations in which a treatment firm received a real mispricing shock. Hence, treatment firms are in the sample only during years in which they experience a placebo mispricing shock. To define the placebo mispricing event years, I identify the set of mutual funds that had "normal" outflows, i.e., outflows between 0% and 5% and outflows between 0% and 2%. I repeat the main regression analysis but use placebo mispricing shocks instead of the real mispricing shocks, and compare the feedback effect of placebo treatment firms to that of control firms during periods in which mutual funds receive small fund outflows.

[Insert Table 11]

Table 11 reports the results of this analysis. The coefficient β_1 in Columns 1 and 2 provides evidence that placebo mispricing events cause firms to lower investment and equity issuance. These results point to selection bias, even in the homogeneous firm sample, and bring into question whether selection bias drives the estimated feedback effect between stock mispricing and firm investment documented in Table 10.

One possible way that selection bias could arise, even among the extreme mispricing event firms, is via the trading "randomization" method. This method assigns trading activity to all portfolio firms but the analysis in Section V showed that managers do not necessarily sell all portfolio firms. In fact, managers may systematically *never* sell some portfolio firms, such that some treatment firms never experience real selling pressure from mutual funds. In this scenario, both firm types are included in the homogeneous sample, but firms with real selling pressure may differ in both observable and unobservable ways from firms that funds never sell.

On one hand, it is possible to remove this selection bias by using the sample of treatment firms that only receive real mutual fund selling activity. However, this strategy reintroduces the information-based trading that the randomization method seeks to avoid. Hence, this particular source of selection bias cannot be resolved in the flow-induced mispricing setting.

The combination of results in Tables 10 and 11 shows that using a homogeneous treatment sample reduces bias in the estimates of a feedback effect. An empirical strategy that combines placebo shocks with homogeneous subsample analysis provides less-biased estimates of feedback effects while preserving the useful features of the flow-induced mispricing setting. Using this strategy, the results in this paper show no evidence of a feedback effect for payout policy and equity issuance, and at most, weak evidence of a feedback effect for investment.

VIII. Conclusion

The stock market is increasingly dominated by large investment vehicles, such as mutual funds and exchange traded funds. This trend has created concern that sudden liquidity needs of these investment vehicles may temporarily reduce market efficiency by pushing stock prices away from fundamental value. Indeed, an empirical literature shows that mutual fund liquidity trading leads to stock mispricing (Chen, Noranha, and Singhal, 2004; Mitchell, Pulvino, and Stafford, 2004; and Coval and Stafford, 2007). A potential side effect of price inefficiencies, if a feedback effect exists, is that inefficient stock prices may influence firm policies.

The analysis in this paper examines the effects of mutual fund flow-induced mispricing events on three financial policies: investment, equity issuance, and payout. The initial results provide compelling evidence of a feedback effect - stock mispricing drives changes in these firm policies. However, further analysis reveals evidence of selection bias in this setting such that treatment firms exhibit a feedback effect even when they experience no mispricing shock.

I explore the sources of this selection problem and document two potential sources. First, large mutual fund outflows, the flows that induce mispricing events, systematically target funds that hold small firms, thereby biasing the mispricing shock towards small firms. Second, fund managers systematically sell the more liquid firms in their portfolios of small firms, biasing the shock towards small firms with specific firm characteristics. This selection bias leads to observable and unobservable differences between treatment and control firms. Moreover, even within the sample of treatment firms, those that have the most severe mispricing events differ from the other treatment firms.

Within the sample of treatment firms, I use a homogeneous sub-sample of treatment firms to test the feedback effect. These results suggest that selection bias, rather than stock mispricing, drives the estimated feedback effect. Although a feedback effect may exist between market prices and firm policies, flow-induced market mispricing does not alter firm policies that potentially affect the broader US economy.

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Appendix: Variable Definitions

