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Earnings Management in Response to Stock Price Pressure: Evidence from Fire Sales (and Purchases) by Mutual Funds

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Earnings Management in Response to Stock Price Pressure: Evidence from Fire Sales (and Purchases) by Mutual Funds

This paper examines whether managers manipulate earnings in response to stock price pressure arising from fire sales (and purchases) of stocks by mutual funds. I find that managers engage in upward earnings management when facing downward price pressure driven by fire sales of mutual funds. I find no evidence that managers engage in downward earnings management when their stocks are fire purchased by mutual funds. My results become stronger for firms with more illiquid stocks and firms under tighter financial constraints. I also find that earnings management increases stock prices in the short term and helps stock prices return to "normal" levels in the long run. Collectively, my evidence suggests that downward price pressure caused by fire sales of mutual funds leads to upward earnings management, which in turn speeds up price recovery.

JEL Classification: G12, G14, M41

Keywords: earnings management, stock price pressure, fire sales, fire purchases, mutual funds

I. INTRODUCTION

The earnings management literature identifies various capital market incentives for managers to manipulate earnings. For example, to meet and beat the analyst consensus forecast, managers try to manipulate earnings upward (Kasznik 1999; Das and Zhang 2003; Graham, Harvey, and Rajgopal 2005; Roychowdhury 2006; An, Lee, and Zhang 2014). The underlying assumption is that managers try to maximize stock price and do not want to disappoint the market at earnings announcements, as this could trigger a sharp decline in stock price (Verrecchia 2001; Jensen 2005; Badertscher 2011; Rennekamp, Rupar, and Seybert 2016).[1] Given the importance of price pressure on earnings management (EM hereafter), there is surprisingly little direct empirical evidence on such a link. One possible reason is that it is difficult to identify a setting of temporary price pressure. EM is little used when stock price decreases due to rational reasons such as poor prospects for firm growth because it cannot solve long-term underlying problems. For temporary price pressures, the market misprices the shares, and such mispricing will be corrected over time. In such a scenario, EM can be used as a tool to counteract the mispricing force and speed up the correction of stock mispricing, which is important given the significant role of stock price played in managerial compensation and evaluation, merger & acquisition, and resource allocation (e.g., Engel, Hayes, and Wang 2003; Edmans, Goldstein, and Jiang 2012; Hazarika, Karpoff, and Nahata 2012; Khan, Kogan, and Serafeim 2012; Hau and Lai 2013). However, in the real world, it is not easy to identify such a clean setting of stock mispricing.

In this study, I measure price pressure as the stock price swings created by fire sales and purchases of stocks by mutual funds, which are exogenous to firms. In general, mutual funds are

[1] Prior studies show that missing analyst targets can result in stock price declines as large as 5.04% on average during the quarter, relative to peers with similar size (Skinner and Sloan 2002; Jensen 2009).

subject to buy and sale order flows from investors that are not within their control. Such exogenous order flows give rise to needs for rebalancing the funds' holdings, often forcing mutual funds to execute fire sales or purchases of individual stocks. In extreme situations, the size of flow-driven trades is large enough to cause significant price pressure, either downward or upward, on the traded stocks, resulting in price swings that can last for more than one year (as has been well documented by Coval and Stafford (2007)). This is a clear scenario of stock mispricing because the price movements induced by fire sales and purchases are unrelated to the underlying firms' fundamentals and are exogenous to these firms. Coval and Stafford (2007) developed a method to separate mutual fund trades that are driven by exogenous order flows from those driven by normal, fundamental-based trading. Evidence indicates that this method is effective, and subsequent studies have adopted the setting of mutual fund fire sales and purchases to investigate insider trading (Ali, Wei, and Zhou 2011), stock repurchases (Dudley and Manakyan 2011), merger and acquisition activity (Edmans et al. 2012), seasoned equity offerings and stock-based acquisitions (Khan et al. 2012), investment and employment (Hau and Lai 2013), trading of close-end funds and hedge funds (Giannetti and Kahraman 2014), and managerial guidance (Fu and Zhang 2015) when firms are exposed to stock mispricing. In this study, I similarly employ this setting to explore the impact of stock price pressure on firms' accounting choices.

I examine three main questions in the study. First, do managers engage in EM as a way to mitigate stock price pressure arising from mutual fund fire sales (purchases)? Specifically, do they manage earnings upward when their firms' stocks experience underpricing and conversely manage earnings downward when stocks experience overpricing? Second, if they do so, does the extent of EM vary with certain factors determining a firm's desire to manage earnings? I

consider two specific factors: (i) the stock's market illiquidity, which affects the sensitivity of stock price to fire sales and purchases, and (ii) the firm's financial constraints, which affect the firm's eagerness to correct mispricing in an effort to seek external financing. Third, does the earnings management play a useful role in restoring stock prices back to "normal" levels following fire sales and purchases?

Using a firm-quarter sample between 1988 and 2012, I find that managers manipulate earnings upward in response to fire sales of mutual funds. Specifically, when the stock price experiences downward pressure driven by fire sales of mutual funds, managers engage in upward EM to report higher accounting performance. I fail to find evidence that managers engage in downward EM when their stocks are overpriced due to fire purchases of mutual funds. In other words, fire sales pressure managers to engage in upward EM, while the opposite is not true for fire purchases.

I then examine whether the extent of EM in response to stock price pressure varies across specific circumstances. First, I consider a firm's stock illiquidity because the price pressure from fire sales (purchases) arises from a shortage in liquidity (Coval and Stafford 2007). Consistent with the conjecture, I find that managers engage in more upward EM in firms with lower stock liquidity. Again, the results mainly come from fire sales sample. Second, because mispricing should be of greater concern to firms that face tighter financial constraints and thus have an immediate need for external financing (e.g., Matsumoto 2002; Cotter, Tuna, and Wysocki 2006), I expect financial constraints to play a role in determining EM. Consistent with this intuition, I find that when firms face tighter financial constraints, they engage in more upward EM against stock underpricing, but they do not conduct downward EM against stock overpricing.

Next, I examine whether EM helps to speed up price correction in the context of mutual fund flow-driven price pressure. My analysis shows that when extreme outflow-driven trades by mutual funds are followed by upward EM, subsequent price reversals are significantly faster, suggesting that EM helps with price recovery. In other words, EM does mitigate price pressure by speeding up the price reversal to "normal" levels in the setting of fire sales of mutual funds.

In the additional analysis, I check whether my results are robust over the consideration of potential endogeneity by examining a natural experiment, the 2003 mutual trading scandal, which resulted in significant outflows to implicated funds and further exogenous negative shock to stock price. I document that this exogenous shock strongly induces upward EM, suggesting the causal relation between stock price pressure and EM. In addition, I check and find that my results hold for both components of EM, including accrual management (AM hereafter) and real transaction management (RM hereafter), and managers strategically use AM or RM according to their relative costs. Furthermore, I find that managers more likely meet and beat analyst consensus forecasts following fire sales of mutual funds, providing confirmative evidence on the existence of EM in response to price pressure. I also find evidence indicating the reversal of EM following the quarter of flow-induced EM when price pressure is mitigated. What is more, I find my results are quantitatively similar when price pressure is measured as continuous variable or dummy variables, or when I restrict my sample to firms without other tools to mitigate price pressure including insider trading, stock repurchase and managerial guidance. Finally, I document that outflow-induced upward EM is not penalized by the board in terms of the dismissal risk as in the case of other forms of EM, but instead mitigates the dismissal risk arising from the stock underpricing driven by mutual fund fire sales.

This paper contributes to the EM literature. The prior literature on EM ignores the incentives directly from share price, although it is implicitly and explicitly emphasized in various contexts. For example, a number of studies provide evidence of EM to meet and beat earnings targets to avoid market disappointment (Kasznik 1999; Das and Zhang 2003; Graham, Harvey, and Rajgopal 2005; Roychowdhury 2006; An, Lee, and Zhang 2014; see Dechow, Ge and Schrand 2010 for a more comprehensive review). However, no study has directly examined the impact of share price pressure on EM. Using the exogenous shock to stock price from fire sales (purchases) of mutual funds, this study shows for the first time that stock price pressure is an important incentive for managers to manipulate earnings.[2]

In addition, the study contributes to further understanding the consequences of EM. Previous studies show that managers opportunistically manipulate earnings at the expense of outside investors in a variety of situations such as equity financing (Teoh, Rao, and Wong 1998) and insider trading (Darrough and Rangan 2005). In contrast, in this study, EM actually serves a beneficial role; namely, it helps mitigate price pressure and correct mispricing driven by external market events. While in general EM is considered a sign of ethical inadequacy that leads to increased CEO turnovers (Engel et al. 2003; Desai, Hogan, and Wilkins 2006; Karpoff, Lee, and Martin 2008; Srinivasan 2005; Menon and Williams 2008; Hazarika et al. 2012), I find that in my context, managers are not penalized to the same extent (in terms of increased risk of

[2] This paper is related to Badertscher (2011), who examines the effect of stock overvaluation on EM. My study differs from Badertscher (2011) at least in the following three important aspects. First, it focuses not only on the upside but also on the downside of misvaluation. My results are mainly derived from stock undervaluation, hence complementing Badertscher (2011) on the role of stock misvaluation in EM. Second, it is based on a setting of temporary stock mispricing rather than sustained mispricing over a certain number of years as in Badertscher (2011). Hence, my findings mainly speak to the consequences of temporary price pressure in contrast to long-term mispricing as examined by Badertscher (2011). Third, given the exogenous nature of my mispricing measure, this study can better address the endogeneity concern and avoid the related weak instrument problem (Larcker and Rusticus 2010).

dismissal) when they engage in upward EM to correct stock underpricing, complementing the prior literature.

This paper also contributes to the stock mispricing literature. Coval and Stafford (2007) document stock mispricing due to rebalancing of mutual funds. Following Coval and Stafford (2007), several studies examine the consequences of such mispricing. For example, Ali et al. (2011) show that insiders trade against stock mispricing due to fire sales (purchases) of mutual funds. Dudley and Manakyan (2011) show that managers more likely repurchase their own stocks when they are underpriced. Edmans et al. (2012) find that the stock mispricing caused by mutual fund rebalancing leads to more mergers and acquisitions. Khan et al. (2012) document that the probability of a seasoned equity offering (SEO), insider sales, and the probability of a stock-based acquisition increase significantly following the stock overpricing. Hau and Lai (2013) document that stock underpricing negatively affects investment and employment. Giannetti and Kahraman (2014) show that managers of close-end funds and hedge funds trade against mispricing driven by fire sales (purchases) of open-end mutual funds. Fu and Zhang (2015) find that managerial forecasts are more optimistic when stocks are underpriced. This study extends this line of research and shows that stock mispricing has another real effect, that is, accounting choices.

The remainder of the paper is organized as follows. Section II develops the hypotheses. Section III discusses the sample and research design. Section IV presents the empirical results. Section V provides additional analysis. Section VI concludes.

II. HYPOTHESIS DEVELOPMENT

In this section, I develop hypotheses concerning (i) managerial incentives to engage in EM in response to mutual fund fire sales and purchases, (ii) variations in the extent of EM across firms, and (iii) the role of EM in mitigating price pressures from mutual fund flow-constrained trades.

Incentives to Engage in Earnings Management

Earnings is arguably the most important information for market participants (Beyer et al. 2010). Prior studies document that managers manipulate earnings to meet and beat market expectations when actual earnings are announced (Kasznik 1999; Das and Zhang 2003; Graham et al. 2005; Roychowdhury 2006; An et al. 2014). By doing so, managers avoid investor disappointment at earnings announcements, which could trigger drastic stock price declines. Consistent with this view, many studies argue that managers try to maximize stock price through their accounting choices (Verrecchia 2001; Jensen 2005; Badertscher 2011; Rennekamp et al. 2016). For example, Jensen (2005) and Badertscher (2011) suggest that managers engage in upward EM to sustain stock overpricing; Rennekamp et al. (2016) show that managers engage in more EM (RM to be specific) in response to short selling pressure. If share price is such an important consideration in EM decisions, it would be useful to directly examine how EM is affected by price pressure.

