The Impact of Shareholders on Corporate Investment: Evidence from Mutual Fund Holdings

Roni Kisin*

Booth School of Business

University of Chicago

May 26, 2010

ABSTRACT

I study the impact of mutual funds on the real investment activities of firms they hold. To address the endogeneity of mutual fund ownership, I use the shock to ownership caused by the 2003/4 mutual fund trading scandal that adversely affected flows of implicated families. I find statistically and economically significant changes in real investments of firms held by implicated families following the scandal. Capital expenditures, R&D, and number of acquisitions decreased more in firms held by families whose ownership was historically associated with higher levels of these investment policies ("high investment types"). Moreover, firms held by high types decreased investments following the shock, while firms held by low types experienced increased investments. The effects of the scandal are especially strong for important shareholders, firms with high sensitivity of compensation to stock prices, and firms with liquid stocks. These findings provide evidence on the causal effect of institutional shareholders on the real activity of firms and highlight an additional link between financial and real sides of firms.

*Email: rkisin@chicagobooth.edu. I am grateful to my dissertation committee, Raghuram Rajan (committee chair), Steven Kaplan, Gregor Matvos, Tobias Moskowitz, and Amit Seru, for their guidance and support. I also thank Itzhak Ben-David, Marianne Bertrand, Douglas Diamond, Michael Gofman, Richard Holden, Ali Hortacsu, Christopher Hrdlicka, Eugene Kandel, Jayesh Khanapure, Rinat Kisin, Yian Liu, Asaf Manela, Atif Mian, Alan Moreira, Adair Morse, Alexi Savov, David Solomon, Amir Sufi, Luigi Zingales and seminar participants at Boston College, Federal Reserve Bank of Boston, Federal Reserve Board, Indiana University, London Business School, University of Chicago, Washington University in St. Louis for helpful comments and discussions.

I. Introduction

Institutional ownership, and mutual fund ownership, in particular, has become a significant phenomenon over the last decades.[1] However, despite its potential importance, we know little about the real impact of these shareholders. In particular, there is a very scarce evidence on the influence of mutual funds on real investment activities of their portfolio companies. The lack of evidence have prompted many to conclude that mutual funds do not influence the real activity of the firms they hold – an important conclusion given the size of mutual fund holdings, a potential scope for disagreement between the management and shareholders, and the importance of understanding the determinants of real investment.

The evidence provided in this paper suggests that the conclusion about the lack of the real impact of mutual funds is premature in the following sense. Consistent with the previous literature on the influence of mutual funds, my results indicate that *on average* mutual funds have little influence on real investments. However, a closer examination of an individual heterogeneity among mutual fund families reveals a significant amount of influence that they exert on real investments of their portfolio companies. I document that an adverse exogenous shock to the ownership of mutual fund families resulted in a significant change in corporate investments, in particular, firms that were held by families that historically had a more positive influence on corporate investments have experienced bigger decreases in their investments.

The empirical approach taken in this paper addresses two challenges that arise in testing for the impact of mutual funds on the real investment activities. The first challenge is the endogeneity of ownership. Correlations between ownership structure (e.g., presence of certain shareholders, their holding sizes or concentration of holdings) and corporate investment would not provide a conclusive evidence on the causal relationship between ownership and investments since common factors are likely to determine both ownership and investment

[1] In my sample, as of 2007, institutional investors held 50% of the shares of an average company. Mutual fund families, which is the subgroup of institutional investors that I focus on here, held 17% in an average firm in my sample.

policies. Moreover, some mutual funds might systematically choose firms that are expected to follow particular investment patterns, introducing a severe selection problem.

The second challenge is that even conditional on observing an exogenous variation in ownership, studying an average effect of this variation could be insufficient. Due to the heterogeneity among firms and shareholders, an average effect of ownership could conceal important effects that cancel each other out. Firm-level heterogeneity could be important since we do not observe (deviations from) the level of investments that the shareholders desire, and firms could underinvest or overinvest, relative to what their shareholder want, depending on the circumstances. Moreover, shareholder-level heterogeneity could result in different shareholders having opposing impacts on investment policies, due to disagreement about optimal policies.[2]

A recent notable example of a disagreement between shareholders involving mutual fund families that suggests importance of shareholder heterogeneity, is the proxy fight that preceded the merger between Hewlett-Packard and Compaq. In that case, Putnam Investments (a mutual fund family in my sample) supported the merger, whereas some others, including Wells Fargo and Banc of America Capital Management were opposed to the deal. Putnam, the largest institutional shareholder in HP at that time (2.5% stake), had a non-trivial impact on the deal, but so did other mutual fund families, judging by the extensive discussions in the media, despite the fact that their side lost in the proxy fight. Although such examples do not provide evidence for systematic differences among shareholders, they suggest that studying the impact of mutual funds on corporate investments by estimating their average effect could be potentially misleading, and that we cannot infer the lack of influence from observing that the average effect of the shock on investment is indistinguishable from zero.

I address the first problem – the endogeneity of ownership – by using the involvement of a number of mutual fund families in the 2003/4 mutual fund trading scandal. In this scandal, 25 large mutual fund families in my sample were implicated in illegal trading practices, such as market timing and late trading, which generated significant outflows of capital from

[2]Theoretically, an extensive literature has studied the origins and the consequences of persistent differences in beliefs, e.g., Kurz (1994a,b), Boot, Gopalan, and Thakor (2006, 2008), Acemoglu, Chernozhukov, and Yildiz (2006), Cripps, Ely, Mailath, and Samuelson (2008).

the implicated families. This event provided an exogenous shock to the liabilities of the implicated families, and therefore also to their asset side, that is, to their ownership in publicly traded companies in my sample.