Variable	Data Definition
Age	The years from a firm's first appearance in CRSP
Amihud	Illiquidity measure per Amihud (2002); yearly average of the square root of (Price x Vol)/Return
Asset Growth	log(book assets(#6)) - log(lagged book assets(#6))
Beta Asset	Beta on the market factor in a Fama-French three-factor model using daily data from CRSP, and then unlevered
Capital Expenditures	capital expenditures (#128)/lagged book assets (#6)
Cash Flows	(income before extraordinary items (#21) + depreciation (#14))/lagged book assets(#6)
Dividends	dividends(#21)/lagged book assets(#6)
Financial Constraints	Kaplan Zingales measure of financial constraints
Inst Own (%)	Fraction of a firm's total shares outstanding owned by institutional investors
Inst Own (HHI)	Herfindahl-Hirschman Index of the concentration of institutional ownership of shares outstanding
Investment	capital expenditures (#128)/lagged book assets (#6)
Issuance	(change in common equity (#60) + change in deferred taxes (#74) - change in retained earnings (#36))/lagged common equity (#60)
Leverage	(Long term debt (#9) + current liabilities (#34) - cash (#1))/(assets (#6))
Market to Book	(book assets (#6) + Market Equity - Common Equity (#60) - Deferred Taxes (#74))/(book assets (#6))
MF Own (%)	Fraction of a firm's total shares outstanding owned by mutual funds
MF Own (HHI)	Herfindahl-Hirschman Index of the concentration of mutual fund ownership of shares outstanding
Mispricing Shock	abs(implied trading volume from mutual funds with outflows of 5% or more)/total trading volume
Mispricing Shock Indicator	equal to 1 if Mispricing Shock > 0, equal to 0 if Mispricing Shock = 0
Payout	(dividends (#21) + repurchases (#115) - sale of common and preferred stock (#108))/lagged book assets (#6); zero if numerator is zero or missing, and one if numerator>0 and denominator=0.
R&D	R&D expense (#46)/Sales (#12); zero if missing
Repurchases	(repurchases (#115) - sale of common and preferred stock (#108))/lagged (book assets (#6))
Returns	Cumulative monthly stock returns over the prior year (CRSP monthly file)
ROA	gross operating income (#13)/lagged book assets (#6)
Sales Rank	Rank of sales (#12) among all Compustat firms in a given year, ranging from zero to one
Size (ME)	ln(price (#199) * shares outstanding (#25) at fiscal year end)
Size (Assets)	ln(book assets (#6))
Size (Asset Quintiles)	quintiles of book assets (#6)
Tobin's Q	(price (#199) * shares outstanding (#25)+long term debt +short term debt)/ (long term debt +short term debt+book equity)
Volatility	standard deviation of daily stock returns over the past year

Table 1: Summary of Mutual Funds

Table 1 reports fund statistics for the mutual fund dataset that spans 1980-2007. The annual statistics are for US equity mutual funds as of December of each year. The CRSP survivorship-bias-free mutual fund database records mutual fund size, monthly returns, and flows. Thompson Financial CDA/Spectrum database records fund holdings data. Number of Funds is the number of mutual funds in the sample at the end of each year; TNA is the total net assets for the average fund, reported in millions of dollars; total equity holdings is the value of the equity holdings in each mutual fund using the stock price and holdings as of December reported in millions of dollars; % market held is the percentage of the value of the US equity market that is held by the mutual funds in the sample.

Year	Number of Funds	($ Million) TNA	($ Million) Total Equity Holdings	Fraction Market Held
1980	217	163.484	142.384	.02
1981	219	149.562	125.057	.017
1982	221	181.801	150.131	.018
1983	226	249.199	210.048	.024
1984	254	246.531	202.599	.026
1985	279	301.674	243.05	.027
1986	308	346.497	273.881	.028
1987	352	336.5	277.582	.035
1988	388	329.802	271.618	.031
1989	438	385.235	308.184	.032
1990	456	351.792	283.239	.034
1991	550	450.785	371.608	.037
1992	566	556.848	447.317	.048
1993	747	597.335	482.777	.047
1994	939	544.714	444.552	.054
1995	1070	737.246	607.596	.058
1996	1086	937.971	794.413	.068
1997	1342	1130.29	981.853	.079
1998	1444	1294.258	1157.854	.089
1999	1635	1472.733	1359.912	.085
2000	1768	1411.238	1285.334	.098
2001	2005	1072.424	989.148	.087
2002	2133	832.407	766.714	.112
2003	2195	1102.233	999.053	.122
2004	2204	1263.603	1107.771	.143
2005	2244	1408.811	1272.499	.143
2006	2109	1651.544	1496.092	.16
2007	2279	1603.545	1454.561	.159
Mean	1102	783.228	688.324	.07

Table 2: Summary of Firms

This table presents summary statistics for the full sample of firms between 1980 and 2007. Columns 1 through 4 report the mean, median, standard deviation, and number of observations for each variable. All data are obtained from Compustat and CRSP. The dataset includes all firms listed on Compustat that have non-missing price and returns data reported in the CRSP monthly file. The sample excludes all financial (SIC code 6000-6999) and utilities (SIC codes 4900-4949) firms. In addition, firms must have non-missing values for: cash flows, profits, returns, volatility, leverage, payout, equity issuance, capital expenditures, book assets, and market to book. All variables are winsorized at the 1% and 99% levels.

Variable	Mean	Median	Std Dev	Number of Obs
Financial Constraints (KZ)	2.438	1.231	4.993	111,312
Cash Flows (%)	0.053	0.081	0.186	111,312
ROA (%)	0.099	0.121	0.196	111,312
Returns (%)	-0.015	0.039	0.520	111,312
Volatility	0.035	0.030	0.021	111,312
Tobin's Q	1.851	1.301	1.620	111,312
Leverage (%)	0.854	0.405	1.589	111,312
Asset Growth (%)	0.110	0.073	0.290	111,312
Dividends (%)	0.010	0.000	0.019	111,312
Repurchases (%)	0.010	0.000	0.029	111,312
Age (Years)	16.546	12.000	14.279	111,312
Issuance (%)	0.191	0.017	0.647	111,312
Cap Ex (%)	0.078	0.049	0.097	111,312
Payout (%)	0.404	0.000	0.487	111,312
Size (ln(Assets))($)	5.185	5.017	2.259	111,312
Size (ln(ME))($)	5.005	4.870	2.242	111,312
Mispricing Shock	1.085	0.003	2.565	111,312
Treatment Firm-Year	0.505	1.000	0.500	111,312
Inst Own (%)	0.247	0.116	0.291	111,312
MF Own (%)	0.084	0.024	0.118	111,312
Inst Own (HHI)	0.154	0.059	0.232	111,312
MF Own (HHI)	0.172	0.055	0.261	111,312