I identify shocks to share prices from mutual fund fire sales (purchases), which are largely unrelated to the underlying firms' fundamentals (Coval and Stafford 2007; Ali et al. 2011; Dudley and Manakyan 2011; Edmans et al. 2012; Khan et al. 2012; Hau and Lai 2013; Giannetti and Kahraman 2014; Fu and Zhang 2015). When stocks experience fire sales (purchases), their

prices are under significant downward (upward) pressure, resulting in stock underpricing (overpricing). Although such mispricing is transitory and typically reverses within two years, it is harmful to both firms and managers, especially for stock underpricing. From the perspective of shareholders, stock underpricing puts firms in a more difficult position to obtain external financing, forces firms to underinvest and further reduces firm valuation, especially for financially constrained firms (Khan et al. 2012; Hau and Lai 2013). For managers, stock underpricing essentially reduces their wealth given their substantial equity position and equity-related compensation, as well as increases their dismissal risk due to poor market performance and hostile takeovers (Engel et al. 2003; Edmans et al. 2012; Hazarika et al. 2012).[3] In this study, I assume managers can tell whether their firms' stocks are over- or under-valued through observing the price swings (Ali et al. 2011; Edmans et al. 2012; Bergman and Roychowdhury 2008).

Managers have a great deal of flexibility in their accounting choices and operation decisions and can use them to influence earnings performance based upon need (Fields, Lys, and Vincent 2001; Graham et al. 2005). Prior research shows that investors cannot fully see through EM (Sloan 1996; Xie 2001). EM in this study is defined as the purposeful altering of reported earnings in a particular direction. To the extent that EM artificially increases earnings and earnings growth expectation, EM can be used by managers to correct transitory stock mispricing. In particular, when share price is experiencing downward pressure from fire sales by mutual funds, I expect that managers manipulate earnings upward in the hope of creating the perception that the company's fundamentals are strong, thus helping to increase the share price (Verrecchia

[3] Furthermore, Engel, Hayes and Wang (2003) find that the board puts more weight on earnings to evaluate managers when stock price deviates from fundamentals, which gives managers another incentive to manipulate earnings upward in order to receive better evaluation.

2001; Rennekamp et al. 2016). On the other hand, when the share price is artificially high due to fire purchases by mutual funds, managers may not have a strong incentive to guide the price down through underestimated earnings (Jensen 2005; Badertscher 2011).

The above argument, however, does not suggest that EM is without costs on managers. Previous research has shown that EM could lead to a loss of reputation and further the increase in dismissal risk in the labor market that often accompanies managers who engage in aggressive EM (Hazarika et al. 2012). In addition, it could cause the decline in firm value that results from managers making suboptimal business decisions or when the market discovers accrual manipulation (Palmrose, Richardson, and Scholz 2004; Desai et al. 2006). Firm value decrease is of concern to managers given their substantial equity ownership. Thus, in the presence of both benefits and costs, whether managers indeed employ EM to mitigate price pressures from fire sales of mutual funds is an empirical question. I nevertheless give priority to the urgent needs of correcting stock underpricing and assume the benefits of EM in this case dominate the costs. Hence, my first hypothesis is developed as follows.

> **H1.** Ceteris paribus, managers manipulate earnings upward in response to fire sales of mutual funds, but they do not manipulate earnings downward in response to fire purchases of mutual funds.

EM consists of two components, AM and RM.[4] AM refers to the purposeful altering of accruals in a particular direction, which is achieved when managers adjust revenue or expense

[4] AM and RM have their own costs and benefits. AM has no first-order effect on cash flows, can be completed at period-end, and can be done within the boundaries of GAAP; in addition, the detection cost is likely to be relatively low. RM is not subject to auditor or governance constraints to the same degree as AM, and its adverse impact on optimal business operations and its potential to destroy long-term firm value can be high. For detailed discussions, please refer to Badertscher (2011), Zang (2012) and Chan et al. (2015).

accruals to alter financial reports. RM means the purposeful altering of reported earnings in a particular direction by changing the timing or structuring of an operating, investing, or financing decision. This study emphasizes the total rather than individual component of EM. Prior studies show that focusing on one of them leads to incorrect interpretation. For example, Cohen, Dey, and Lys (2008) and Chan, Chen, Chen, and Yu (2015) show that SOX and the adoption of clawback provisions reduce AM while increasing RM and on the whole does not reduce EM. To obtain a complete understanding of managerial attitudes toward EM, I choose to focus on the sum of AM and RM, i.e., EM, in my main analyses. In the sensitivity analyses, the impact on each component of EM is examined.

Variations in Earnings Management

The price pressure created by fire sales (purchases) of mutual funds is mainly due to liquidity shortages (Coval and Stafford 2007). Firms whose stocks are less liquid are expected to be subject to greater price pressure from mutual funds' forced trades. I thus conjecture that managers conduct more upward EM in response to fire sales of mutual funds when stocks have low, versus high, market liquidity. On the other hand, I do not expect a significant effect of stock liquidity on the extent of EM when fire purchases inflate stock prices. This leads to my next hypothesis.

> **H2a.** Ceteris paribus, the upward earnings management in response to mutual fund fire sales is positively related to stock illiquidity, but there is no significant relation between the (downward) earnings management and stock illiquidity in response to fire purchases.

It is widely accepted that maintaining and increasing stock prices is one of the most important goals in managerial decision making (Verrecchia 2001; Verrecchia 2001; Badertscher

2011). Such incentives are particularly strong when firms are under tight financial constraints and therefore are in immediate need of external financing. Applying this argument to my setting, I expect that managers conduct more upward EM against stock mispricing when firms face tighter financial constraints; however, again, such incentives are more relevant to situations of stock underpricing than to situations of stock overpricing.

> **H2b.** Ceteris paribus, the upward earnings management in response to mutual fund fire sales is greater for firms facing tighter financial constraints, but there is no significant relation between the (downward) earnings management and financial constraints in response to fire purchases.

The Role of Earnings Management in Mitigating Price Pressures

If managers indeed employ EM to mitigate price pressures, I would expect that the managed component of the earnings has an impact on stock prices. Thus, at the time when an earnings news is announced, the stock price is expected to react to the managed component along with the true unexpected earnings component. In particular, stock price increases in response to upward EM during the earnings announcement period, especially for underpriced stocks that have large room for upward price correction. For these stocks, investors observe large drop in price and might be unsure whether this is due to fundamentals or mispricing. Under such circumstance, investors tend to rely more on new information to judge firm value and hence react stronger to earnings news (Holthausen and Verrecchia 1988). Correspondingly, subsequent return reversals are smaller because there is less need for return reversals after the announcement given that more return reversals occur when earnings are announced. This is particularly true for

upward EM to correct stock underpricing but not for downward EM to correct overpricing. This leads to my final hypotheses.

H3a. At the time of earnings announcements, stock prices react more strongly to earnings surprises in the presence of earnings management following mutual fund fire sales.

H3b. Subsequent return reversals are significantly smaller for firms that engage in upward earnings management following mutual fund fire sales.

III. RESEARCH DESIGN

Measurement of Mutual Fund Trades

I collect data pertaining to mutual funds from two databases. First, I obtain the portfolio holdings at the end of a quarter for US domestic equity mutual funds over the period 1988 to 2012 from Thomson Reuters Mutual Fund Holdings Data. I infer fund purchases and sales from changes in their quarterly positions. I focus on trades made by actively managed, diversified U.S. domestic equity funds and exclude all trades by index funds, international funds, municipal bond funds, "bond and preferred" funds, and sector funds. Then, I obtain fund returns and total net asset value from the CRSP Survivorship Bias Free Mutual Fund Database. These two mutual fund databases are then linked via the MFLINKS data set provided by Wharton Research Data Services (WRDS).

To identify funds experiencing extreme flows, I follow Coval and Staffort (2007) to calculate quarterly fund flows as the change in total net assets over a quarter, adjusted for investment returns (assuming that flows occur at the end of each quarter). That is,

$$Flow_{jt} = \frac{TNA_{jt} - TNA_{jt-1}(1+R_{jt})}{TNA_{jt-1}}, \quad (1)$$

where TNA_{jt} is the total net assets of fund *j* at the end of quarter *t*, and R_{jt} is the quarterly return of fund *j* during quarter *t*. I assume there is no difference in the share classes and combine quarter-end total net assets across all share classes of each fund and calculate fund returns as the weighted average of returns across share classes with the weight as the beginning-of-quarter total net asset value. A fund is considered to be experiencing extreme capital flows in a quarter if it has realized flows above the 90th or below 10th percentile among all funds in the quarter.

To examine price pressure due to mutual fund trades that are forced by extreme flows, I follow prior studies and construct a stock level price pressure measure (e.g., Coval and Stafford 2007; Ali et al. 2011; Dudley and Manakyan 2011; Edmans et al. 2012; Khan et al. 2012; Hau and Lai 2013; Giannetti and Kahraman 2014; Fu and Zhang 2015). First, I sum all inflow-driven purchases and outflow-driven sales made by funds trading a stock in a given quarter. I then normalize the difference by the firm's shares outstanding at the beginning of the quarter, obtained from the CSRP monthly stock database. The flow-driven price pressure measure of the stock is defined as

$$Forced_{it} = \frac{\sum_j \left(\max(0, \Delta holding_{jit}) \middle| flow_{jt} > percentile\ (90th)\right) - \sum_j \left(\max(0, -\Delta holding_{jit}) \middle| flow_{jt} < percentile\ (10th)\right)}{Shares\ Outstanding_{it-1}}, \quad (2)$$

where $\Delta holdings_{jit}$ is the change in fund *j*'s holding of stock *i* in quarter *t*, and $flow_{jt}$ is the capital flow for fund *j* in quarter *t*. Essentially, *Forced* measures the degree to which a stock's trading is accounted for by mutual funds experiencing significant inflows or outflows. Lower (upper) range of *Forced* values indicates stocks being fire sold (purchased) by mutual funds.

As Coval and Stafford (2007) have shown, significant stock price pressure can be caused not only by fire sales but also by fire purchases. Mutual fund trading activities are bounded by liquidity constraints, on the one hand, and portfolio holding policies, on the other hand. When faced with large shocks of cash inflows or outflows, they are typically prevented from engaging in slow and orderly trades. Indeed, Coval and Stafford (2007) find that "the funds with the most significant outflows are very likely to reduce their existing positions……. Funds in the top decile of capital flows tend to increase a large fraction of their existing positions." In another word, mutual funds adjust their holdings of existing stocks in a largely proportional manner in response to flow shocks.

For unforced (voluntary) mutual fund trading, Coval and Stafford (2007) show that there are no price reversals, in contrast to mutual funds' flow-forced trade. This is in line with the view that unconstrained fund trading contains information about firms' fundamental value. Following Ali et al. (2011), I control for trades by unconstrained funds in my analysis. Specifically, I measure these trades as

$$Unforced_{it} = \frac{\sum_j \left(\Delta holding_{jit} \middle| percentile(10th) \leq Flow_{jt} \leq percentile(90th) \right)}{SharesOutstanding_{it-1}}. \quad (3)$$

This measure is similar to the dollar trade imbalance ratio used in Lakonishok, Shleifer, and Vishny (1992). To exclude flow-forced trades, I only sum trades made by those mutual funds that are not in the top or bottom 10 percentile according to their quarterly percentile ranks of capital flows.