Theoretical literature on shareholder influence suggests that involvement in the trading scandal should adversely affect the ability of mutual funds to influence firms. This literature could be roughly divided into two strands, depending on whether the influence is executed through "voice" or through "exit." Theories of voice, where shareholders intervene directly, usually tie shareholder influence to holding sizes.[3] In the theories of exit shareholders can sell their shares causing the stock price to reflect their information. Management, whose compensation is tied to prices, would then have an incentive to cater to the interests of shareholders.[4] Importantly, despite the differences between mechanisms for shareholder influence, both types of theories predict that following the scandal implicated mutual fund families will be less able to influence firms. In the theories of voice, this would happen since implicated funds would have to reduce their holdings due to outflows, which would reduce their incentives and ability to interfere. In the theories of exit, this shock would lead to an increase in the probability that shareholders would sell their shares for reasons unrelated to the firms' fundamental characteristics, which would hurt the effectiveness of the threat of exit as a disciplining device.[5]

In order to deal with the second challenge – the issue of shareholder-level heterogeneity – I construct a measure of a mutual fund family "type," that is the historical relation of each mutual fund family with the corporate investments made by the firms that it held. The notion of shareholder heterogeneity leads to a testable hypothesis that if mutual funds of heterogenous types exert influence, we would expect the actual investment policies of the firms they hold to reflect such a heterogeneity. In particular, I hypothesize that ownership

[3]E.g., Shleifer and Vishny (1986), Admati, Pfleiderer, and Zechner (1994), Maug (1998).

[4]Papers from this strand of literature include Admati and Pfleiderer (2009), Edmans (2009), Edmans and Manso (2009).

[5]A separate strand of theoretical literature discusses possible sources of disagreement about corporate investments between management and shareholders. For example, some agency models study moral hazard with respect to investment (e.g., Holmstrom and Weiss, 1985; Lambert, 1986; Hirshleifer and Suh, 1992). Another group argues that managers might act myopically when choosing the investment levels (e.g., Narayanan, 1985; Scharfstein and Stein, 1990; Stein, 1988, 1989; Edmans, 2009).

by some families may systematically result in higher levels of corporate investment levels. I obtain family types by estimating individual mutual fund family fixed effects in the regressions of different measures of investments on observable firm and family characteristics, as well as firm, family, and year fixed effects.[6] A family of a higher investment type means that historically on average, firms exhibited a higher level of a particular investment policy when this family held them.

The most important advantage of this measure is that it allows studying the effect of the trading scandal separately for firms held by different types of mutual fund families, and therefore it allows testing a clear prediction on the direction of the effect of the shock. If mutual funds exert influence on corporate investments, then involvement in the scandal would diminish their ability to influence companies according to their types. Therefore, we should see a bigger decrease in corporate investments in firms held by mutual fund families of higher types, all else equal. This interaction between the mutual fund family type and the indicator of its involvement in the scandal is central to the test for the influence of mutual fund families on the real investments used in this paper.[7]

To summarize the identification strategy, I first estimate the types of mutual fund families for different measures of corporate investment policies using the sample of the mutual fund families and their holdings. Then, using a triple-differences framework, I examine the effect of the trading scandal. This exercise allows the effect of the scandal on portfolio companies to be shareholder specific (vary across shareholder type).

I find that having implicated shareholders had a significant effect on firms' investment policies. Moreover, the effect of the scandal differed depending on the type of a mutual fund family. For example, an increase in 1 standard deviation in type resulted in an additional

[6] I estimate its type for each of the investment policies, i.e., capex type, R&D type, and M&A type for each mutual fund family in my sample. The methodology is similar to the one in Bertrand and Schoar (2003) and Cronqvist and Fahlenbrach (2008). In a departure from these papers, I use the procedure pioneered by Abowd, Kramarz, and Margolis (1999) that allows, among other advantages, estimating models with high-dimensional fixed effects.

[7] In addition, the measure of mutual fund family type offers a way to identify families that are a priori more likely to have an impact on corporate investments than others. Moreover, the measure incorporates important unobservable persistent characteristics of mutual fund families, such as skill and preferences with respect to corporate investment.

decrease of -0.014 in the capex following the scandal. For firms held by shareholders belonging to the 1st percentile of type (low investment types), the shock resulted in an increase in capex of 0.029, and for firms held by shareholders from the 99th percentile, it resulted in a decrease of -0.037.[8] Importantly, the average effect was very small. Qualitatively similar results were obtained for R&D and number of acquisitions.

Next, I test several additional hypotheses in order to gain a better understanding of the source of the results. First, consistent with a prediction of theories of shareholders' impact, I find that the results are especially strong for the subsample of important shareholders.[9] Second, I find that the results are primarily driven by firms where the CEO compensation is sensitive to stock prices, which is predicted by the theories where shareholders use the threat of exit to discipline management. Third, consistent with the theories that predict shareholders will have stronger influence when the liquidity of the shares is higher,[10] I find that the above results do not hold for a subsample of firms with illiquid stocks.

The results are reinforced by a number of robustness tests. In one such test, as an alternative to the scandal, I examine the correlation between flows of capital into mutual fund families and corporate investment, allowing for the effect of flows to vary across family types. Consistent with evidence from the effect of the trading scandal, I find a positive coefficient on the interaction of flow and family type. Due to the endogeneity of flows, we should be careful in interpreting this finding. However, this result is consistent with the hypothesis that inflows of funds into families of higher types leads to a higher level of real investment than inflows into families of lower types, further reinforcing the main results of the paper.