Table 3: The Effects of Market Prices on Firm Financial Policies (using Large Mutual Fund Outflows)

This table reports the results from a regression of firm financial policies on the Mispricing Shock. The sample consists of annual firm-level data between 1980 and 2007. The dependent variables are investment, equity issuance, and payout policy. Investment is capital expenditures scaled by lagged assets, payout is total dividends and repurchases scaled by lagged assets, and issuance is the change in common equity and change in deferred taxes less the change in retained earnings scaled by lagged common equity. Stock Mispricing Shock is an annual measure of implied mutual fund trading in each firm from funds that receive large outflows $\geq 5\%$ in a quarter. Control variables include firm size, volatility, Tobin's Q, returns, profitability, and leverage and are defined in the Appendix. The coefficient on Mispricing Shock measures the relative change in firm policies due to exogenous stock mispricing. Regressions include firm and year fixed effects. Robust standard errors are clustered at the firm level. *t*-statistics are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels.

	Large Outflows (>5%)		
	Investment	Issuance	Payout
	(1)	(2)	(3)
Mispricing Shock	-0.0002**	-0.0014**	0.0011**
	(-2.12)	(-2.17)	(2.10)
Size	-0.0121***	-0.1336***	0.0410***
	(-14.10)	(-22.03)	(10.94)
Volatility	-0.2207***	0.5882***	-1.3998***
	(-8.19)	(2.60)	(-14.71)
Tobin's Q	0.0116***	0.1432***	0.0043***
	(27.11)	(34.47)	(4.82)
Returns (%)	0.0135***	0.2067***	0.0092***
	(23.26)	(34.69)	(5.49)
ROA (%)	0.0582***	-0.4408***	0.1085***
	(17.73)	(-14.42)	(11.83)
Leverage (%)	-0.0044***	0.1259***	-0.0186***
	(-13.09)	(22.19)	(-13.04)
R-squared	0.592	0.460	0.826
Number of Observations	106,029	106,545	106,545
Number of Clusters	14,164	14,208	14,208
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes

Table 4: The Effects of Market Prices on Firm Financial Policies (using placebo Mispricing Shocks)

This table reports the results from a regression of firm financial policies on placebo mispricing shocks. The sample consists of annual firm-level data between 1980 and 2007. The dependent variables are investment, equity issuance, and payout policy. Investment is capital expenditures scaled by lagged assets, payout is total dividends and repurchases scaled by lagged assets, and issuance is the change in common equity and change in deferred taxes less the change in retained earnings scaled by lagged common equity. Mispricing Shock is a placebo mispricing shock based on an annual measure of implied mutual fund trading in each firm from funds that receive small outflows $\leq$ 5% (Columns 1-3) and $\leq$ 2% (Columns 4-6) in a quarter. Control variables include firm size, volatility, Tobin's Q, returns, profitability, and leverage and are defined in the Appendix. The coefficient on Mispricing Shock measures the relative change in firm policies due to placebo stock mispricing. Regressions include firm and year fixed effects. Robust standard errors are clustered at the firm level. *t*-statistics are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels.

	5% Outflows			2% Outflows		
	Investment	Issuance	Payout	Investment	Issuance	Payout
	(1)	(2)	(3)	(4)	(5)	(6)
Mispricing Shock	-0.0007**	-0.0060***	0.0030*	-0.0029**	-0.0246***	0.0108
	(-2.05)	(-2.82)	(1.66)	(-2.08)	(-2.77)	(1.55)
Size	-0.0114***	-0.1479***	0.0334***	-0.0114***	-0.1478***	0.0333***
	(-11.56)	(-20.57)	(9.47)	(-11.55)	(-20.55)	(9.47)
Volatility	-0.2162***	0.8644***	-1.3665***	-0.2163***	0.8661***	-1.3678***
	(-7.22)	(3.47)	(-14.62)	(-7.22)	(3.48)	(-14.61)
Tobin's Q	0.0115***	0.1448***	0.0033***	0.0115***	0.1448***	0.0033***
	(25.02)	(31.77)	(4.03)	(25.03)	(31.77)	(4.01)
Returns	0.0149***	0.2138***	0.0095***	0.0150***	0.2138***	0.0095***
	(21.93)	(31.02)	(5.51)	(21.94)	(31.03)	(5.49)
ROA	0.0513***	-0.4439***	0.1065***	0.0512***	-0.4440***	0.1064***
	(14.59)	(-12.93)	(12.21)	(14.58)	(-12.93)	(12.21)
Leverage	-0.0039***	0.1197***	-0.0133***	-0.0039***	0.1197***	-0.0133***
	(-11.71)	(20.48)	(-11.19)	(-11.71)	(20.48)	(-11.20)
R-squared	0.588	0.477	0.848	0.588	0.477	0.848
Number of Observations	85,867	91,109	94,374	85,867	91,109	94,374
Number of Clusters	14,279	14,587	15,039	14,279	14,587	15,039
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Table 5: Predicting Mutual Fund Flows