Measurement of Earnings Management

I follow prior studies and measure EM as the sum of AM and RM (e.g., Cohen et al. 2008; Badertscher 2011; Zang 2012; Chan et al. 2015).[5] Following Kothari, Leone, and Wasley (2005), I measure AM as performance-adjusted discretionary accruals, which is estimated at the firm-quarter level to be in line with the proxy of stock price pressure (Call et al. 2014). Specifically, I first estimate the following modified Jones (1991) model cross-sectionally for industry-quarters (industry is classified by Fama-French 48 industries) with at least 20 observations, using the entire Compustat universe:

$$\frac{TA_{it}}{A_{it-1}} = k_1 \frac{1}{A_{it-1}} + k_2 \frac{\Delta Sales_{it}}{A_{it-1}} + k_3 \frac{PPE_{it}}{A_{it-1}} + \varepsilon_{it}, \quad (4)$$

where *TA* is earnings before extraordinary items and discontinued operations minus the operating cash flow reported in the statement of cash flows in quarter t (Collins and Hribar 2002). *A* denotes total assets, *Sales* indicates sales revenue, and *PPE* is gross property, plant, and equipment. Following Kothari et al. (2005), I subtract the change in accounts receivable from the change in sales revenue prior to estimating equation (4). The estimated residuals from equation (4) are unadjusted discretionary accruals. Finally, I match each firm-quarter observation with another from the same industry (classified by Fama-French 48 industries) and quarter with the closest return on assets in the current quarter. I define the performance-matched discretionary accrual for firm *i* in quarter *t* as the discretionary accrual in quarter *t* minus the matched firm's discretionary accrual in the same quarter.

Following Roychowdhury (2006), I proxy for RM using three measures, ABExp, ABProd, and ABCash, which represent abnormal levels of discretionary expenses (the sum of R&D,

[5] My results are similar when AM is calculated according to Chan, Chan, Jegadeesh, and Lakonishok (2006) and RM is calculated according to Vorst (2015). I also obtain similar evidence when EM is defined as a dummy variable coded as one for upward EM and zero for downward EM.

advertising, and SG&A expenses), production costs, and cash flow from operating activities, respectively. ABExp, ABProd, and ABCash are residuals from the following three regressions:

$$\frac{DE_{it}}{A_{it-1}} = k_1 \frac{1}{A_{it-1}} + k_2 \frac{Sales_{it}}{A_{it-1}} + \varepsilon_{it}; \quad (5)$$

$$\frac{PROD_{it}}{A_{it-1}} = k_1 \frac{1}{A_{it-1}} + k_2 \frac{Sales_{it}}{A_{it-1}} + k_3 \frac{\Delta Sales_{it}}{A_{it-1}} + k_4 \frac{\Delta Sales_{it-1}}{A_{it-1}} + \varepsilon_{it}; \quad (6)$$

$$\frac{CFO_{it}}{A_{it-1}} = k_1 \frac{1}{A_{it-1}} + k_2 \frac{Sales_{it}}{A_{it-1}} + k_3 \frac{\Delta Sales_{it}}{A_{it-1}} + \varepsilon_{it}, \quad (7)$$

where *DE* represents the discretionary expenditures, defined as the sum of advertising expenses, R&D expenses and SG&A, Production costs (*PROD*) are defined as the sum of cost of goods sold and change in inventory, and *CFO* is the operating cash flows. I estimate equations (5) to (7) by industry (classified by Fama-French 48 industries) and quarter for all firms in Compustat. The estimated coefficients from the corresponding industry-quarters are used to compute firm-specific ABExp, ABProd, and ABCash. Roychowdhury (2006) posits that managers often cut discretionary expenses, such as advertising or R&D expenses, to boost short-term earnings, suggesting a negative ABExp. Moreover, a positive ABProd suggests that managers overproduce inventory items to reduce costs of goods sold per unit, thus achieving a higher reported operating income. Finally, to inflate sales revenue, managers are likely to offer price discounts or lenient credit terms, although these practices may lead to lower operating cash flow, a negative ABCash. Following Cohen et al. (2008), Badertscher (2011) and Zang (2012), I create a summary measure of RM by summing ABCash, ABExp, and ABProd. Specifically, I multiply ABExp and ABCash by -1 so that they can represent real transaction management in a consistent fashion as in the case of ABProd; i.e., companies with greater real transaction management are expected to have a positive ABProd but a negative ABExp and ABCash.

Regression Model for Earnings Management

To examine whether fire sales and purchases of mutual funds induce EM, I regress the EM proxies on the flow-driven price pressure measure (*Forced*). To account for the effects of mutual fund trading imbalance that is unrelated to extreme flows, I control for *Unforced*, as against trades forced by extreme capital flows. The regression model is as follows.[6]

$$EM_t=\alpha+\beta_1 Foreced_{t-1}+\beta_2 AF_t+\beta_3 Cycle_t+\beta_4 NOA_t+\beta_5 Herf_t+\beta_6 MS_t+\beta_7 Zscore_t+\beta_8 NetIssue_t+\beta_9 ROE_t$$
$$+\beta_{10} Lev_t+\beta_{11} Size_t+\beta_{12} BM_t+\beta_{13} Earn_t+\beta_{14} InsTrad1Q_t+\beta_{15} MFB_t+\beta_{16} Repurp_t+\beta_{17} Unforeced_{t-1}+\varepsilon_t. \quad (8)$$

EM is the earnings management, equal to the sum of AM and RM as described earlier. Following Badertscher (2011), Zang (2012) and Chan et al. (2015), I include *AF*, *Cycle* and *NOA* to control for the costs associated with AM and include *Herf*, *MS*, and *Zscore* to control for the costs related to RM. *AF* is the log value of the number of analysts following the firm, *Cycle* the log value of the total of the days receivable plus days inventory less days payable, and *NOA* a dummy variable equal to 1 if net operating assets (i.e., shareholders' equity less cash and marketable securities and plus total debt) is above the median of the corresponding industry-quarter and 0 otherwise. These variables are included to control for the potential monitoring role of analysts and the flexibility of AM (Healy and Palepu 2001; Zang 2012). *Herf* is the Herfindahl index using Fama-French 48 industries, *MS* the market share, and *ZScore* the Altman (1968)'s *Z*-score. They are included to control for industry competition, competitive advantage, and financial condition (Barton and Simko 2002; Zang 2012). See the Appendix for a complete description of how I calculate each variable.

[6] Prior studies indicate that big auditors and auditors with longer tenure deter EM (DeFond and Jiambalvo 1991, 1993; Stice 1991; Myers, Myers, and Omer 2003). To control for audit-related effects, Zang (2011), Badertscher (2012) and Chan et al. (2015) include dummy variables for big auditor and auditor tenure in their regression models. These audit-related variables are not included in my model because my sample is at the quarterly level and quarterly financial reports do not need to be audited. My results are insensitive to controlling for these variables when quarterly reports are treated as similar to annual reports in terms of the auditing effect.

For other general control variables, *NetIssue* is the log value of the ratio of the split-adjusted shares outstanding divided by the split-adjusted shares outstanding at the end of the prior quarter, *ROE* income before extraordinary items divided by lagged book value of equity, *Lev* the leverage ratio, *Size* is the natural log of total assets, and *BM* the book-to-market ratio. They are used to control for effects related to external financing, firm performance, the monitoring role of debt holders, firm scale, and growth rate (Teoh et al. 1998; Badertscher 2011; Zang 2012; Chan et al. 2015). *Earn* is pre-managed earnings, defined as the earnings before extraordinary items minus *EM*, and is included to control for the goal of managing earnings upward (Beatty, Chamberlain, and Magliolo 1995; Hunt, Moyer, and Shevlin 1996; Zang 2012). In addition, *InsTrad1Q*, *MFB* and *Repurp* are included to control for other tools managers might use to counter against stock mispricing, including insider trading, managerial guidance and stock repurchases (Ali et al. 2011; Dudley and Manakyan 2011; Fu and Zhang 2015). *InsTrad1Q* is net insider trading, defined as the absolute value of the difference between total shares purchased by insiders and total shares sold by insiders as a fraction of shares outstanding. *MFB* denotes management forecast bias calculated as the management forecast less actual earnings deflated by the absolute value of actual earnings.[7] *Repurp* equals to the percentage of shares repurchased over the number of shares outstanding. Finally, firm and quarter indicators are included to control for firm-specific differences and time-series differences across quarters.

Regression Model for the Incremental Analyses

In this subsection, I discuss regression models for examining whether the extent of EM varies with certain factors determining a firm's desire to manage earnings, including stock

[7] To enlarge sample size, when the variables of *InsTrad1Q* and *MFB* are missing, zero values are assigned. My results, however, are insensitive to such treatment.

illiquidity and financial constraints. First, if managers manipulate earnings due to the price pressures from fire sales (and purchases) of mutual funds, the effect should be stronger for illiquid stocks that are more sensitive to trading shocks from mutual funds. To test this argument, I augment equation (8) with an interaction term between *Forced* and a measure of stock illiquidity (*Illiquidity*) plus the illiquidity measure.

$$EM_t=\alpha+\beta_1 Foreced_{t-1}\times Illiquidity_{t-1}+\beta_2 Illiquidity_{t-1}+\beta_3 Foreced_{t-1}+\beta_4 AF_t+\beta_5 Cycle_t+\beta_6 NOA_t$$
$$+\beta_7 Herf_t+\beta_8 MS_t+\beta_9 Zscore_t+\beta_{10} NetIssue_t+\beta_{11} ROE_t+\beta_{12} Lev_t+\beta_{13} Size_t+\beta_{14} BM_t+\beta_{15} Earn_t$$
$$+\beta_{16} InsTrad1Q_t+\beta_{17} MFB_t+\beta_{18} Repurp_t+\beta_{19} Unforeced_{t-1}+\varepsilon_t \quad (9)$$

Following Amihud [2002], I use the price impact of trading to proxy for stock illiquidity, calculated as $Illiquidity_{id} = |r_{id}|/V_{id}$, where $|r_{id}|$ is the absolute value of daily stock return on date *d,* and V_{id} is the dollar trading volume (the number of shares traded multiplied by the stock price at the end of a day). Hasbrouck [2003] shows that this measure is the best available price-impact proxy constructed from daily data.

To avoid the effects of extreme observations, I follow Daske, Hail, Leuz, and Verdi (2008) and use the median value over the quarter as the proxy at quarterly level. In addition, to reduce the noise in the construction of this measure, I require the number of daily return observations larger than 30. Given that NYSE/AMEX and NASDAQ report trading volume differently, I employ an adjusted Amihud illiquidity measure as the raw Amihud (2002) illiquidity ratio standardized by the average value of the ratio for all stocks traded in the same exchange. Because this measure captures the absolute price impact of a given dollar volume, larger value means more illiquid stocks.

Second, firms under financial constraints have stronger incentive to maintain or increase stock price to obtain external financing (Matsumoto 2002; Cotter et al. 2006). Such incentives

may pressure managers to engage in more EM. To investigate this conjecture, I augment regression equation (8) with an interaction term between *Forced* and a measure of financial constraints (*Constraint*) plus the constraint measure. The specific model is as follows:

$$EM_t=\alpha+\beta_1 Foreced_{t-1}\times Constraint_{t-1}+\beta_2 Foreced_{t-1}+\beta_3 Constraint_{t-1}+\beta_4 AF_t+\beta_5 Cycle_t+\beta_6 NOA_t$$
$$+\beta_7 Herf_t+\beta_8 MS_t+\beta_9 Zscore_t+\beta_{10} NetIssue_t+\beta_{11} ROE_t+\beta_{12} Lev_t+\beta_{13} Size_t+\beta_{14} BM_t+\beta_{15} Earn_t$$
$$+\beta_{16} InsTrad1Q_t+\beta_{17} MFB_t+\beta_{18} Repurp_t+\beta_{19} Unforeced_{t-1}+\varepsilon_t \quad (10)$$

I measure a firm's financial constraints (*Constraint*) based on the financial health score of Piotroski (2000). In constructing this score, one point is given for each of the following items if its value is greater than 0: *ROA* (equal to income before extraordinary items scaled by lagged total assets), *CFO* (equal to net operation cash flow scaled by lagged total assets), *ΔROA* (the change in ROA from the prior year), *CFO – ROA, -Leverage* (leverage=long-term debt scaled by lagged total assets), the change in current ratio from the prior year (with the current ratio equal to current assets divided by current liabilities), no common equity issuance (i.e., common shares issued equal to 0), *ΔMargin* (margin=(sales revenue - cost of goods sold) / sales revenue), and *ΔTurn* (turn=sales revenue / lagged total assets). Piotroski (2000) shows that the financial health score measures the strength of a firm's financial position. To facilitate the interpretation of results, I multiply the financial health score by -1 to determine *Constraint* such that a higher value of *Constraint* indicates a firm facing tighter financial constraints.