This study contributes to two strands of literature. First, it provides causal evidence on the importance of mutual funds for real investment activity of firms they hold, adding to the literature on the role of institutional investors, and shareholders in general. The results are consistent with the view that institutional shareholders, and mutual fund families in particular, have a real impact on firms. Moreover, the evidence I provide emphasizes

[8] This effect is sizeable compared to the mean value of 0.28 of capex in the year of the scandal.
[9] I define importance as larger than average holding size for the period prior to the scandal.
[10] E.g., Maug (1998), Admati and Pfleiderer (2009).

that heterogeneity among individual shareholders' is an important factor that needs to be taken into consideration when analyzing their impact. Second, the paper provides micro-level evidence on the interaction between financial and real sides of firms. In the channel highlighted here, short-term fluctuations in the financial markets that affect shareholders participation in the ownership of firms might have real consequences for companies they hold.

The remainder of the paper is organized as follows. Chapter II presents a review of a related literature. Chapter III develops the empirical approach and develops the main hypotheses tested in this paper. Chapter IV presents the empirical methodology in detail. Chapter V provides an overview of the data sources and the sample. Chapter VI describes the results of the analysis. Chapter VII concludes.

II. Related Literature

1. Theoretical Literature

Studying the influence of shareholders on corporate investment requires a framework that addresses the following issues. First, if shareholders have a role in shaping firms' investment policies, through what channel do they exert their influence? Second, what exactly is the role of shareholders in shaping corporate investments, i.e., why would management not implement the "right" investment policy on its own?

Shareholders in the United States that want to actively interfere in the management process can do so through direct intervention (e.g., electing boards, voting, proxy contests), negotiations with management, and exerting other types of pressure. The theoretical literature has discussed this channel of shareholder influence extensively (e.g., Shleifer and Vishny, 1986; Burkart, Gromb, and Panunzi, 1997; Maug, 1998; Admati, Pfleiderer, and Zechner, 1994; Kahn and Winton, 1998). In the majority of these models of "voice," larger block size is more desirable as it helps mitigate the free-rider problem and thus improves sharehold-

ers' incentives to monitor the firm. In the context of this paper, the main prediction that comes out of this literature is that shocks that force shareholders to decrease their holdings, such as the shock introduced by the 2003/4 mutual fund trading scandal, would harm their effectiveness as a monitors.[11]

A more recent group of theories that study shareholder influence provides an additional channel for shareholder influence. In these papers, shareholders influence management by the threat of exit (Admati and Pfleiderer, 2009; Edmans, 2009; Edmans and Manso, 2009). When shareholders prefer not to intervene actively in the management of the firm, they still could influence management by using the so-called "Wall Street walk" rule of "voting with their feet," that is, by trading on superior information about firms. Their information gets incorporated in prices, and since managerial compensation is tied to prices, the threat of exit disciplines management ex ante and forces it to take actions that enhance shareholder value.

In the context of this paper, the "exit" models predict that the effectiveness of the threat to exit as a disciplinary device increases when a shareholder is less likely to get a liquidity shock that is unrelated to the fundamentals of the firm. This is because an increase in the probability of exit due to such reasons weakens the signal the market infers from the fact of exit. Therefore, the prediction that involvement in the 2003/4 trading scandal should adversely affect the mutual funds' ability to influence firms is common to both the voice and exit mechanisms of shareholder influence.

The literature on shareholder influence provides additional testable predictions that could help shedding more light on the mechanism behind the influence an help differentiating between alternative channels of shareholder involvement. Several such predictions are directly relevant for this paper. First, common to both strands of literature (i.e., voice and exit channels) is the prediction that shareholder influence will be stronger for more important shareholders. Second, shareholder influence should be stronger in firms where the managerial

[11]Some models that deliver finite optimal block size (e.g., Burkart, Gromb, and Panunzi, 1997; Faure-Grimaud and Gromb, 2004; Pagano and Rell, 1998) would then predict that a strong enough shock to the shareholder will result in reduction in monitoring if it forces a shareholder to cross a certain threshold in terms of the holding size. Also, even with the finite optimal holding size, the larger holding sizes are likely to improve the ability of shareholders to impose their idiosyncratic styles on firms.

compensation is tied to prices. This prediction is unique to the theories of exit, since for this channel to work, management has to care about the price impact of shareholders' exit. Third, shareholder influence should be weaker for firms with illiquid stock. The intuition behind this prediction in the theories of exit is that higher transaction costs might diminish the credibility of the threat to exit. The same prediction could be also found in the voice literature (e.g., Maug, 1998), where liquidity is important since it facilitates the building of the blocks of stocks necessary to exert influence.

Another strand of theoretical literature that is relevant for this study discusses the causes and the consequences of disagreement between shareholders and management with respect to the investment policies in firms. The exact source of a disagreements between shareholders and management depends on a particular friction under investigation. For example, agency models suggest that moral hazard will drive investments away from the optimal level if picking the right level of investments is costly in terms of managerial effort (Holmstrom and Weiss, 1985; Lambert, 1986; Hirshleifer and Suh, 1992). The models that analyze reputation concerns of managers (Narayanan, 1985; Scharfstein and Stein, 1990) or their preoccupation with short-term stock prices, for example, Stein (1988, 1989), discuss the incentives for management to boost short-term profits at the expense of long-term growth, which also suggests potential role of shareholders in mitigating these problems. Edmans (2009) studies how the "Wall Street walk" way of exerting influence might affect corporate investments. In his model, shareholders can trade on their private information, causing prices to reflect this information. This shields management from price movements that reflect current earnings instead of fundamental value, mitigating the myopic investment problem.

To sum up, the theoretical literature on shareholder involvement proposes different ways in which shareholders could impact corporate policies, conditional on their belief about the *right* course of action and the need for their intervention. However, these theories do not provide a clear prediction on the direction of influence of shareholders on corporate investments. Applying the predictions of theories of investment distortions does not eliminate the problem. While these theories explicitly or implicitly suggest a role for shareholders in addressing these distortions, they also suggest that the distortions could go in different

directions, depending on circumstances. The multiplicity of possible directions presents a challenge for empirical applications, since in a large sample it is hard to know a priori what is the expected direction of shareholder influence on investments. This remains an issue even conditional on having a shock to the ownership by mutual funds, such as the trading scandal. In other words, in order to make the theories more relevant for the empirical analysis of the real impact of mutual funds, a potential heterogeneity among firms and shareholders needs to be explicitly taken into consideration.