This table reports forecasting regressions of mutual fund flows for the sample of US Equity Mutual funds between 1980 and 2007. The regressions predict asset flows to mutual fund j in quarter t. The dependent variable is an outflow indicator, equal to one if the fund receives outflows of 5% or more and zero, otherwise. Independent variables include $alpha_{j,t-1}$, the monthly Carhart four-factor alpha, $Adj.Return_{j,t-1}$, the cumulative market-adjusted fund return, and lagged capital flows in the previous four quarters, $Flow_{j,t-1}$ through $Flow_{j,t-4}$. Additional variables include $Index_j$ which is an indicator variable that denotes if the fund is index or actively managed. $Size_{j,t-1}$ is lagged quarterly TNA in dollars. Fund objective indicator variables control for a fund's investment style. The omitted category in the regression is Domestic Growth. Robust standard errors are clustered at the fund level. t-statistics are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

	Outflow Indicator (Flow ≤ -5%) (1)	Outflow Indicator (Flow ≤ -5%) (2)
Alpha	-2.8351**	-2.8974**
	(-3.25)	(-3.18)
Adj Return (%)	-0.6291***	-0.6116***
	(-7.26)	(-7.38)
Flow (%) (t-1)	-0.0690	-0.0705*
	(-1.85)	(-1.98)
Flow (%) (t-2)	-0.0265*	-0.0280*
	(-1.97)	(-2.00)
Flow (%) (t-3)	-0.0105	-0.0118
	(-1.15)	(-1.46)
Flow (%) (t-4)	-0.0005**	-0.0006**
	(-2.55)	(-2.63)
Index Indicator		-0.0773***
		(-4.59)
Size (ln(TNA))		-0.0250***
		(-18.24)
Income (U.S.)		-0.0117***
		(-4.61)
Hedged (U.S.)		0.0604***
		(11.66)
Growth & Income (U.S.)		-0.0144***
		(-48.65)
Large Cap (U.S.)		-0.0183
		(-1.12)
Mid Cap (U.S.)		0.0291***
		(33.01)
Small Cap (U.S.)		0.0371***
		(20.91)
Micro Cap (U.S.)		0.1028***
		(44.19)
U.S. (no style)		0.2282***
		(33.00)
R-squared	0.091	0.112
Number of Observations	51,917	51,917
Number of Clusters	9	9
Year-Quarter FE	Yes	Yes
Cluster Variable	Fund Style	Fund Style

Table 6: Predicting Mutual Fund Manager Trades

This table reports regression analyses of mutual fund trading in response to large capital outflows (> 5% outflows). The dependent variable in all specifications is the percentage change in shares held by fund j in stock i from quarters $t-1$ to t with stock split adjustments. The main independent variable of interest is the coefficient on $flow_{j,t}$ as defined in Section II. Control variables reflect trading costs and other firm characteristics which include: $own_{i,j,t-1}$, the ownership share of mutual fund j in stock i, $liqcost_{i,t-1}$, the Amihud Illiquidity measure, and the portfolio-weighted average ownership share, $own_{j,t-1}$. Other control variables include: lagged annual returns ($returns_{i,t-1}$), lagged annual volatility ($volatility_{i,t-1}$), the Kaplan-Zingales measure of financial constraints ($finconstraint_{i,t-1}$), market-to-book ($MkttoBook_{i,t-1}$), and firm size ($size_{i,t-1}$). The coefficients are estimated using panel OLS with year-quarter fixed effects. Robust standard errors are clustered at the fund level. t-statistics are reported in parentheses.

	$trade_{i,j,t}$	$trade_{i,j,t}$	$trade_{i,j,t}$	$trade_{i,j,t}$
	(1)	(2)	(3)	(4)
$Intercept$	0.032***	0.047***	0.021*	0.159***
	(3.420)	(4.890)	(1.880)	(6.930)
$flow_{j,t}$	0.714***	0.909***	0.839***	1.177***
	(17.790)	(18.700)	(9.380)	(5.850)
$own_{i,j,t-1}$		-0.119***	-0.125***	-0.143***
		(-17.560)	(-17.190)	(-17.210)
$flow_{j,t} \times own_{i,j,t-1}$		-0.022	-0.038	-0.086
		(-0.330)	(-0.520)	(-1.070)
$liqcost_{i,t-1}$		0.000	0.000	0.001
		(1.490)	(0.470)	(1.240)
$flow_{j,t} \times liqcost_{i,t-1}$		-41.623***	-24.120***	-16.690***
		(-8.410)	(-6.040)	(-4.350)
$ownj, t-1$		0.123***	0.121***	0.124***
		(8.760)	(8.370)	(8.280)
$flow_{j,t} \times own_{j,t-1}$		0.026	0.037	0.051
		(0.180)	(0.260)	(0.350)
$liqcost_{j,t-1}$		-0.057	-0.088**	-0.151***
		(-1.390)	(-2.010)	(-3.390)
$flow_{j,t} \times liqcost_{j,t-1}$		-0.672**	-0.930**	-1.160***
		(-1.990)	(-2.530)	(-3.060)
$volatility_{i,t-1}$			1.274***	0.473
			(4.010)	(1.440)
$flow_{j,t} \times volatility_{i,t-1}$			0.605	-1.813
			(0.200)	(-0.570)
$returns_{i,t-1}$			-0.039***	-0.047***
			(-7.100)	(-8.440)
$flow_{j,t} \times returns_{i,t-1}$			-0.033	-0.049
			(-0.710)	(-1.050)
$FinConstraint_{i,t-1}$				0.000
				(0.510)
$flow_{j,t} \times FinConstraint_{i,t-1}$				0.000
				(0.540)
$MkttoBook_{i,t-1}$				0.002**
				(2.380)
$flow_{j,t} \times MkttoBook_{i,t-1}$				0.007
				(0.860)
$Size_{i,t-1}$				-0.014***
				(-6.920)
$flow_{j,t} \times size_{i,t-1}$				-0.035*
				(-1.800)
Adjusted R^2 (%)	0.021	0.032	0.034	0.036
Number of Observations	815,967	815,967	783,342	758,471