Regression Model for the Effect of Earnings Management on Price Correction

Coval and Stafford (2007) show that the stock mispricing due to concentrated mutual fund sales and purchases forced by extreme money flows takes more than one year to correct. An important question is whether EM, which is used to counteract price pressure, indeed helps to

speed up price recoveries to "normal" levels. I take both a short-window and a long-window approach to exploring the price effect of EM.

First, I examine whether EM has an effect on the stock price reactions to earnings announcement. The following model is used to test the short-window price effect of EM:

$$Car\_01=\alpha+\beta_1 Forced\times EM+\beta_2 Forced+\beta_3 EM+\beta_4 Esurp\_exEM+\beta_5 Price\_reversal+\beta_5 Size+\beta_6 BM +\beta_7 PastReturn+\varepsilon \quad (11)$$

In equation (11), *Car_01* is the cumulative daily return minus the CRSP value-weighted index return over the two-day window from day 0 (the earnings announcement day) to day +1. *Esurp_exEM* equals *Esurp* minus *EM*, where *Esurp* is the earnings surprise, calculated as (Actual EPS –Analyst consensus forecast). The analyst consensus forecast is determined from the period right before the earnings announcement. *Price_reversal* is defined as one divided by share price. *Size*, *BM* and *PastReturn* are included to control for the risk premiums related to firm size, the book-to-market ratio of equity, and momentum. Other variables are defined before. Firm and quarter fixed effects are included. I expect a positive coefficient on *EM* if EM is used effectively to help correct stock mispricing, and a negative coefficient on the interaction term *Forced*×*EM* if the price reaction to EM is more positive (negative) when shares are undervalued (overvalued) due to fire sales (purchases) of mutual funds.

Second, I examine whether EM in response to the fire sales of mutual funds reduces the price reversal over the eight-quarter period after the quarter of earnings announcement (Ali et al. 2011). The following model is used to examine the long-window price effect of EM:

$$ARET_{t+1,t+8}=\alpha+\beta_1 Forced_{t-1}\times EM_t+\beta_2 Forced_{t-1}+\beta_3 EM_t+\beta_4 Forced_{t-1}\times InsTrd1Q_t+\beta_5 InsTrd1Q_t +\beta_6 Forced_{t-1}\times MFB_t+\beta_7 MFB_t+\beta_8 Forced_{t-1}\times Repurp_t+\beta_9 Repurp_t+\beta_{10} Forced_{t-1}\times NetIssue_t +\beta_{11} NetIssue_t+\beta_{12} Size_t+\beta_{13} BM_t+\beta_{14} PastReturn_t+\beta_{15} Unforced_{t-1}+\varepsilon_t \quad (12)$$

In equation (12), *ARET* is the cumulative market-adjusted abnormal return over the eight quarters after the quarter that earnings announcement occurs. The interactions of *Forced* with *InsTrd1Q*, *MFB*, *Repurp*, and *NetIssue* are included to control for the effects of other possible tools to correct stock mispricing including insider trading, managerial guidance, and stock repurchases as well as the possible confounding effect of stock issuances that can impact the firm's subsequent abnormal returns (Ali et al. 2011; Dudley and Manakyan 2011; Khan et al. 2012). As before, I include *Size*, *BM* and *PastReturn* to control for the risk premiums associated with firm size, book-to-market, and momentum, and include *Unforced* to provide a contrast to the effect of *Forced*. Other variables are as defined above. Again, I control for firm and quarter fixed effects in the model.

IV. EMPIRICAL RESULTS

Descriptive Analysis

My sample is at the firm-quarter level and covers the period from 1988 to 2012.[8] The sample size differs across analyses. The top and bottom one percentiles of the data are winsorized for all variables except those with a natural boundary including *NetIssue*, *Herf*, *MS*, *NOA*, *ROE*, *Lev* and *Repurp*. *Instrd* and *Repurp* are multiplied by 100 to reduce zeroes after the decimal point. Table 1 reports the mean and median values of the variables used in the main analyses for three samples: fire sales, benchmark, and fire purchases. The mean *EM* for fire sales sample is -0.050, compared to -0.060 for benchmark firms and -0.080 for the fire purchases sample, indicating that managers of my sample firms on average engage in downward EM. Parametric and non-parametric (Wilcoxon signed rank) test statistics indicate that *EM* for fire

[8] Why my sample period begins in 1988 is because the calculation of total accruals needs cash flow data, which starts to be available since 1988 (Collins and Hribar 2002).

sales sample is significantly higher than for benchmark sample, which is significantly higher than for fire purchases sample. The mean price pressure induced by forced mutual fund flow (*Forced*) is -0.020, -0.001, and 0.014 for fire sales sample, benchmark sample, and fire purchase sample, respectively. The summary statistics for other variables are similar to those in prior studies such as Badertscher (2011), Zang (2012) and Chan et al. (2015).

[Insert Table 1 here]

Earnings Management in Response to Fire Sales (Purchases) of Mutual Funds

In this subsection, I test whether managers manipulate earnings upward (downward) in response to fire sales (purchases) of mutual funds. Table 2 presents the results of estimating equation (8), where I regress EM on the forced trading imbalance of mutual funds (*Forced*) after controlling for costs related to EM and other general controls such as *Size*, *BM*, etc. I include firm and quarter-fixed effects and calculate t-statistics using robust standard errors that adjust for clustering by firm.

[Insert Table 2 here]

The results are reported in column 1 for the full sample. The coefficients on the control variables generally show expected signs. For example, the coefficients on *InsTrad1Q*, *MFB* and *Repurp* are significantly negative, in line with the conjecture that less EM is needed when insider trading, managerial guidance and stock repurchases are used to correct stock underpricing. For the variable of my interest, I find that the coefficient on *Forced* is significantly negative,

indicating that managers manipulate earnings in the opposite direction to mispricing to counter against price pressure.[9]

To further examine whether my results differ across downward versus upward price pressure from fire sales and purchases of mutual funds, I next run regressions separately for the subsamples of fire sales and fire purchases together with the benchmark group (which is not in the top or the bottom decile of *Forced*), with the results shown in columns 2 and 3, respectively. I find that the coefficient on *Forced* is significantly negative only for the subsample of forced sales but not for fire purchases. This shows that managers engage in upward EM when their stocks face downward price pressure from mutual funds' fire sales, but they do not engage in downward EM when their stocks face upward price pressure from fire purchases. These findings are consistent with my hypothesis H1. In terms of the economic significance, my results based on column 2 suggest that when downward price pressure increases by one standard deviation (0.014), EM increases by 0.406% (=(-0.290)×(-0.014)) of the total assets, which is equivalent to 1.68% of the standard deviation (0.241).

The Analyses of Incremental Effects

In this subsection, the results on the incremental analyses are discussed. First, I examine the impact of stock illiquidity. Coval and Stafford (2007) and Ali et al. (2011) indicate that more illiquid stocks experience greater price pressure for a given amount of forced mutual fund trade. If the goal of EM is indeed to mitigate the price pressure from mutual fund trading, then I expect

[9] It is worth mentioning that the coefficient on *Unforced* is significantly negative as well. This might be due to the overestimated expected earnings performance arising from underestimated expected discretionary expense for high growth firms that are more likely to be purchased by mutual funds. In unreported results, I control for the growth rate in the estimation models of expected earnings performance and find an insignificant coefficient on *Unforced*, confirming such conjecture.

managers to engage in more EM when firms' stocks are more illiquid in the market and hence more prone to being affected by price pressure. Regression model (9) is used for this purpose, and a negative sign is expected for the coefficient on the interaction term (*Forced*×*Illiquidity*).

[Insert Table 3 here]

The regression results are presented in Panel A Table 3. As shown in column 1, where the full sample is used, both the coefficient of *Forced* and the coefficient of the interaction between *Forced* and *Illiquidity* are significantly negative, suggesting that extreme fund flow negatively affects EM, especially for illiquid stocks, consistent with hypothesis H2a. When I run regressions separately for the fire sale and fire purchase samples in combination with the benchmark sample (columns 2 and 3), I find that the negative effect of *Forced*×*Illiquidity* is significant only for the fire sales sample but not for the fire purchase sample, which is in line with the prior finding that EM is driven only by extreme fund outflows but not by extreme fund inflows, again suggesting that managers are concerned about stock underpricing but not stock overpricing. Economically, my results indicate that when illiquidity increases by one standard deviation (0.507), the impact of *Forced* on EM increases by 359% (=(-1.645×0.507)/(-0.232)) (see column 1).

Second, I investigate the role of financial constraints. Firms' desire to engage in EM could also be related to the extent to which they are financially constrained. Firms facing tight financial constraints are in immediate need of obtaining external financing (Matsumoto 2002; Cotter et al. 2006). Furthermore, firms under financial constraints are hit the most by stock underpricing in terms of their investment and employment (Hau and Lai 2013). As such, they have strong incentives to avoid underpricing and maintain stock price at a high level. In my

context, I thus expect that these firms are also more likely to engage in EM when faced with underpricing. To investigate whether financial constraints affect EM, I add financial constraints (*Constraint*) and its interaction with *Forced* in regression model (8).

The results are reported in Panel B of Table 4. Column 1 provides the regression results based on the full sample. While the coefficient of *Forced* is significantly negative, the interaction term (*Forced*×*Constraint*) has an insignificantly negative coefficient. In column 2, where the subsample of fire sales (together with the benchmark group) is used, the coefficient of the interaction term turns significantly negative. Thus, when a firm's stock is facing fire sales in the market, its managers tend to engage in upward EM to mitigate downward stock price pressure, and this is the case especially for firms that are financially constrained. In contrast, for the subsample of firms facing fire purchases by mutual funds (column 3), the coefficients on *Forced* and *Forced*×*Constraint* are both insignificant, suggesting that managers do not use downward EM to counteract upward stock price pressure from fire purchases. These findings are consistent with Hypothesis H2b concerning the role of financial constraints in mediating the effect of fire sales and purchases on EM. From an economic perspective, my results show that the impact of *Forced* on EM increases by 25% (=(-0.153×1.691)/(-1.047)) when *Constraint* increases by one standard deviation (1.691) (See column 2).

Earnings Management and the Price Correction Process

The preceding results establish that managers engage in upward EM to mitigate downward price pressure caused by mutual funds' flow-driven sales. In this subsection, I examine whether EM indeed speeds up the recovery of depressed stock prices as caused by fire sales. I conduct two tests for this purpose. The first test focuses on short-window price reactions

to earnings announcement. The question is whether EM alone has an effect in causing a price reaction. The regression model in equation (11) is used to examine this question, with the results reported in Table 4.

[Insert Table 4 here]

In column 1, I regress the market reaction (*Car_01*) on EM and earnings surprise excluding the component of EM (*Esurp_exEM*) with the control of price reversal (i.e., 1/price), firm size, book-to-market, and momentum.[10] The control variables generally show the expected sign and significance. More importantly, I find that the coefficients on both *EM* and *Esurp_exEM* are significantly positive, indicating that both EM and the true earnings surprise have an effect on stock prices. Nonetheless, the magnitudes of these two effects are not the same. The coefficient on *Esurp_exEM* is 0.017, which is significantly larger at the 1% level than that on *EM*, i.e., 0.009. Thus, overall, the market does respond positively to EM beyond the true earnings surprise, but it attaches a much smaller weight on the manipulated component relative to that on the true component.

I next augment the model with the interaction between EM and mutual fund trading imbalance (*Forced*) to explore whether market pricing is affected by EM differently when stocks face price pressure from extreme mutual fund flows. For the full sample (column 2) and the subsample of fire sales (column 3), the coefficients on the interaction term are significantly negative, suggesting that upward EM helps to increase share prices more when firms face downward price pressure relative to those facing upward price pressure. Economically, the results in column 3 suggest that when EM increases by one standard deviation (i.e., 0.241), the

[10] I also find that earnings surprise (*Esurp*), the sum of EM and *Esurp_exEM*, is positively related to the market reaction, suggesting that share price increases (decreases) in response to the good (bad) news of earnings announcements.

stock price increases by 0.217% (=0.009×0.241), which is approximately 30% of the price increase arising from the increase in true earnings surprise (*Esurp_exEM*) by one standard deviation (=0.017×0.414); when EM is used to correct the underpricing of one standard deviation relative to the mean (i.e., -0.014), one standard deviation of EM is associated with the increase in stock price by 0.264% (=(0.009-0.139×(-0.014))×0.241), which is 22% percent higher than the effect when there is no stock mispricing. In contrast, for the subsample of fire purchases (column 4), the coefficient on the interaction term is not significant, suggesting that EM does not play a role in influencing stock prices at the time of earnings announcements. These results reinforce my main hypothesis that managers use upward EM to mitigate downward stock price pressure, but not vice versa.