Large body of theoretical work that studies the causes and the consequences of differences in beliefs between different agents, suggests a potential solution to the problem described above. For example, Kurz (1994a,b) shows that rational agents may disagree about the interpretation of the data even if they share a common goal (e.g., maximizing firm value) and have access to the same data. In his theory, the disagreement may persist when the data generating process is non-stationary[12], since in such an environment the process is not uniquely identified and agents' beliefs cannot be rejected based on the available data.[13] Other examples of theories that studied heterogenous priors include Acemoglu, Chernozhukov, and Yildiz (2006) and Cripps, Ely, Mailath, and Samuelson (2008). Acemoglu et al (2006) show that with uncertainty about the precision of signals, agents' beliefs may not converge. Cripps et al (2008) show that individual learning may not result in an agreement even when agents start with common priors, if the signal space that the agents receive is finite. Applied to my setting, this literature suggests that rational value-maximizing shareholders may consistently disagree about the optimal investment strategies.

The literature on heterogenous beliefs suggests an intriguing opportunity for an empirical research on shareholder influence. Conditional on being able to identify proxies for heterogenous beliefs of shareholders, we can have a clear testable prediction on the effect of shareholder influence on corporate investments. With such proxies, we may bypass the need

[12]Or when agents are not certain that it is stationary.

[13]Boot, Gopalan, and Thakor (2008) and Garmaise (2001), among others, apply this theory in financial settings. Boot, Gopalan, and Thakor (2008) study a firm's decision to stay public or go private, and demonstrate that an uncertainty about future shareholders' beliefs creates an incentive for a firm to go private, due to the instability of alignment between the beliefs of managers and shareholders about future growth opportunities. Garmaise (2001) studies the interaction between investors' heterogenous beliefs and security design.

to identify a priori particular investment distortions in the data – a task that is very hard to implement in a large sample of firms – and instead concentrate on potentially an easier problem of identifying shareholder-level heterogeneity.

2. Empirical Literature

Mutual funds have had a significant presence in the ownership of the U.S. publicly traded companies for quite a long time. However, the empirical literature on mutual funds has mostly ignored their impact on real investment activities of their portfolio companies. One notable exception, and perhaps the closest study to this paper, is Cronqvist and Fahlenbrach (2008), who find significant blockholder fixed effects in determining various corporate policies. In particular, they document that these effects are significant for 111 mutual funds in their sample. Cronqvist and Fahlenbrach (2008) conclude that their results are consistent with significant heterogeneity across blockholders in their relation to corporate policies that could stem from differences in skills, beliefs, or other factors. However, they are unable to reject the hypothesis that the correlation between the presence of these shareholders and investment policies is due to selection.

The empirical literature that examines institutional investors in general, and not mutual funds in particular, also has not reached a consensus about the real effects of these shareholders. Recent examples include Bushee (1998), Wahal and McConnell (2000), Hansen and Hill (1991) who find positive correlation between institutional ownership and R&D expenditures. Although this literature provides very useful descriptive evidence, whether institutional investors, and particularly mutual funds, have a causal impact on investment policies it is still an open empirical question.

Recent empirical contributions by Parrino, Sias, and Starks (2003) and Chen, Harford, and Li (2007) provide evidence in favor of the "Wall Street walk" hypothesis, supporting the idea that even in the absence of active interference, shareholders can exert influence. Parrino, Sias, and Starks (2003) document that institutional investors sell their holdings in firms before forced CEO turnover, and the long-term returns are negative following their

exit. Better informed (larger) shareholders exhibit a greater tendency to sell these shares. Chen, Harford, and Li (2007) find that large shareholders tend to sell their shares before value-reducing mergers.

Factors specific to the mutual fund industry could be viewed as responsible for the scarcity of evidence on the real impact of mutual funds. Probably the most important limitations to their role as monitors come from regulatory requirements. One such requirement is disclosure of holdings that makes it harder to accumulate large blocks of stocks that might be needed for intervention. Another important regulation requires that at least 50 percent of a mutual fund's assets would be subject to stringent diversification rules.[14] To the extent that accumulating large blocks that are also significant relative to the fund's size is an important factor for the fund's incentives as a monitor, this regulation makes it harder for funds to be effective monitors. On the other hand, due to their size, mutual funds might enjoy economies of scale in monitoring. Moreover, the fact that they tend to diversify investments over a large number of firms could facilitate monitoring if the costs of monitoring could be spread across similar firms.

Overall, although the structure of the industry might make it hard for an average mutual fund to be an effective monitor, the above considerations once again highlight the importance of addressing the individual heterogeneity of mutual funds instead of studying their average impact. These industry-related details are likely to create situations where mutual funds might have different incentives to interfere in managerial investment decisions. For example, observing that the average effect of the shock on investment is indistinguishable from zero would not mean that mutual funds do have an impact on investments. The previous empirical research reinforces this concern. Although this research has not reached an unambiguous conclusion about whether the presence of different groups of shareholders leads to changes in real firm-level activities, recent evidence suggests the average effects conceal important individual heterogeneity across different agents. For example, Cronqvist and Fahlenbrach

[14]See, e.g., Kahan and Rock (2006) for the description of regulatory environment for mutual funds industry. Fifty percent of the fund's assets are subject to limitation that prevents a fund from holding more than 10% of the firm's assets, and the stock of any single company cannot exceed 5% of the value of the fund. Moreover, if a fund wants to advertise itself as diversified, then 75% of the fund must be subject to this requirement.