Table 7: Summary of Firms

This table presents summary statistics for sample firms between 1980 and 2007. The first column reports data for the full sample of firms. The second and third columns summarize data by firm-years in which firms experienced a Mispricing Shock (Column 2) and firm-years in which firms did not experience a Mispricing Shock. Column 4 reports p-values of differences in means tests between the two subsamples, with standard errors clustered at the firm level. All data are obtained from Compustat and CRSP. The dataset includes all firms listed on Compustat that have non-missing price and returns data reported in the CRSP monthly file. The sample excludes all financial (SIC code 6000-6999) and utilities (SIC codes 4900-4949) firms. In addition, firms must have non-missing values for: cash flows, profits, returns, volatility, leverage, payout, equity issuance, capital expenditures, book assets, and market to book. All variables are winsorized at the 1% and 99% levels.

Mean (t-1)	Full Sample	Mispricing Shock = 0	Mispricing Shock > 0	p-value
	(1)	(2)	(3)	(2)-(3)
Financial Constraints (KZ)	2.438	2.953	1.932	(0.00)
Cash Flows (%)	0.053	0.026	0.079	(0.00)
ROA (%)	0.099	0.064	0.133	(0.00)
Returns (%)	-0.015	-0.023	-0.007	(0.00)
Volatility	0.035	0.039	0.032	(0.00)
Tobin's Q	1.851	1.742	1.958	(0.00)
Leverage (%)	0.854	1.020	0.691	(0.00)
Asset Growth (%)	0.110	0.094	0.126	(0.00)
Dividends (%)	0.010	0.010	0.010	(0.67)
Repurchases (%)	0.010	0.006	0.014	(0.00)
Age (Years)	16.546	14.032	19.010	(0.00)
Issuance (%)	0.191	0.235	0.148	(0.00)
Cap Ex (%)	0.078	0.074	0.082	(0.00)
Payout (%)	0.404	0.389	0.419	(0.00)
Size (ln(Assets))($)	5.185	4.628	5.731	(0.00)
Size (ln(ME))($)	5.005	4.257	5.739	(0.00)
Mispricing Shock	1.085	0.000	2.149	(0.00)
Inst Own (%)	0.247	0.132	0.359	(0.00)
MF Own (%)	0.084	0.049	0.117	(0.00)
Inst Own (HHI)	0.154	0.217	0.091	(0.00)
MF Own (HHI)	0.172	0.199	0.145	(0.00)
Number of Observations	111,312	55,107	56,205	

Table 8: Monthly Cumulative Average Abnormal Returns around Mispricing Events

The table reports the average abnormal returns, the cumulative average abnormal returns, and test statistics for extreme mispricing event firms and non-extreme mispricing event firms, respectively. Cumulative average abnormal returns (CAARs) are measured as monthly returns in excess of the CRSP equal-weighted average return in each month. Mispricing Shock is a firm-level measure of the percentage of firm trading volume that is due to implied mutual fund trades from mutual funds that receive outflows of 5% or more during a given quarter. The extreme Mispricing Shock events are firm-months in which firms receive the highest Mispricing Shocks (top 10%) during the full sample period (1980 - 2007). Test statistics are calculated using event time fixed effects with standard errors clustered by month, giving equal weight to each monthly observation, rather than to each individual firm-month observation.