[Insert Table 5 here]

The second test focuses on longer-term price movement following earnings announcements. The model in equation (13) is used to conduct this analysis, with the results shown in Table 5. Following Ali et al. (2011), I initially regress the abnormal stock return over an eight-quarter period starting from the quarter subsequent to the earnings announcement (i.e., quarter t+1 to t+8) on proxies of insider trading and net stock issuance and their interactions with extreme trading imbalance of mutual funds (*Forced*), while controlling for size, book-to-market ratio and momentum. In addition, Dudley and Manakyan (2011) and Fu and Zhang (2015) show that stock repurchases and managerial guidance are used to correct stock underpricing. Hence, I also control for managerial forecast biases (*MFB*), stock repurchase percentage (*RepurP*), and their interactions with *Forced* in the model. In column 1, the coefficient on *Forced* is significantly negative, suggesting that extreme trading flows caused by mutual funds are associated with price reversals. More interestingly, the interaction between *EM* and extreme

trading flow (*Forced*) has a significantly positive coefficient (columns 2 and 3), implying that when the incidence of a mutual fund fire sale is coupled with subsequent EM, the future abnormal returns of the stock are less positive, consistent with the idea that there is a greater increase in stock price due to EM when earnings is announced and accordingly less increase after an earnings announcement. However, this phenomenon is displayed only in the subsample of fire sales (column 3), not in the subsample of fire purchases (column 4).

Taken together, my results suggest that EM plays a significant role in counteracting stock underpricing driven by fire sales of mutual funds, which helps stock prices revert back to "normal" levels. On the other hand, EM does not play an obvious role in correcting overpricing driven by fire purchases of mutual funds. These findings provide further evidence in support of my hypotheses.

V. ADDITIONAL ANALYSES

Mutual Fund Scandal: A Natural Experiment

Although extreme mutual fund trading behaviors are driven by investors' buy and sale orders and unlikely related to firms' fundamentals, ultimately I cannot rule out the possibility that mutual fund managers selectively trade stocks based on their fundamentals under circumstances of fire sales/purchases. To alleviate such concern, I follow Kisin (2011) and Anton and Polk (2014) and exploit a natural experiment based on the mutual fund scandal that occurred in September 2003. During that month, 25 fund families settled allegations of illegal trading that included market timing and late trading. Implicated families had significant outflows as a consequence of the scandal. Kisin (2011) estimates that funds of implicated families lost 14.1% of their capital within one year and 24.3% within two years. By contrast, families not implicated

increased their capital by nearly 12% over the same period. Following Kisin (2011) and Anton and Polk (2014), I assume that capital flow arising from this scandal is an exogenous shock, providing a useful way to alleviate endogeneity concern.

[Insert Table 6 here]

My chosen instrument is the ratio (*RATIO*) of the total value held by all common "scandal" funds over the total value held by all common funds, as of the time when the scandal broke, i.e., September 2003. Panel A of Table 6 presents the summary results with *RATIO* as instrument. For the sake of brevity, only the coefficients on the instrumented *Forced* are reported. As before, the results are separated according to the sample used in the regressions. Again, my results show that downward price pressure induces upward EM while upward price pressure does not lead to downward EM, consistent with my earlier findings.

To further verify the validity of my results, I conduct difference-in-difference analyses. In specific, I classify my sample firms into two groups, one with above-median *RATIO* and the other with below-median *RATIO*, and then define the former group as treatment firms (*Treat*=1) and the latter group as benchmark firms (*Treat*=0); also, I define the firm-quarters after September 2003 as post-scandal period (*Post*=1) and pre-scandal period otherwise (*Post*=0). The ideas is to test whether firms heavily held by the "scandal" funds experience larger downward price pressure due to more fund outflows and thereafter engage in more upward EM, relative to those lightly held by the "scandal" funds. To test this idea, I additionally include *Treat*, *Post*, and the interaction term *Treat*Post* in the equation (8) and meanwhile drop *Forced* and *Unforced* from the model. To conserve the coefficients of *Treat* and *Post*, I do not control for firm and quarter fixed effects and only control for industry fixed effects. The interpretation of my results,

however, is similar when both firm and quarter fixed effects are controlled for. The summary results are reported in Panel B of Table 6. As shown, the coefficients of *Treat* are significantly negative while those of *Post* are generally insignificant, suggesting that firms heavily held by "scandal" funds on average engage in downward EM and the settlement of the "scandal" seems to have no significant effect on EM. The variable of my interest, *Treat*Post*, has significantly positive coefficients, consistent with my earlier findings that outflow-driven downward price pressure leads to upward EM.[11]

To summarize, Panels A and B of Table 6 show that the mutual fund scandal generates exogenous shocks to fund ownership that causes significant price decrease and thereafter leads to upward EM, confirming my argument that downward price pressure induces upward EM.

Substitution between AM and RM

In this subsection, I examine the sensitivity of my main results to different EM measures. First, I look into each component of EM and see whether my results differ across AM and RM. Prior studies have shown there is substitution between AM and RM (e.g., Cohen et al. 2008; Badertscher 2011; Zang 2012; Chan et al. 2015). Hence, I follow these studies and include AM (RM) as a control variable, in addition to other controls used in equation (8), when the dependent variable is RM (AM). AM is proxied by performance-adjusted discretionary accruals, and RM is measured by the sum of abnormal cash flow, abnormal expense and abnormal production costs. The summary results are provided in Panel C and D of Table 6. As shown, the earlier findings hold for both AM and RM. Furthermore, the significantly negative coefficients on RM (AM)

[11] I follow Roberts and Whited (2013) and check whether my results are similar when only the pre-"scandal" sample is used in the pseudo-event tests with randomly assigned "scandal"-broken quarter. Insignificant results confirm the validity of the "difference-in-differences" design in my setting. Such results also suggest that EM of firms with high "scandal" fund ownership does not increase automatically over time and hence my findings are not driven by such effect.

when AM (RM) is the dependent variable confirm the substitution effects documented in prior studies.

To further confirm the substitution effect, I construct the summary proxies of AM costs and RM costs according to Badertscher (2011), Zang (2012) and Chan et al. (2015). Specially, I obtain the first principal component of the variables associated with AM costs (including *AF*, *Cycle* and *NOA*) and RM costs (including *Herf, MS*, and *Zscore*) as the summary proxies of AM costs and RM costs.[12] To facilitate the interpretation, I multiply the first principal component of RM-related variables by -1 so that higher value means higher RM costs. For the first principal component for AM costs, its loadings are positive for *AF* and *NOA* while negative for *Cycle* and hence higher value already indicates higher AM costs. Then, I include the summary proxies of AM costs and RM costs and their interaction with *Forced* in equation (8). Correspondingly, these individual proxies of AM costs and RM costs are removed from the model. To conserve the space, I present only the results when RM is the dependent variable, although the results with AM as the dependent variable have similar implications.

The summary results are reported in Panel E of Table 6. As shown, the coefficients of *Forced* are insignificant; the coefficients of AM costs are significantly positive while those for RM costs are significantly negative, suggesting that managers engage in more RM when facing higher AM costs and lower RM costs; the coefficients on the interaction between AM costs (RM costs) and *Forced* are generally significantly negative, implying that managers engage in more RM when their stocks are underpriced.

Alternative Definition of Price Pressure

[12] I follow Badertscher (2011) and Zang (2012) and use *NOA* as the proxy of AM costs and find that managers engage in more RM when their ability to engage in AM is more constrained, consistent with my results.

In earlier sections, I use the continuous variable, *Forced*, as the proxy of flow-induced price pressure. Now I follow Ali et al. (2011) and use two dummy variables to capture the difference in price pressure, i.e., *FSdum* and *FPdum*, which are coded one if *Forced* is in the bottle and top decile, respectively. I run regressions according to equation (8) with the replacement of *Forced* with *FSdum* and *FPdum*. The summary results are present in Panel F of Table 6. The coefficient on *FSdum* is significantly positive while that on *FPdum* is insignificant, suggesting that managers engage in more upward EM when faced with downward price pressure but do not engage in downward EM when faced with upward price pressure, in line with my earlier findings. Given the varying degree of flow-induced price pressure even among firms exposed to fire sales/purchases of mutual funds, I choose to utilize such variance in my tests to maximize statistical power and use the continuous variable, *Forced*, rather than the above two dummy variables to capture the variation of price pressure in the main analyses.[13]

Reversal Nature of EM

My earlier findings suggest that upward EM is used to mitigate the flow-induced downward pressure and it successfully mitigates the price pressure. Given the reversal nature of EM, I expect that managers engage in downward EM in the future to balance the upward EM following the stock underpricing. To test such conjecture, I additionally include in equation (8) *lagged Forced* and *lagged Unforced*, which are two quarters before the quarter of EM. Panel G of Table 8 presents the summary results with only the coefficients of *Forced* and *lagged Forced*. As shown, the coefficients on *Forced* are significantly negative while those on *lagged Forced* are significantly positive when full sample or fire sales plus benchmark sample is used in the

[13] Because Falkenstein (1996) has shown that mutual funds' flow-driven trading of stocks is associated with firm size and its squared term, stock return volatility and its squared term, stock illiquidity, logarithm of the stock price, momentum, the book-to-market ratio, and return on equity, I regress *Forced* on these variables and use the residual to proxy for mutual funds' forced trades to explain *EM*. I obtain similar results to those based on *Forced*.

regressions. The results suggest that managers engage in upward EM to mitigate the urgent price pressure while conduct downward EM to balance earlier upward EM after the price pressure is mitigated. My results have similar implications when *Forced* and *Unforced* are excluded from the above analyses.

Confounding of alternative tools of mitigating price pressure

Prior literature finds that managers use other tools to mitigate the flow-induced stock underpricing, including insider trading, stock repurchases, and managerial guidance. Which tools managers choose to use to counteract stock mispricing likely depends on the relative costs of each tool. Both insider trading and stock repurchases require significant amount of cash holdings, one from the executives and the other from companies, which might not be easily available. The initiation of managerial guidance is generally considered as a dramatic movement toward transparency and it is not easy to stop. Issuing guidance regularly in the future could be a burden. Hence, some managers might use EM to serve this purpose. Of course, it is possible that managers use all these tools at the same time when their costs are relative low and the price pressure is large enough. Ultimately, what tools managers decide to use is an empirical issue.

In my main analyses, I control for these three tools documented in earlier studies in the model. To further ensure my results are not confounded by these tools, I rerun regression equation (8) based on the sample without insider trading, stock repurchase and managerial guidance. The summary results are reported in Panel H of Table 6. The results become slightly weaker but yield similar implications, further confirming my argument that EM is indeed used to mitigate price pressure.