(2008) report a significant blockholder effect when individual blockholder heterogeneity is taken into account, but no meaningful average effect of the presence of blockholders in firms.[15]

III. Empirical Approach and Hypotheses

Taken together, the theoretical literature on investment distortions and the literature on shareholder influence provide a testable hypothesis on the relation between mutual funds and corporate investment. In particular, when management deviates from an investment policy favored by the mutual funds, the funds have the tools to enforce a different course of action.

However, as was noted above, the empirical examination of this hypothesis is complicated by some empirical challenges. Consider the following naive regression:

$$I_{ijt} = \beta X_{ijt} + \theta_i + \psi_j + \gamma Ownership_{ijt} + \epsilon_{ijt}, \tag{1}$$

where I_{ijt} is an investment of firm i held by shareholder j at time t, X_{ijt} is a set of time varying firm- and shareholder-level characteristics and year fixed effects, θ_i is a firm fixed effect, ψ_j is a shareholder fixed effect, $Ownership_{ijt}$ is a measure of ownership of family j in firm i, and ϵ_{ijt} is a regression residual.

The first problem with the regression in equation 1 is that ownership is endogenous. As discussed in the introduction, most conventional measures of ownership, such as holding sizes, or simply the presence of mutual funds in firms, are unlikely to be independent from unobservable factors that govern corporate investments. One potential solution to this would be to use flows of capital into and out of mutual fund families as a source of variation in ownership, since in the mutual fund industry, flows force funds to alter their asset side and therefore their ownership patterns. Unfortunately, flows are also likely to be correlated with

[15] An additional example for the paper that documents the lack of an average effect is McConnell and Servaes (1990).

unobservable characteristics that affect firms' investment policies. For example, unobservable factors that drive profitability of firms can influence their investment policies, and are likely to be correlated with the flows of mutual funds that hold them.[16] Notwithstanding, examination of factors that drive flows of mutual funds is useful since it could be easier to find sources of exogenous variation in the liabilities of mutual funds; due to the nature of their business funds are exposed to shocks that are not necessarily related to the fundamental characteristics of firms they hold.

The second problem with taking equation 1 to data is that $\hat{\gamma}$, that is, the average effect of the mutual fund ownership, might not be a correct estimate to examine. First, we do not observe the extent to which the investment levels differ from what shareholders would prefer. As evident from the literature on investment distortions surveyed in section 1, these distortions could get different forms and directions. For example, managers could overinvest or underinvest if choosing the right investment level is personally costly for them. They could myopically underinvest if higher level of investment would interfere with the short-term considerations. Second, as the Compaq-HP example in the introduction suggests, different shareholders may have different beliefs about optimal investment policies.

As a result of having systematically heterogenous firms or mutual funds in the data, the average effect of the shock to the ownership by mutual fund families could conceal an important evidence on real impact of these shareholders, that could be uncovered if individual heterogeneity in shareholder influence would be taken into account. For example, a finding that the average mutual fund family has no significant impact on firm policies, could be explained by the canceling out of various distortions across the portfolio companies, by the absence of such distortions, or by the canceling out of the effects of different shareholders.

The above discussion suggests that in order to test, or even in order to have a clear prediction for the effect of mutual funds on corporate investments we need not only a source of exogenous variation in the mutual fund ownership, but also a way to study this variation separately for different types of firms and shareholders. In other words, a shock to mutual

[16] I return to this point in the robustness tests section of this paper, where I will examine the effect of mutual fund family-level flows on the investment activities of portfolio companies.

fund ownership needs to be examined while explicitly allowing the effect of the shock to vary according to some measures of firm-level or shareholder-level heterogeneity.

1. Addressing the Endogeneity of Ownership – The 2003/4 Trading Scandal

The trading scandal that I use as a solution to the endogeneity of ownership started on September 3, 2003, when New York Attorney General Eliot Spitzer announced a settlement with certain hedge funds accused of illegal trades with funds that belonged to four mutual fund groups (Bank of America, Janus, Strong, and Bank One). The illegal trading practices included late trading and market timing. Following this announcement, a large-scale regulatory inquiry resulted in litigation in which 25 mutual fund families were implicated in illegal trading practices.

Late trading is an illegal activity which involves trading in the funds' shares after the closing deadline, but at the closing prices. Mutual funds in the United States stop trading at 4pm, and any orders that are submitted at the same day after 4pm have to be executed at the next day's prices. However, some mutual funds allowed traders to trade after 4pm at 4pm prices, sometimes as late as 9pm on the same day.

Market timing is a form of rapid trading which takes advantage of stale prices. Prices of frequently traded securities get updated often enough, but for thinly traded securities long time might pass between trades. This makes mutual funds that hold securities that are not often traded near the 4 pm closing time highly susceptible to stale prices – a problem that is especially pronounced in international funds, small-company stock funds, and high-yield bond funds. To illustrate this issue, consider an international fund that consists of securities traded in New York, Tokyo and London. At 4pm New York time, the prices on the London traded securities held by this fund would be 4.5 hours old, and the prices of Tokyo-listed securities would be 15 hours old. When market prices are available, the law instructs mutual funds to price their portfolio at the current value. But if the current prices are stale, the law allows funds to estimate the fair value of the security. In this example, when the management

fails to properly adjust the price of the mutual fund a market-timer could easily exploit the stale prices if there is a correlation between the U.S. and Japanese markets.[17]

The scandal thus provides a natural experiment where an exogenous shock to the liabilities of mutual fund families resulted in changes in their asset side, therefore affecting their ownership patterns. This shock is appealing because it was arguably unrelated to the unobservable factors that drive corporate investments, and it had significant negative short-term implications for the flows of implicated mutual fund families. Figure I shows monthly flows of funds separately for funds that were implicated in the scandal and funds that were not implicated. Flows are defined as $Flow_{jt} = [TNA_{jt} - TNA_{jt-1} * (1 + R_{jt})]/TNA_{jt-1}$, where TNA_{jt} is total net assets under management of fund j at time t. As can be seen in the figure, immediately following the start of the scandal, flows of the implicated funds decreased significantly. A similar effect is obtained when the effect of scandal is aggregated to the family level (not shown).[18]