	Extreme Events			All Events (excluding Extreme Events)		
Event Time (t)	AAR (%)	t-statistic	CAAR (%)	AAR (%)	t-statistic	CAAR (%)
	(1)	(2)	(3)	(4)	(5)	(6)
-14	-0.224	1.590	-0.224	0.440	1.590	0.440
-13	0.055	4.970	-0.168	1.160	4.970	1.598
-12	0.389	4.550	0.222	1.078	4.550	2.667
-11	-0.354	1.160	-0.133	0.315	1.160	2.968
-10	0.081	5.320	-0.051	1.093	5.320	4.049
-9	0.471	4.400	0.420	1.048	4.400	5.076
-8	-0.494	1.110	-0.075	0.303	1.110	5.354
-7	-0.132	4.950	-0.208	0.953	4.950	6.286
-6	0.375	3.570	0.168	0.866	3.570	7.125
-5	-0.517	0.090	-0.349	0.023	0.090	7.119
-4	-0.377	3.200	-0.726	0.640	3.200	7.759
-3	0.035	2.790	-0.691	0.598	2.790	8.357
-2	-2.010	0.470	-2.701	0.105	0.470	8.462
-1	-1.629	3.120	-4.329	0.747	3.120	9.209
0	-0.802	2.500	-5.131	0.516	2.500	9.725
1	-0.614	-2.400	-5.745	-0.530	-2.400	9.195
2	-0.091	0.140	-5.836	0.029	0.140	9.224
3	0.210	0.730	-5.626	0.137	0.730	9.361
4	-0.202	-2.360	-5.828	-0.550	-2.360	8.811
5	0.097	0.890	-5.731	0.180	0.890	8.991
6	0.156	0.340	-5.576	0.065	0.340	9.057
7	-0.088	-1.680	-5.668	-0.397	-1.680	8.654
8	0.424	1.100	-5.250	0.227	1.100	8.877
9	0.249	-0.510	-5.027	-0.090	-0.510	8.784
10	-0.606	-0.830	-5.631	-0.193	-0.830	8.586
11	0.265	1.080	-5.416	0.228	1.080	8.839
12	0.734	0.000	-4.736	0.001	0.000	8.878
13	-0.618	-0.940	-5.365	-0.214	-0.940	8.675
14	0.477	1.330	-4.885	0.260	1.330	8.951
15	0.615	0.240	-4.259	0.043	0.240	9.033
16	-0.017	-1.330	-4.252	-0.319	-1.330	8.736
17	0.459	1.670	-3.774	0.307	1.670	9.105
18	0.612	0.400	-3.134	0.073	0.400	9.302
19	0.091	-0.570	-2.984	-0.139	-0.570	9.232
20	0.725	1.530	-2.155	0.311	1.530	9.595
21	0.639	-0.010	-1.452	-0.002	-0.010	9.692
22	-0.362	-0.120	-1.812	-0.028	-0.120	9.776
23	0.553	1.640	-1.186	0.313	1.640	10.180
24	0.786	0.470	-0.334	0.082	0.470	10.366

Table 9: Predicting Mispricing Shocks

This table reports results from regressions in which an indicator variable for a Mispricing Shock is regressed on firm characteristics within the full sample of firm-year observations (Column 1) and the extreme Mispricing Shock indicator variable is regressed on firm characteristics within the subsample of Mispricing Shock event firm-year observations (Column 2). The Mispricing Shock is an annual measure of implied mutual fund trading in each firm from funds that receive outflows $\geq 5\%$ in a quarter. The independent variables include $MF\ Own(\%)_{i,t-1}$, the fraction of shares held by mutual funds, $MF\ Own(HHI)_{i,t-1}$, the concentration of mutual fund ownership, $Firm\ Size_{i,t-1}$, the natural log of book assets, $Firm\ Age_{i,t-1}$, the years from first appearance in CRSP, $Market\ to\ Book_{i,t-1}$, $Cash\ Flows_{i,t-1}$, $Returns_{i,t-1}$, and annualized monthly returns. Regressions include firm and year fixed effects and robust standard errors are clustered at the 3-digit industry level. t-statistics are reported in parenthesis. *, **, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

Variables (t-1)	Mispricing Shock Indicator (1)	Extreme Mispricing Event Indicator (2)
MF Own (%)	0.098***	0.621***
	(3.75)	(15.68)
MF Own (HHI)	-0.006	-0.004
	(-0.92)	(-0.22)
Size (ln(Assets))($)	0.076***	-0.032***
	(12.84)	(-4.91)
Age (Years)	0.013***	-0.020***
	(6.35)	(-4.54)
Tobin's Q	0.019***	-0.014***
	(14.68)	(-3.87)
Cash Flows (%)	0.102***	-0.103***
	(7.57)	(-5.12)
Returns (%)	0.016***	-0.063***
	(4.53)	(-9.05)
Financial Constraints (KZ)	-0.003***	0.000
	(-8.95)	(0.14)
Volatility	-1.545***	-1.850***
	(-11.01)	(-6.72)
R-squared	0.716	0.382
Number of Observations	106,545	52,858
Number of Clusters	277	268
Firm FE	Yes	Yes
Year FE	Yes	Yes
Cluster Variable	3 digit SIC	3 digit SIC
Sample of Firms	Full Sample	Firm-years with Mispricing Shock 0

Table 10: The Effects of Market Prices on Firm Financial Policies in a Homogeneous Subsample (using Large Mutual Fund Outflows)