The Likelihood of Meeting and Beating Analyst Consensus Forecast

So far, my EM measurement relies on the subjective estimation of expected level of earnings performance. To avoid the potential subjective estimation errors, in this subsection I use analyst consensus forecast as the earnings target and examine whether the price pressure affects firms' likelihood of meeting or marginally beating the analyst consensus forecast. Graham et al. (2005) show that CFOs are willing to engage in earnings manipulation to beat the analyst consensus forecast. Thereafter, the tendency of firms to meet and beat the analyst consensus by up to one cent has been used to infer earnings management (Bhojraj et al. 2009; Fang et al. 2016). I follow prior research and run the following probit model to examine the conjecture above:

$$M\&B_t=\alpha+\beta_1 Foreced_{t-1}+\beta_2 AF_t+\beta_3 ROE_t+\beta_4 Size_t+\beta_5 BM_t+\beta_6 Aly\_horizon_t+\beta_7 Aly\_disp_t$$
$$+\beta_8 Unforeced_{t-1}+\varepsilon_t \ . \quad (13)$$

The dependent variable M&B is coded one for firm quarters in which the firm's reported EPS meets or beats the most recent analyst consensus EPS forecast before the earnings announcement by up to one cent. Both reported EPS and analyst forecasts are retrieved from I/B/E/S. To calculate analyst consensus, I take each analyst's latest forecast issued within 180 days of the fiscal quarter-end and before the earnings announcement, and require a firm-quarter to have at least three analysts. For the independent variables of my interest, *Forced* and *Unforced* are included to capture stock mispricing and firms' fundamental prospect, respectively. For the control variables, I largely follow Fang et al (2016) and include the log of analyst coverage (*AF*), return on equity (*ROE*), firm size (*Size*), book-to-market ratio (*BM*), the log of the average forecast horizon (*Aly_horizon*), and analyst forecast dispersion (*Aly_disp*).[14] The analyst-related controls comprising of *AF*, *Aly_horizon*, and *Aly_disp* are included to capture monitoring role played by analysts and the effect of forecast characteristics on forecast consensus. *Size* is

[14] My results are similar when I follow Fang et al (2016) and additionally control for two proxies of real earnings management comprising of the change in R&D expenditures from quarter t−4 to quarter t scaled by beginning total assets and the change in capital expenditures scaled by beginning total assets.

included to control for the effects related to firm scale and *BM* for growth prospect.

The regression results estimating equation (13) are reported in Table 7. The coefficients on *Forced* are significantly negative when full sample or fire sales plus benchmark sample is used, suggesting that underpriced firms more likely meat and beat analyst consensus forecast. Interestingly, the coefficients on *Unforced* are significantly positive, consistent with the intuition that firms with good fundamental prospect more likely surprise the market by releasing above-consensus earnings performance.

The Conditional Effect of Earnings Management on CEO Turnover

In preceding sections, I document that EM actually serves a beneficial role in mitigating price pressure caused by mutual funds' fire sales, thus improving price efficiency. However, Hazarika et al. (2012) have shown that in general, EM is considered an ethical concern and can lead to an increased likelihood of CEO turnover. It is curious whether managers engaging in EM in my context – which supposedly helps to speed up price correction – are similarly penalized, or investors (and the firm's board of directors) actually tend to view such EM differently and do not penalize the managers to the same extent.

To explore this question, I follow Hazarika et al. (2012) and estimate a probit regression, as described below:

$$Turnover_{t+1}=\alpha+\beta_1 positiveEM_t+\beta_2 Abs(negativeEM)_t+\beta_3 FSdum_t+\beta_4 positiveEM_t\times FSdum_t+\beta_5 Abs(negativeEM)_t\times FSdum_t+\beta_6 FirmRet_t+\beta_7 ROA_t+\beta_8 IndRet_t+\beta_9 Growth_t+\beta_{10} Volatility_t+\beta_{11} MB_t+\beta_{12} Size_t+\beta_{13} Lev_t+\varepsilon_t . \quad (14)$$

Turnover is an indicator that takes the value of one if forced CEO turnover takes place during the fiscal year following the year when CEOs engage in EM and zero otherwise. Forced CEO turnovers are identified following the procedures used by Parrino (1997), Bushman et al.

(2010) and Li and Srinivasan (2011).[15] *EM* and *Forced* are aggregated to the firm-year level (i.e., the sum of *EM* and *Forced* in the four quarters of the same calendar year) to match with the turnover data. Given the differential role of upward EM vs. downward EM played in my context, I separate these two and include two variables, i.e., positive EM (*positiveEM*) and the absolute value of negative EM (*abs(negativeEM)*) to measure the degree of EM (Hazarika et al. (2012)). *positiveEM* (*abs(negativeEM)*) is defined as zero when EM is negative (positive). As key variables of my interest, I include in the model *positiveEM, abs(negativeEM), FSdum,* and the interaction terms *positiveEM*×*FSdum* and *abs(negativeEM)*×*FSdum*. The coefficients on *positiveEM* and *abs(negativeEM)* test the effect of EM on the likelihood of forced CEO turnover. The coefficient on *FSdum* tests the effect of stock underpricing on CEO dismissal risk. The coefficient estimates on the interaction terms test whether CEO dismissal risk differs across firms with differential degree of underpricing and EM. Following Hazarika et al. (2012), I control for several factors that influence the likelihood of CEO turnover including market capitalization of equity (*Size*), market-to-book ratio of equity (*MB*), industry-adjusted return (*FirmRet*), return on assets (*ROA*), industry median annual stock return (*IndRet*), annual sales growth rate (*Growth*), volatility of daily stock returns of the firm during a fiscal year (*Volatility*), and leverage (*Lev*), as well as industry and year fixed effects. The definitions of the variables above are described in the Appendix.

[Insert Table 8 here]

[15] Specifically, in each fiscal year, I identify CEO turnover by comparing the names of CEOs in current and following fiscal years using the ExecuComp database, which begins in 1992. I then search the *Factiva* news database to determine whether the turnover is routine or forced. Turnover is classified as forced if the articles report that the CEO is fired, demoted, or resigns under questionable circumstances (e.g., policy differences, pressure, lawsuits, or suspected earnings management). Among routine turnover events, I further classify them as forced turnover if the CEO retires before the age of 60 or if the news article does not report the reason being death, poor health, or the acceptance of another position. I exclude CEO turnover due to death, interim appointments, mergers, or spinoffs from the sample.

The results are presented in Table 8. The sample consists of 32,475 firm-year observations between 1992 and 2010. In column (1), I examine whether the likelihood of forced CEO turnover is associated with EM during the previous year. The coefficients on both *positiveEM* and *abs(negativeEM)* are significantly positive, suggesting that the likelihood of forced CEO turnover increases with the degree of EM, consistent with Hazarika et al. (2012). In column (2), I find that the coefficient on *FSdum* is significantly positive, indicating that CEO dismissal risk increases even with temporary stock underpricing (Engel et al. 2003). In column (3), I explore whether such an incremental effect of upward EM on CEO turnover is mitigated by the underlying incentive, in this context, the correction of stock underpricing. The coefficient on the interaction term *positiveEM×FSdum* is significantly negative, suggesting that upward EM is penalized less by the board when it is used to counter against stock underpricing arising from fire sales of mutual funds. In fact, it is not penalized on the whole in terms of the dismissal risk, as evidenced by the insignificant sum of positive EM and the interaction term *positiveEM×FSdum* (p-value=0.268). The results could also be interpreted that the enhanced dismissal risk due to the stock underpricing is mitigated by upward EM. It is worth mentioning that the coefficient on *abs(negativeEM)×FSdum* is significantly positive, suggesting downward EM in underpriced firms increases CEO dismissal risk.[16]

VI. CONCLUSION

In this paper, I examine whether managers engage in EM in response to the fire sales (purchases) of mutual funds. I find that managers engage in upward EM when there are fire sales

[16] I also examine whether upward EM is driven by less monitoring and poorer governance due to the decrease in mutual fund ownership arising from fire sales and further lower institutional ownership. This conjecture is not supported by my finding on the significantly negative correlation between institutional ownership and *Forced*, which indicates an increase in institutional ownership for underpriced firms.

of mutual funds and do not engage in downward EM in response to the fire purchases of mutual funds. The results suggest that managers are concerned about downward price pressure but do not worry about upward mispricing. I also find that the results become stronger for firms with more illiquid stocks and firms with tighter financial constraints, confirming the conjecture that mitigating price pressure is the goal of EM. Finally, I find that EM indeed increases stock price in the short term and speeds up price recovery in the long run.

Previous studies on EM incentives emphasize the underlying importance of the capital market (Kasznik 1999; Das and Zhang 2003; Graham, Harvey, and Rajgopal 2005; Roychowdhury 2006; An, Lee, and Zhang 2014); surprisingly, no study directly examines the effect of stock price pressure on EM. This paper shows that exogenous shocks on stock price from extreme mutual fund flows indeed induce EM and hence enriches the literature on EM incentives. In addition, my evidence shows that EM mitigates the price pressure and speeds up price reversal. This is possibly the first study to show the benefits of EM and hence contribute to the overall EM literature on the consequence of EM. Finally, this study contributes to the literature on the consequences of price shocks (Coval and Stafford 2007; Ali et al. 2011; Edmans et al. 2012; Dudley and Manakyan 2011; Khan et al. 2012; Hau and Lai 2013; Giannetti and Kahraman 2014; Fu and Zhang 2015). The literature documents the effects of price shocks on insider trading, merger and acquisitions, stock repurchases, investment, other funds' trading behavior, and managerial guidance. This paper adds to this line of literature by showing that price shocks have real effects on accounting choices.

Appendix

Variable Definition

Variable	Definition
Variables in the main model	
EM	Earnings management, equal to the sum of accrual-based earnings management (AM) and real transaction management (RM);
AM	Discretionary accruals computed using the performance matched approach following Kothari et al. (2005);
RM	Sum of 1) the level of abnormal cash flows from operations, 2) the level of abnormal production costs, where production costs are defined as the sum of cost of goods sold and the change in inventories, and 3) the level of abnormal discretionary expenses, where discretionary expenses are the sum of advertising expenses, R&D expenses and SG&A expenses;
Forced	The degree to which a stock's trading is accounted for by mutual funds experiencing significant inflows or outflows;
AF	Nature logarithm of one plus the number of analysts following the firm from I/B/E/S;
Cycle	Nature logarithm of the total of the days receivable plus the days inventory less the days payable at the beginning of the quarter;
NOA	An indicator variable that equals 1 if the net operating assets (i.e., shareholders' equity less cash and marketable securities and plus total debt) at the beginning of the quarter divided by lagged sales is above the median of the corresponding industry-quarter, and 0 otherwise;
Herf	Industry concentration measured as the Herfindahl index calculated using revenues of all firms in the same Fama-French 48 industry;
MS	Percentage of the company's sales to the total sales of its industry at the beginning of the quarter, where industry is defined based on Fama-French 48 industry classification;
Zscore	Z-score at the beginning of the quarter, which is equal to $0.3(NI_t/Asset_t)+1.0(Sales_t/Asset_t)+1.4$ (Retained $Earnings_t/Asset_t)+1.2$(Working $Capital_t/Asset_t)+0.6$*([Stock Price*Shares $Outstanding_t$]/Total $Liabilities_t$);
NetIssue	Nature logarithm of the ratio of the split-adjusted shares outstanding divided by the split-adjusted shares outstanding at the end of prior quarter;
ROE	Return on equity, computed as net income for the rolling four quarters divided by the book equity at the end of the prior quarter;
Lev	Leverage ratio, calculated as short-term debt plus long-term debt, scaled by total assets;
Size	Nature logarithm of total assets;
BM	Book-to-market ratio;
Earn	The earnings before extraordinary items minus the total earnings management, i.e., EM;
InsTrd1Q	Absolute value of the difference between total shares purchased by insiders and total shares sold by insiders as a fraction of shares outstanding;
MFB	Management forecast bias defined as the management forecast less actual earnings deflated by the absolute value of actual earnings;
Repurp	Percentage of shares repurchased over the number of shares outstanding;
Unforced	Net trade imbalance of a firm's shares by unconstrained mutual funds;
Illiquidity	Raw Amihud (2002) illiquidity ratio standardized by the average value of the ratio for all stocks traded in the same exchange;
Constrain	Minus one multiplied by the financial health score of Piotroski (2000), ranging from 0 to 9, with a higher score indicating better financial health; one point is given for each of the following items if its value is greater than 0: ROA (equal to income before extraordinary items scaled by lagged total assets), CFO (equal to net operation cash flow scaled by lagged total assets), ΔROA (the change in ROA from the prior year), CFO – ROA, -Leverage (leverage=long-term debt scaled by lagged total assets), the change in current ratio from the prior year (with the current ratio equal to current assets divided by current liabilities), no common equity issuance (i.e., common shares issued equal to 0), ΔMargin (margin=(sales revenue - cost of goods sold) / sales revenue), and ΔTurn (turn=sales revenue / lagged total assets).