As an additional way to examine the effect of the scandal on flows, I run a simple regression, $Flows_{jt} = Post + Scandal + Post * Scandal + \epsilon_{jt}$. Here, flow is an annual flow to the mutual fund family (which is the unit of observation used in the analysis), *Scandal* is an indicator for an implicated family, and *Post* is a dummy variable that takes the value of 1 in the period after the scandal. The coefficient on the interaction term $Post * Scandal$ is -0.285, significant at the 1 percent level.[19]

In sum, the data suggest a significant adverse effect of the trading scandal on the flows of implicated mutual funds and mutual fund families. In my setting this adverse effect on flows makes the scandal a valuable natural experiment to examine the impact of mutual fund ownership.

[17]This activity is not illegal per se. Most of the formal charges brought by the SEC and Spitzer were against funds that secretly allowed market timing for slected groups of traders, sometimes contrary to what was promised in their prospectuses.

[18]On the family level, the difference between the implicated and non-implicated group disappears towards the end of the second quarter of 2005.

[19]The coefficient on the *Scandal* dummy is 0.0967, significant at the 10% level. The coefficient on the *Post* dummy is not significantly different from zero. The date range is from 1980 to 2006. Standard errors are clustered by fund family and year.

2. Addressing the Shareholder Heterogeneity – Mutual Fund Family Types

An issue of the firm heterogeneity, that is, the multiplicity of possible ways in which firms could deviate from the investment policies that maximize shareholder value, could be addressed if we had a good way of measuring deviations by firms from investment policies favored by the mutual fund families. Then we would like to estimate the extent to which the presence of (randomly assigned) mutual fund families corrects these distortions. However, this is obviously an extremely challenging task, especially in a large sample of firms. Therefore, I explore an alternative solution to this problem, which involves addressing the shareholder heterogeneity.

To address the issue of shareholder heterogeneity I obtain a proxy for what an individual mutual fund family might *want* the investment level to be, all else being equal. This measure reflects the view of the world discussed above, whereby shareholders may systematically differ according to their impact on corporate investment policies, which could stem from different skills, preferences, views on how firms should be managed, or simply different levels of focus on firms' investment policies. In particular, I hypothesize that shareholder heterogeneity manifests itself in such a way that holdings by some shareholders could systematically result in higher levels of corporate investment than holdings by others.

In order to test whether such systematic differences between shareholders exist in the data, I follow the recent empirical literature in corporate finance that studies the individual heterogeneity of different agents in influencing firm-level policies.[20] In particular, I estimate the mutual fund family fixed effect from a regression that decomposes firms' investment policies into time-varying firm and family characteristics, as well as firm, year, and family fixed effects. The individual family-level fixed effect is used as a proxy for shareholder type, as it measures how investment policies in the portfolio companies differed during the time when a family held a stake in a firm, relative to the period it did not. This measure allows me to classify mutual fund families based on whether their ownership was associated with

[20]E.g., Bertrand and Schoar (2003) and Cronqvist and Fahlenbrach (2008).

an increase or a decrease in particular measures of corporate investments, allowing me to proxy for this particular sort of shareholder heterogeneity.

In addition to its usefulness as a solution to the issue of shareholder heterogeneity, this measure incorporates important unobservable persistent characteristics of mutual fund families, such as skill and preferences with respect to corporate investment policies. Moreover, the measure is attractive because including the firm and year fixed effects as well as time varying controls allows me to control for firm/sector idiosyncracies.[21] Section 1 will describe the estimation procedure of types in greater detail.

3. Hypotheses

The measures of mutual fund family type together with the source of exogenous variation in mutual fund ownership provided by the trading scandal, allow testing the following hypotheses that are suggested by the literature on shareholder influence surveyed above.

H1: *Significant heterogeneity in the types of mutual fund families' exists with respect to corporate investments. As a result of this heterogeneity, firms held by different types of mutual fund families differ systematically in the level of investment policies.*

The goal of testing this prediction is to verify whether the hypothesized shareholder types are empirically relevant before using them in the second stage. Of course, observing the exact empirical counterpart of the shareholder type *in influencing* firms would go a long way toward studying the mutual fund impact on corporate investments. However, as will be made clear in what follows, the estimated measure is not clean from endogeneity concerns. This test will concentrate in verifying whether the individual mutual fund family fixed effects are significant in explaining the variation in different corporate investment policies, and its main purpose is to allow the effect of ownership to vary across different families.

[21] Going back to the HP-Compaq merger example, Putnam which was in favor of the merger, also had a higher M&A type than Wells Fargo, which opposed the merger.

H2: *The effect on corporate investments of a negative shock to ownership will be more negative for firms held by mutual fund families of higher investment types, all else equal.*

This hypothesis is the central one in this paper. As discussed in the review of theoretical literature in section 1, theories of shareholder influence predict that implicated mutual fund families will be less able to impact firms' investment policies following the scandal. The interaction between the scandal and mutual fund family type allows us to examine whether implicated families were less able to impact investments *according to their types* following the scandal. The hypothesis that follows from this is that all else equal, firms that were held by families of higher types will experience a bigger drops in corporate investments than firms that were held by families of lower types. This is because families of higher types push the corporate investments to a higher level than what would be chosen by the management otherwise. Therefore, if the type of mutual fund family becomes less reflected in firm-level investment policies following the 2003/4 trading scandal, this effect would provide direct evidence for the effect of this group of shareholders on real investment.