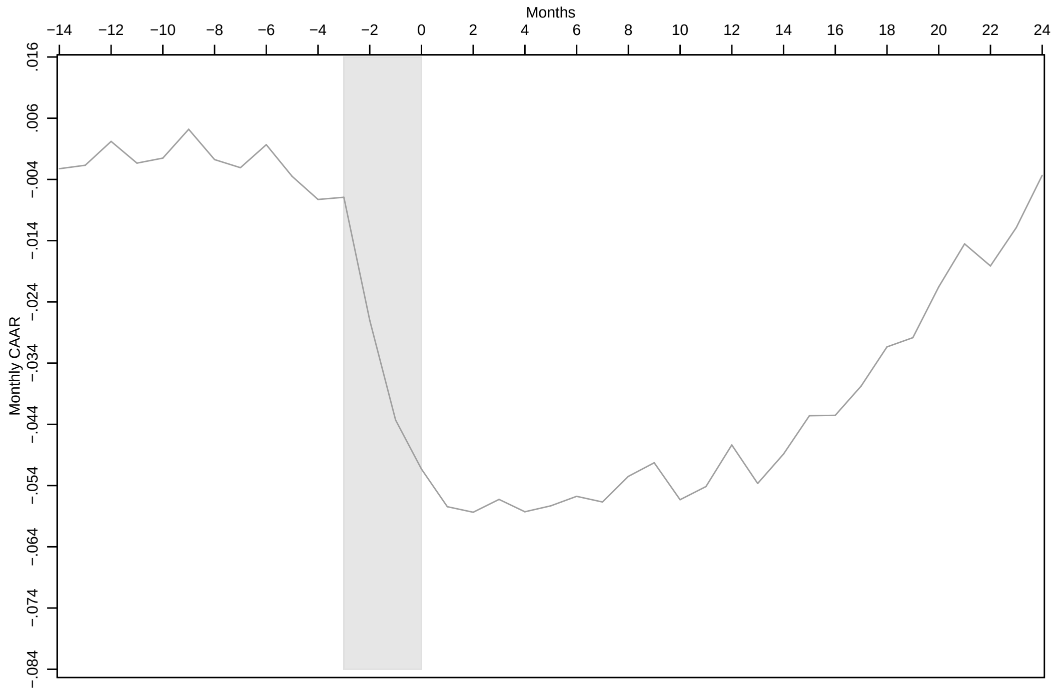
This table reports the results from a regression of firm financial policies on the Mispricing Shock. The subsample consists of firm-level data for firms with an extreme mispricing event (top 10% during the full sample period) between 1980 and 2007. The dependent variables are investment, equity issuance, and payout policy. Investment is capital expenditures scaled by lagged assets, payout is total dividends and repurchases scaled by lagged assets, and issuance is the change in common equity and change in deferred taxes less the change in retained earnings scaled by lagged common equity. Stock Mispricing Shock is an annual measure of implied mutual fund trading in each firm from funds that receive large outflows $\geq$ 5% in a quarter. Control variables include firm size, volatility, Tobin's Q, returns, profitability, and leverage and are defined in the Appendix. The coefficient on Mispricing Shock measures the relative change in firm policies due to exogenous stock mispricing. Regressions include firm and year fixed effects. Robust standard errors are clustered at the firm level. *t*-statistics are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels.

	Large Outflows (>5%)		
	Investment	Issuance	Payout
	(1)	(2)	(3)
Mispricing Shock	-0.0002**	-0.0010	0.0007
	(-2.50)	(-1.46)	(1.32)
Treatment Firm-Year (non-zero Mispricing Shock)	0.0029***	-0.0142*	0.0104**
	(2.86)	(-1.73)	(2.33)
Size	-0.0130***	-0.1172***	0.0446***
	(-13.12)	(-17.84)	(9.48)
Volatility	-0.2481***	-0.0269	-1.7873***
	(-7.15)	(-0.09)	(-12.12)
Tobin's Q	0.0116***	0.1412***	0.0056***
	(21.57)	(26.31)	(4.28)
Returns (%)	0.0126***	0.1972***	0.0101***
	(18.54)	(28.08)	(4.31)
ROA (%)	0.0741***	-0.4345***	0.1191***
	(17.82)	(-10.81)	(9.10)
Leverage (%)	-0.0049***	0.1198***	-0.0233***
	(-11.53)	(16.26)	(-11.41)
R-squared	0.589	0.383	0.798
Number of Observations	63,054	63,248	63,248
Number of Clusters	5,988	5,991	5,991
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes

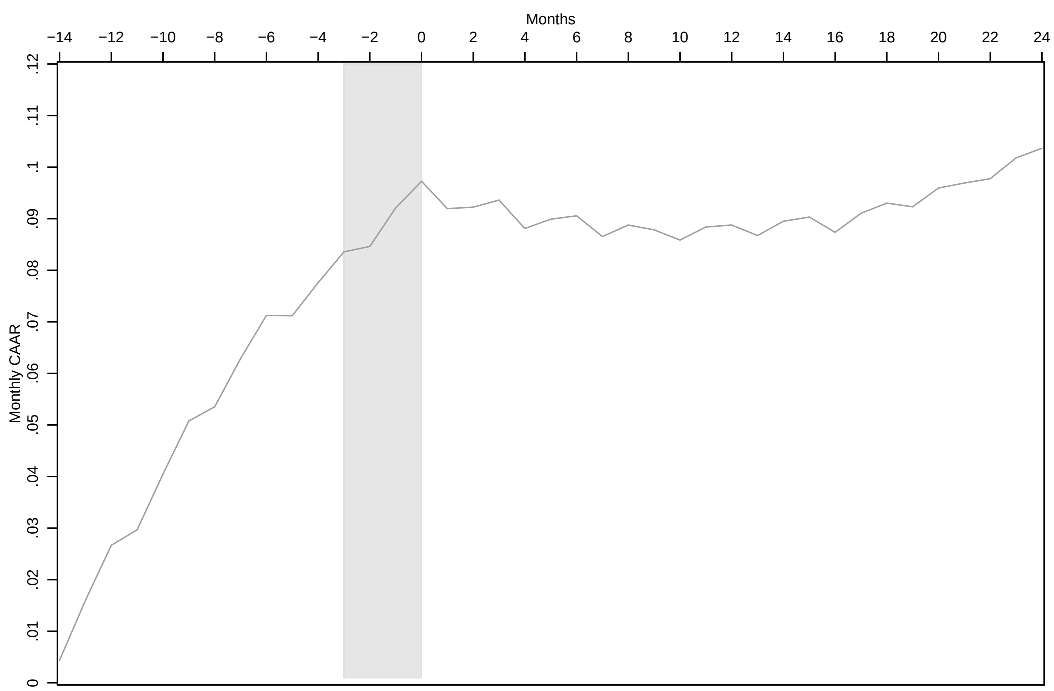
Table 11: The Effects of Market Prices on Firm Financial Policies in a Homogeneous Subsample (using Placebo Mispricing Shocks)

This table reports the results from a regression of firm financial policies on placebo mispricing shocks. The subsample consists of firm-level data for firms with an extreme mispricing event (top 10% during the full sample period) between 1980 and 2007. The dependent variables are investment, equity issuance, and payout policy. Investment is capital expenditures scaled by lagged assets, payout is total dividends and repurchases scaled by lagged assets, and issuance is the change in common equity and change in deferred taxes less the change in retained earnings scaled by lagged common equity. Mispricing Shock is a placebo mispricing shock based on an annual measure of implied mutual fund trading in each firm from funds that receive small outflows $\leq 5\%$ (Columns 1-3) and $\leq 2\%$ (Columns 4-6) in a quarter. Control variables include firm size, volatility, Tobin's Q, returns, profitability, and leverage and are defined in the Appendix. The coefficient on Mispricing Shock measures the relative change in firm policies due to placebo stock mispricing. Regressions include firm and year fixed effects. Robust standard errors are clustered at the firm level. t-statistics are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels.

	5% Outflows			2% Outflows		
	Investment	Issuance	Payout	Investment	Issuance	Payout
	(1)	(2)	(3)	(4)	(5)	(6)
Mispricing Shock	-0.0008**	-0.0087***	0.0014	-0.0030**	-0.0310***	0.0096
	(-2.14)	(-3.47)	(0.75)	(-2.01)	(-3.14)	(1.28)
Treatment Firm-Year (non-zero Mispricing Shock)	0.0036**	0.0167	0.0252***	0.0025*	0.0000	0.0180***
	(2.01)	(1.26)	(3.67)	(1.78)	(0.00)	(3.38)
Size	-0.0123***	-0.1418***	0.0368***	-0.0123***	-0.1402***	0.0367***
	(-9.95)	(-15.50)	(7.31)	(-9.87)	(-15.29)	(7.26)
Volatility	-0.2505***	0.0635	-1.4006***	-0.2515***	0.0402	-1.4081***
	(-5.47)	(0.17)	(-8.92)	(-5.47)	(0.11)	(-8.97)
Tobin's Q	0.0116***	0.1437***	0.0049***	0.0116***	0.1437***	0.0049***
	(18.36)	(22.65)	(3.61)	(18.34)	(22.65)	(3.58)
Returns	0.0145***	0.2180***	0.0112***	0.0145***	0.2179***	0.0111***
	(15.77)	(22.45)	(4.12)	(15.76)	(22.40)	(4.06)
ROA	0.0677***	-0.4339***	0.1148***	0.0678***	-0.4321***	0.1160***
	(13.52)	(-8.60)	(8.48)	(13.54)	(-8.56)	(8.55)
Leverage	-0.0042***	0.1273***	-0.0183***	-0.0042***	0.1272***	-0.0183***
	(-8.57)	(13.30)	(-9.58)	(-8.57)	(13.28)	(-9.63)
R-squared	0.582	0.421	0.814	0.582	0.421	0.814
Number of Observations	39,356	39,108	39,845	39,356	39,108	39,845
Number of Clusters	5,551	5,521	5,562	5,551	5,521	5,562
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes



Extreme Events



All Events - excluding Extreme Events

Figure 1: Cumulative Average Abnormal Returns
Figure 1 depicts the cumulative average abnormal returns (CAARs) over the 36 months surrounding a mutual fund price pressure event. The CAARs are the difference between the firm's monthly return and the CRSP equal-weighted index returns. The extreme events represent the highest Mispricing Shocks (top 10%) during the full sample period (1980 - 2007). Panel 1a traces out the CAARs for the sample of extreme events. Panel 1b includes all events, excluding extreme events, over the event quarter.