Variables in the models of price correction

CAR_01	Event period return measured as the market-adjusted cumulative abnormal return from the day of to one day after the earnings announcement date;
Esurp_exEM	Earnings surprise excluding earnings management component measured as actual earnings minus the earnings management (EM) and minus the consensus analyst forecast right before the earnings announcement date;
Price_reversal	One divided by share price;
PastReturn	Market-adjusted cumulative abnormal return in the 4 quarters before the end of the prior quarter;
ARET	Market-adjusted cumulative abnormal return during the eight quarters from quarter t+1 to quarter t+8;

Variables in the additional analyses

RATIO	The ratio of the total value held by all common "scandal" funds over the total value held by all common funds, as of the time when the scandal broke;
Treat	Treatment firm dummy, defined as one for firms with above-median RATIO zero otherwise;
Post	Post scandal dummy, defined as one for firm-quarters after September 2003 and zero otherwise;
AM costs	The first principal component of the variables associated with AM including *AF*, *Cycle* and *NOA*;
RM costs	Minus one multiplied by the first principal component of the variables associated with RM including *Herf*, *MS*, and *Zscore*;
FSdum	Fire sales dummy, defined as one if *Forced* is in the bottle decile and zero otherwise;
FPdum	Fire purchases dummy, defined as one if *Forced* is in the top decile and zero otherwise;
Aly_horizon	Nature logarithm of one plus the average forecast horizon, where forecast horizon is the number of days between earnings announcement date and analyst forecast date;
Aly_disp	Analyst forecast dispersion, calculated as the standard deviation of analyst forecasts divided by the absolute value of the analyst consensus forecast;
positiveEM	Equal to EM when it is positive and zero otherwise;
negativeEM	Equal to EM when it is negative and zero otherwise;
FirmRet	Difference between annual stock return of the firm and the median annual return of firms in the same Fama-French (1997) 48 industry;
ROA	Ratio of earnings excluding extraordinary items to total assets;
IndRet	Median annual returns of firms in the same industry;
Growth	Annual growth in firm's sales;
Volatility	Volatility of daily stock returns of the firm during the fiscal year;
MB	Ratio of the market value of equity to the book value of equity.

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TABLE 1
Descriptive Statistics

Variable	Fire Sales Sample		Benchmark Sample		Fire Purchases Sample		p-values for tests of equality: Fire Sales vs. Benchmark		p-values for tests of equality: Fire Purchases vs. Benchmark	
	Mean	Median	Mean	Median	Mean	Median	t-test	z-test	t-test	z-test
Variables in the main model										
EM	-0.050	-0.049	-0.060	-0.058	-0.080	-0.070	0.005	0.000	0.000	0.000
Forced	-0.020	-0.015	-0.001	0.000	0.014	0.010	0.000	0.000	0.000	0.000
AF	2.106	2.197	1.817	1.792	2.050	2.079	0.000	0.000	0.000	0.000
Cycle	1.490	1.304	1.649	1.412	1.562	1.328	0.000	0.000	0.000	0.000
NOA	0.515	1.000	0.493	0.000	0.475	0.000	0.003	0.003	0.021	0.021
Herf	0.159	0.101	0.168	0.103	0.158	0.098	0.000	0.033	0.000	0.000
MS	0.042	0.006	0.052	0.006	0.041	0.005	0.000	0.011	0.000	0.000
Zscore	6.736	3.811	5.540	3.224	6.261	3.586	0.000	0.000	0.000	0.000
NetIssue	0.012	0.002	0.012	0.002	0.062	0.004	0.510	0.000	0.000	0.000
ROE	-0.142	0.022	0.033	0.023	0.012	0.028	0.178	0.357	0.666	0.000
Lev	0.396	0.373	0.401	0.382	0.389	0.361	0.109	0.121	0.000	0.000
Size	5.967	5.891	5.931	5.692	5.881	5.790	0.096	0.000	0.033	0.478
BM	0.450	0.377	0.552	0.439	0.484	0.383	0.000	0.000	0.000	0.000
Earn	0.013	0.004	0.041	0.003	0.017	0.005	0.000	0.064	0.000	0.000
InsTrd1Q	0.160	0.005	0.149	0.001	0.225	0.012	0.083	0.000	0.000	0.000
MFB	0.015	0.000	0.009	0.000	0.017	0.000	0.029	0.063	0.003	0.000
Repurp	0.031	0.000	0.019	0.000	0.023	0.000	0.012	0.000	0.463	0.569
Unforced	-0.004	-0.001	0.002	0.001	0.017	0.006	0.000	0.000	0.000	0.000
Illiquidity	0.016	0.002	0.053	0.004	0.019	0.002	0.000	0.000	0.000	0.000
Constrain	4.651	5.000	4.806	5.000	4.991	5.000	0.000	0.000	0.000	0.000
Variables in the models of price correction										
CAR_01	-0.001	-0.001	0.001	0.000	0.006	0.003	0.000	0.017	0.000	0.000
Esurp	-0.028	0.005	-0.023	0.004	-0.005	0.008	0.147	0.926	0.000	0.000
Esurp_exEM	-0.003	0.014	-0.003	0.011	0.024	0.019	0.906	0.022	0.000	0.000
Price_reversal	0.089	0.050	0.096	0.049	0.072	0.045	0.000	0.143	0.000	0.000
PastReturn	0.968	0.856	1.013	0.922	1.204	1.016	0.000	0.000	0.000	0.000
ARET	-0.097	-0.284	-0.073	-0.211	-0.084	-0.246	0.112	0.000	0.307	0.000

The table provides descriptive statistics for the sample at firm-quarter level during 1988 to 2012. The sample size varies and depends on data availability. The sample size for variables in the main model is 39,867, expect for *Illiquidity* and *Constrain*, which are 39,864 and 33,444, respectively. The sample size for variables in the model of price correction is 139,394, expect for *ARET*, which is 127,132. All variables are defined in the Appendix.

TABLE 2

Earnings Management in Response to Fire Sales (Purchases) of Mutual Funds

$$EM_t=\alpha+\beta_1 Forced_{t-1}+\beta_2 AF_t+\beta_3 Cycle_t+\beta_4 NOA_t+\beta_5 Herf_t+\beta_6 MS_t+\beta_7 Zscore_t+\beta_8 NetIssue_t+\beta_9 ROE_t+\beta_{10} Lev_t+\beta_{11} Size_t+\beta_{12} BM_t+\beta_{13} Earn_t+\beta_{14} InsTrad1Q_t+\beta_{15} MFB_t+\beta_{16} Repurp_t+\beta_{17} Unforced_{t-1}+\varepsilon_t$$

Variable	Full sample	Fire sales+ benchmark sample	Fire purchases+ benchmark sample
	(1)	(2)	(3)
Forced	**-0.207*** **	**-0.290*** **	**0.069**
	(0.004)	**(0.001)**	**(0.651)**
AF	-0.003	-0.005*	-0.003
	(0.224)	(0.052)	(0.342)
Cycle	-0.008***	-0.007***	-0.008***
	(0.000)	(0.000)	(0.000)
NOA	0.041***	0.043***	0.037***
	(0.000)	(0.000)	(0.000)
Herf	0.012	0.030	0.006
	(0.618)	(0.230)	(0.826)
MS	-0.043	-0.038	-0.050
	(0.155)	(0.236)	(0.119)
Zscore	0.001***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)
NetIssue	0.012	0.010	0.003
	(0.278)	(0.500)	(0.820)
ROE	0.019	0.016	0.026*
	(0.125)	(0.197)	(0.054)
Lev	0.062***	0.069***	0.058***
	(0.000)	(0.000)	(0.000)
Size	0.011***	0.007**	0.011***
	(0.000)	(0.016)	(0.000)
BM	-0.024***	-0.022***	-0.022***
	(0.000)	(0.000)	(0.000)
Earn	-0.009**	-0.009**	-0.009**
	(0.016)	(0.035)	(0.031)
InsTrd1Q	-0.010***	-0.011***	-0.009***
	(0.000)	(0.000)	(0.000)
MFB	-0.023***	-0.026***	-0.022**
	(0.006)	(0.006)	(0.010)
Repurp	-0.417**	-0.386**	-0.506**
	(0.014)	(0.030)	(0.025)
Unforced	-0.202***	-0.240***	-0.195***
	(0.000)	(0.000)	(0.000)
Intercept, firm and quarter fixed effects	Yes	Yes	Yes
Adjusted R^2	47.92%	48.44%	48.69%
Sample Size	39,867	35,214	35,077

The table provides regression results on earnings management in response to fire sales (purchases) of mutual funds based on the sample of 39,867 firm-quarter observations from 1988 to 2012. Forced sales (purchases) sample includes the firms who experience fire sales (purchases) by mutual funds, i.e., those stocks that are ranked in the bottom (top) decile according to the *Forced* measure. Benchmark sample includes the firms who experience neither fire sales nor fire purchases. All variables are defined in the Appendix. The table reports OLS coefficient estimates and (in parentheses) p-values based on robust standard errors that are clustered by firm. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels (two-tailed), respectively.

TABLE 3

Analyses of Incremental Effects

Variable	Full sample	Fire sales + benchmark sample	Fire purchases + benchmark sample
	(1)	(2)	(3)
Panel A: Incremental effect of stock illiquidity			
Forced*Illiquidity	-0.845**	-0.976**	-0.682
	(0.013)	(0.041)	(0.214)
Forced	-0.232***	-0.299***	0.005
	(0.002)	(0.000)	(0.972)
Illiquidity	0.005	0.006*	0.005
	(0.137)	(0.082)	(0.120)
Controls and fixed effects	Included	Included	Included
Adjusted R^2	47.93%	48.44%	48.70%
Sample Size	39,844	35,192	35,054
Panel B: Incremental effect of financial constraints			
Forced*Constraint	-0.093	-0.153**	0.049
	(0.107)	(0.045)	(0.610)
Forced	-0.675**	-1.047***	0.265
	(0.019)	(0.004)	(0.597)
Constraint	0.020***	0.020***	0.020***
	(0.000)	(0.000)	(0.000)
Controls and fixed effects	Included	Included	Included
Adjusted R^2	48.76%	49.27%	49.41%
Sample Size	33,444	29,505	29,544

The table provides regression results on the incremental effects of stock price pressure on earnings management based on the sample of 39,867 firm-quarter observations from 1988 to 2012. Forced sales (purchases) sample includes the firms who experience fire sales (purchases) by mutual funds, i.e., those stocks that are ranked in the bottom (top) decile according to the *Forced* measure. Benchmark sample includes the firms who experience neither fire sales nor fire purchases. All variables are defined in the Appendix. The table reports OLS coefficient estimates and (in parentheses) p-values based on robust standard errors that are clustered by firm. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels (two-tailed), respectively.

TABLE 4

Effect of Earnings Management on the Market Reaction to Earnings Announcement

$Car\_01=\alpha+\beta_1 Forced\times EM+\beta_2 Forced+\beta_3 EM+\beta_4 Esurp\_exEM+\beta_5 Price\_reversal+\beta_5 Size+\beta_6 BM+\beta_7 PastReturn+\varepsilon$

Variable	Full sample		Fire sales + benchmark sample	Fire purchases + benchmark sample
	(1)	(2)	(3)	(4)
Forced*EM		**-0.142****	**-0.139****	**-0.171**
		(0.023)	**(0.045)**	**(0.244)**
Forced		**0.070*****	**0.096*****	**0.064**
		(0.005)	**(0.003)**	**(0.108)**
EM	**0.009*****	**0.009*****	**0.009*****	**0.008*****
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**
Esurp_exEM	0.017***	0.017***	0.017***	0.016***
	(0.000)	(0.000)	(0.000)	(0.000)
Price_reversal	-0.025***	-0.025***	-0.024***	-0.026***
	(0.000)	(0.000)	(0.000)	(0.000)
Size	-0.001***	-0.001***	-0.002***	-0.001*
	(0.003)	(0.004)	(0.002)	(0.072)
BM	0.007***	0.007***	0.007***	0.006***
	(0.000)	(0.000)	(0.000)	(0.000)
PastReturn	0.011***	0.012***	0.012***	0.012***
	(0.000)	(0.000)	(0.000)	(0.000)
Intercept, firm and quarter fixed effects	Yes	Yes	Yes	Yes
Adjusted R^2	10.76%	10.81%	11.89%	11.71%
Sample Size	139,394	139,394	124,776	123,870

The table provides regression results on effect of earnings management on the market reaction to earnings announcement based on the sample of 139,394 firm-quarter observations from 1988 to 2012. Forced sales (purchases) sample includes the firms who experience fire sales (purchases) by mutual funds, i.e., those stocks that are ranked in the bottom (top) decile according to the *Forced* measure. Benchmark sample includes the firms who experience neither fire sales nor fire purchases. All variables are defined in the Appendix. The table reports OLS coefficient estimates and (in parentheses) p-values based on robust standard errors that are clustered by firm. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels (two-tailed), respectively.