The following hypotheses follow from additional predictions of theories of shareholder influence as discussed in section 1 and their goal is to provide a closer look into the theories of shareholder influence and help better understand the sources of the impact of mutual funds on corporate investment.

H3: *The effect on corporate investments of an adverse shock to family ownership of firms will be stronger in cases where the affected mutual fund families are more important shareholders.*

H4: *The effect on corporate investments of an adverse shock to family ownership of firms will be stronger in firms where managerial compensation is more sensitive to stock prices.*

H5: *The effect on corporate investments of an adverse shock to family ownership of firms will be stronger for firms with more liquid securities.*

IV. Methodology

1. Estimation of Mutual Fund Family Types

I estimate the types of mutual fund families in corporate investments as a latent variables from the investment equation where the variable of interest is determined by shareholder and firm characteristics, using the methodology proposed by Abowd, Kramarz, and Margolis (1999). This methodology provides a way to estimate models with high-dimensional fixed effects by decomposing the variation in a variable of interest into time variant and invariant firm and shareholder components as long as there is enough mobility of shareholders across firms. In particular, I estimate the following equation:

$$I_{ijt} = \beta X_{ijt} + \theta_i + \psi_j + \epsilon_{ijt}, \tag{2}$$

where I_{ijt} is one of the measures of corporate investment policies of firm i that was held by mutual fund family j at time t (capital expenditures over lagged net PP&E, R&D over lagged total assets, number of acquisitions), X_{ijt} is a set of time-varying variables that includes time fixed effects and controls that were found to have strong explanatory power in the literature, θ_i is a firm fixed effect, ψ_j is a mutual fund family fixed effect, and ϵ_{ijt} is a regression residual. I use the estimated $\hat{\psi}_j$ as a proxy for the type of a mutual fund family j.

In order to avoid the spurious correlation between the estimated $Type_j$ and investments, I estimate the type variable out of sample (using the sample until the year 2000), and perform the estimation of the effects of the scandal using the post-2000 sample.[22]

Equation 2 contains time-varying and fixed firm and shareholder characteristics. Therefore, in order to estimate this equation, we need a way to separate between firm and shareholder fixed effects. Abowd et al. (1999) develop a methodology where this can be achieved if we observe movements of agents across firms. They propose a way to identify the effects

[22]The results, described in what follows, are not sensitive to reasonable changes in this cutoff.

through the group connection,[23] which is defined in the following way. Start with an arbitrary firm and include all mutual fund families that ever held it. For each of these families, add all the firms they ever held. Continue these steps until no new agents are added to the group. In my sample, both before and after 2000, there is only one such group, that is, all firms and mutual funds families are connected, and the procedure allows identifying $J+I-1$ firm and family fixed effects. The actual estimation of the effects involves differencing out the firm effect, then estimating the family fixed effects using the least squares dummy variable approach, and then backing out the firm effects. Appendix B provides a more detailed description of the methodology[24].

This estimation procedure assumes exogenous mobility of firms across shareholders conditional on observable variables and fixed effects. Given this assumption, this variable represents a causal impact of mutual fund families on investment policies. Although this assumption is standard in the literature in the literature that uses this type of estimation technique,[25] in my setting it is clearly unrealistic. However, using this measure together with the exogenous shock to ownership mitigates this concern. If the type reflects only selection of families into certain types of firms, it would not be reflected in the real corporate investment policies when interacted with exogenous shock to ownership.

2. Measuring the Effect of the Trading Scandal on Investments

As described in the previous sections, the identification strategy uses both the trading scandal and the measure of family type. In the first stage, I estimate the measure of type that allows me to obtain a relation between the presence of each individual family and the corporate

[23]Intuitively, separating the two effects for family-firm matches where the firm and the family were only observed in one match is not possible.

[24]The method of Abowd et al. (1999) has some advantages over the least squares dummy variable method other papers use (Bertrand and Schoar, 2003; Cronqvist and Fahlenbrach, 2008). First, using the least squares approach becomes computationally difficult in datasets with large number of firms and shareholders. Second, it does not require dropping firms that were held only by one mutual fund family in my sample. It allows the separation of fixed effects not only for firms that "changed hands," but also for firms that were held by only one mutual fund family throughout the sample period – 818 firms in my sample.

[25]E.g., Bertrand and Schoar (2003), Abowd et al. (1999), Graham, Li, and Qiu (2008). The latter paper employs the methodology of Abowd et al. (1999) to study executive compensation.

investments in firms it held in the past. In the second stage, I interact the estimated shareholder type with the exogenous shock to ownership, in my case, the trading scandal, which allows me to study the effect of the scandal allowing the effect of each family to vary with its type. In particular, I estimate the following triple differences specification for the post-2000 sample, where the effect of the scandal is allowed to vary across shareholder types:

$$\begin{aligned} I_{ijt} = \beta_1 X_{ijt} + \theta_i + \beta_2 Post * Scandal_j + \beta_3 Post * Scandal_j * Type_j \\ + \beta_4 Type_j + \beta_5 Post + \beta_6 Scandal_j \\ + \beta_7 Post * Type_j + \beta_8 Scandal_j * Type_j + \epsilon_{ijt}, \end{aligned} \tag{3}$$

where $Scandal_j$ is a dummy variable that indicates whether a mutual fund family j was implicated in the trading scandal, $Post$ is a dummy variable that refers to the post-scandal period, $Type_j$ is the type of family j as defined above, X_{ijt} is a vector of time-varying controls that includes year fixed effects, θ_i is a firm fixed effect, and ϵ_{ijt} is the regression residual. Throughout the analysis, the standard errors are clustered on the firm level.