TABLE 5

Earnings Management Against Flow-Driven Price Pressure and Future Abnormal Returns

$$ARET_{t+1,t+8}=\alpha+\beta_1 Forced_{t-1}\times EM_t+\beta_2 Forced_{t-1}+\beta_3 EM_t+\beta_4 Forced_{t-1}\times InsTrd1Q_t+\beta_5 InsTrd1Q_t+\beta_6 Forced_{t-1}\times MFB_t+\beta_7 MFB_t+\beta_8 Forced_{t-1}\times Repurp_t+\beta_9 Repurp_t+\beta_{10} Forced_{t-1}\times NetIssue_t+\beta_{11} NetIssue_t+\beta_{12} Size_t+\beta_{13} BM_t+\beta_{14} PastReturn_t+\beta_{15} Unforced_{t-1}+\varepsilon_t$$

Variable	Full Sample		Fire sales + benchmark sample	Fire purchases + benchmark sample
	(1)	(2)	(3)	(4)
Forced*EM		**5.396*** **	**5.868** **	**1.322**
		(0.009)	**(0.037)**	**(0.669)**
Forced	**-3.353*** **	**-3.244*** **	**-3.105*** **	**-2.755*** **
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**
EM		**-0.007**	**-0.008**	**0.000**
		(0.748)	**(0.736)**	**(0.988)**
Forced*InsTrd1Q	2.298***	2.318***	0.843	2.856***
	(0.001)	(0.001)	(0.416)	(0.002)
InsTrd1Q	0.033***	0.033***	0.039***	0.038***
	(0.000)	(0.000)	(0.000)	(0.000)
Forced*MFB	0.053**	0.051**	0.115**	0.017
	(0.020)	(0.021)	(0.018)	(0.208)
MFB	0.002***	0.002***	0.003***	0.002***
	(0.000)	(0.000)	(0.000)	(0.000)
Forced*Repurp	160.750	164.226	190.817	106.406
	(0.219)	(0.209)	(0.218)	(0.661)
Repurp	-0.903	-0.902	-0.617	-0.698
	(0.475)	(0.476)	(0.652)	(0.591)
Forced*NetIssue	2.018	2.252	16.798***	0.630
	(0.392)	(0.339)	(0.006)	(0.816)
NetIssue	-0.246***	-0.246***	-0.233***	-0.179***
	(0.000)	(0.000)	(0.000)	(0.000)
Size	-0.360***	-0.360***	-0.363***	-0.348***
	(0.000)	(0.000)	(0.000)	(0.000)
BM	0.372***	0.372***	0.378***	0.361***
	(0.000)	(0.000)	(0.000)	(0.000)
PastReturn	-0.236***	-0.236***	-0.250***	-0.225***
	(0.000)	(0.000)	(0.000)	(0.000)
Unforced	-0.307	-0.304	-0.256	-0.765
	(0.235)	(0.286)	(0.367)	(0.186)
Intercept, firm and quarter fixed effects	Yes	Yes	Yes	Yes
Adjusted R^2	27.53%	27.53%	28.26%	28.70%
Sample Size	127,132	127,132	114,023	115,174

The table provides regression results on whether earnings management in response to fire sale (purchase) of mutual funds speeds up the price reversal based on the sample of 127,132 firm-quarter observations from 1988 to 2012. Forced sales (purchases) sample includes the firms who experience fire sales (purchases) by mutual funds, i.e., those stocks that are ranked in the bottom (top) decile according to the *Forced* measure. Benchmark sample includes the firms who experience neither fire sales nor fire purchases. All variables are defined in the Appendix. The table reports OLS coefficient estimates and (in parentheses) p-values based on robust standard errors that are clustered by firm. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels (two-tailed), respectively.

TABLE 6

Sensitivity Analyses

Variable	Full sample	Fire sales + benchmark sample	Fire purchases + benchmark sample
Panel A: Use RATIO as instrument			
Forced	-0.499***	-0.548***	-0.254
	(0.000)	(0.000)	(0.234)
Panel B: Difference-in-difference tests around September 2003			
Treat*Post	0.012**	0.013***	0.006
	(0.010)	(0.009)	(0.272)
Treat	-0.029***	-0.028***	-0.028***
	(0.000)	(0.000)	(0.000)
Post	0.005	0.007**	0.004
	(0.114)	(0.041)	(0.197)
Panel C: AM as the dependent variable			
Forced	-0.085*	-0.142**	0.078
	(0.079)	(0.011)	(0.438)
RM	-0.223***	-0.220***	-0.221***
	(0.000)	(0.000)	(0.000)
Panel D: RM as the dependent variable			
Forced	-0.081*	-0.091**	-0.022
	(0.064)	(0.032)	(0.812)
AM	-0.182***	-0.177***	-0.179***
	(0.000)	(0.000)	(0.000)
Panel E: RM as the dependent variable with alternative measures of AM costs and RM costs			
Forced	-0.031	-0.078	0.008
	(0.578)	(0.277)	(0.938)
AM costs	0.012***	0.014***	0.010***
	(0.000)	(0.000)	(0.000)
RM costs	-0.005***	-0.006***	-0.003*
	(0.004)	(0.002)	(0.086)
Forced*AM costs	-0.105*	-0.089*	0.009
	(0.078)	(0.091)	(0.933)
Forced*RM costs	-0.116*	-0.037	-0.209**
	(0.051)	(0.659)	(0.020)
Panel F: Replace *Forced* with fire sales dummy and fire purchases dummy			
FSdum	0.005**		
	(0.026)		
FPdum	-0.004		
	(0.198)		
Panel G: Including the lagged Forced			
Forced	-0.173**	-0.176**	0.004
	(0.017)	(0.035)	(0.980)
Lagged Forced	0.109*	0.142**	0.082
	(0.060)	(0.023)	(0.197)
Panel H: Based on the sample without insider trading, stock repurchases and managerial guidance			
Forced	-0.136	-0.203**	-0.070
	(0.156)	(0.049)	(0.813)

The table provides summary regression results on the sensitivity analyses. The sample consists of 39,867 firm-quarter observations, expect for panel H, which has only 15,529 firm-quarter observations. Forced sales (purchases) sample includes the firms who experience fire sales (purchases) by mutual funds, i.e., those stocks that are ranked in the bottom (top) decile according to the *Forced* measure. Benchmark sample includes the firms who experience neither fire sales nor fire purchases. All variables are defined in the Appendix. The table reports OLS coefficient estimates and (in parentheses) p-values based on robust standard errors that are clustered by firm. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels (two-tailed), respectively.

TABLE 7

Likelihood of Beating Analyst Consensus Forecast Following Fire Sales (Purchases) of Mutual Funds

$M\&B_t=\alpha+\beta_1 Foreced_{t-1}+\beta_2 AF_t+\beta_3 ROE_t+\beta_4 Size_t+\beta_5 BM_t+\beta_6 Aly\_horizon_t+\beta_7 Aly\_disp_t+\beta_8 Unforeced_{t-1}+\varepsilon_t$

Variable	Full sample	Fire sales + benchmark sample	Fire purchases + benchmark sample
	Model 1	Model 2	Model 3
Forced	**-1.480*** (0.000)**	**-1.573*** (0.000)**	**0.461 (0.526)**
AF	-0.155*** (0.000)	-0.144*** (0.000)	-0.161*** (0.000)
ROE	0.082 (0.234)	0.070 (0.308)	0.067 (0.327)
Size	-0.062*** (0.000)	-0.057*** (0.000)	-0.063*** (0.000)
BM	-0.359*** (0.000)	-0.378*** (0.000)	-0.355*** (0.000)
Aly_horizon	0.222*** (0.000)	0.221*** (0.000)	0.229*** (0.000)
Aly_disp	-0.000 (0.888)	-0.000 (0.939)	-0.000 (0.884)
Unforced	1.045*** (0.000)	1.008*** (0.000)	1.432*** (0.000)
Intercept, firm and quarter fixed effects	Yes	Yes	Yes
Adjusted R^2	4.80%	4.63%	5.00%
Sample Size	96,470	85,283	85,135

The table provides probit regression results on whether the likelihood of beating analyst consensus forecast increases (decreases) following fire sales (purchases) of mutual funds based on the sample of 96,470 firm-quarter observations from 1988 to 2012. Forced sales (purchases) sample includes the firms who experience fire sales (purchases) by mutual funds, i.e., those stocks that are ranked in the bottom (top) decile according to the *Forced* measure. Benchmark sample includes the firms who experience neither fire sales nor fire purchases. All variables are defined in the Appendix. The table reports OLS coefficient estimates and (in parentheses) p-values based on robust standard errors that are clustered by firm. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels (two-tailed), respectively.

TABLE 8

Likelihood of Forced CEO Turnover Due to Earnings Management and Fire Sales of Mutual Funds

$Turnover_{t+1}=\alpha+\beta_1 positiveEM_t+\beta_2 Abs(negativeEM)_t+\beta_3 FSdum_t+\beta_4 positiveEM_t\times FSdum_t+\beta_5 Abs(negativeEM)_t\times FSdum_t+\beta_6 FirmRet_t+\beta_7 ROA_t+\beta_8 IndRet_t+\beta_9 Growth_t+\beta_{10} Volatility_t+\beta_{11} MB_t+\beta_{12} Size_t+\beta_{13} Lev_t+\varepsilon_t$

Variable	Model 1	Model 2	Model 3
positiveEM (1)	**2.541*** (0.000)**		**2.747*** (0.000)**
Abs (negativeEM) (2)	**1.737*** (0.000)**		**1.635*** (0.000)**
FSdum		**0.139*** (0.007)**	**0.146*** (0.004)**
positiveEM*FSdum (3)			**-1.074*** (0.009)**
Abs (negativeEM)*FSdum (4)			**1.130*** (0.000)**
FirmRet	-0.288*** (0.000)	-0.282*** (0.000)	-0.290*** (0.000)
ROA	-0.507*** (0.007)	-0.425** (0.011)	-0.521*** (0.006)
IndRet	-0.185** (0.044)	-0.092 (0.258)	-0.178* (0.056)
Growth	-0.003 (0.770)	-0.003 (0.741)	-0.002 (0.803)
Volatility	6.789*** (0.000)	6.936*** (0.000)	6.713*** (0.000)
MB	-0.019*** (0.003)	-0.004 (0.430)	-0.020*** (0.002)
Size	0.064*** (0.000)	0.054*** (0.000)	0.065*** (0.000)
Lev	0.207** (0.045)	0.126 (0.169)	0.209** (0.045)
Intercept, industry and year fixed effects	Yes	Yes	Yes
Pseudo R^2	5.30%	1.67%	5.43%
Sample Size	32,475	32,475	32,475
Test: (1)+(3)			0.268
Test: (2)+(4)			0.000

The table provides the results of probit regressions of forced CEO turnover on earnings management and stock underpricing arising from fire sales of mutual funds based on a sample of 32,475 firm-year observations between 1992 and 2010. All variables are defined in the Appendix. All control variables are lagged for one year to capture the characteristics of the firms before the year of forced CEO turnover. Industry and year fixed effects are controlled. *P*-values in parentheses are based on standard errors clustered at the firm level. ***, **, and * stand for statistical significance based on two-sided tests at the 1%, 5%, and 10% levels, respectively.