The coefficients of interest in equation 3 are β_3 and $\beta_2 + \beta_3 * \tilde{Type}_j$. The coefficient β_3 measures how the effect of the scandal varies with the family type. Other coefficients are usual interaction terms used in a typical differences-in-differences analysis. The total effect of the scandal can be computed as $\beta_2 + \beta_3 * \tilde{Type}_j$, where $\tilde{Type}_j$ is a particular family type. The coefficient β_4 measures the direct effect of family type on the level of investment. β_5 measures the possible differences in average investment levels before and after the shock, unaccounted for by year effects. β_6 measures the effect of possible unobservable characteristics that might be common to all firms held by implicated families. β_7 measures a fixed pattern in investments that could be common to all firms held by family of $Type_j$ after the scandal, after controlling for family type. β_8 is a coefficient on a similar control that takes care of a fixed pattern in investment common to implicated firms of a certain type, above and beyond what the type and the dummy for an implicated family explain. Firm and year fixed effects help separate the effect of the scandal from the effects of fixed firm-level unobservable characteristics and common time-specific fluctuations in investment activity.

Equation 3 first compares the level of investment before and after the scandal separately for the treatment group (firms held by implicated families) and the control group, creating a difference for each group. Then the regression takes the difference between these two separate differences. This provides an estimate of the scandal on investment. The interaction with type provides the third difference, allowing the scandal to have a separate effect for firms held by distinct types. This third differencing is a direct test of the main hypothesis of this paper, that is, the hypothesis that firms that happened to have implicated shareholders of higher types experienced bigger drops in investments.

V. Data

1. Sources

Data in this study are obtained from several sources. Data on holdings of mutual fund families come from the Thomson-Reuters Mutual Fund Holdings database (formerly known as CDA/Spectrum), which includes holding information for all mutual funds that report their holdings with the SEC.

Data on mutual fund families come from Morninstar Inc. database and CRSP Survivor-Bias-Free Mutual Fund Database. These sources do not provide an adequate quality of data needed to trace families over time or even across funds, especially for earlier years. Therefore, I manually check the data for inconsistencies and supplement them with the information from SEC filings, company websites, and other sources.

The data on mergers and acquisitions come from the SDC Platinum database. The data on CEO compensation are from the Exucomp database. Finally, firm-level accounting variables are obtained from Compustat, and returns and stock prices are from CRSP. Appendix A provides details on the definitions of variables.

I collect the data on funds implicated in the 2003/4 trading scandal from the online business publications (such as the Financial Times and the Wall Street Journal), SEC litigation

publications, and Stanford Law School Securities Class Action Clearinghouse, which provides information relating to the prosecution, defense and settlement of federal class action securities fraud litigation, and other online sources. Table A1 in Appendix A has the list of the implicated families and the date the news about the scandal was released for each family.

2. Final Sample

The final sample consists of a mutual fund family-firm matched panel dataset. In order to be included in my sample, the mutual fund needs to have valid holding data in the Thomson-Reuters Mutual Fund Holdings database, as well as a valid link between the holding data and CRSP Mutual Funds database. In addition, I exclude a small number of funds for which I could not find the fund family information.

Firms in the sample are publicly traded U.S. corporations with valid Compustat data that could be matched to the Thomson holdings data. In addition, I exclude regulated utilities (SIC codes 4900-4949) and financial institutions (SIC codes in the 6000 range). The sample consists of 13334 firms and 975 mutual fund families for years 1980-2008.

Table I presents some descriptive statistics and compares implicated and non-implicated families in terms of distributions of different variables in year 2002 (1 year before the scandal). The table shows that the implicated families were larger both in terms of the number of funds and the number of firms they held. However, the average levels of investment variables of interest in the firms they held do not seem to differ significantly from the control group. The shareholder types in the two groups have similar means, but families from the non-implicated group exhibit higher variance across types. Finally, the mean values of firm types, that is, the firm fixed effects in the investment polices estimated by equation 2 have similar means, with greater dispersion within the control group.

VI. Results

1. Mutual Fund Family Heterogeneity

Before proceeding to the description of the effect of mutual fund ownership on real investment, I examine the empirical relevance of the individual mutual fund family fixed effects, that is whether they have a significant power in explaining the variation in firms investment policies over and above important time varying characteristics and firm fixed effects.

Panel 1 of Table II shows the result of the estimation of the mutual fund family types. The specification is from equation 2, where the triple fixed effect regression is run separately for each investment variable: investments, R&D, and number of acquisitions. Each row in the table represents a regression. For each dependent variable, the first row is the baseline specification, and the second row adds family-level and firm-family-level time-varying controls (log size, holding size, experience with the firm). The first part of panel 1 runs the regression on the full sample of mutual fund family holdings, and the second part shows the results of the estimation for a sample before the year 2000 (which is the part of the sample used to estimate the shareholder types that will be used in the rest of the analysis).

Consistent with the view that shareholders differ from each other in their types, I find significant individual heterogeneity for mutual fund families in explaining the corporate investment policies. The hypothesis that all shareholder effects are zero is rejected in all specifications. These results are also consistent with the findings reported by Cronqvist and Fahlenbrach (2008), who find that individual blockholder fixed effects are statistically significant in explaining variation in corporate investment, particularly in the case of mutual funds that held blocks in their sample.

Panel 2 of Table II shows the correlation between different types. The correlations between capex type and R&D type is approximately 0.134, statistically significant at the 5 percent level. The correlation between capex type and M&A type is -0.064, not statistically significant. The correlation between the R&D and the M&A type is 0.133, statistically significant at the 10 percent level. The lack of correlation between the capex and the M&A

types is intuitive, as this suggests that although both are measures of investment activity, they might represent a very different way of expansion.

2. Evidence from the Trading Scandal

i. Trading Scandal and Real Investment Policies in Firms

Figure II presents a simplified version of the triple differences analysis used in this section. It shows an average capital expenditure ratio of companies held by mutual fund families of high (higher than average) and low types, separately for implicated and non-implicated families. For example, the "non-implicated, low type" cluster on this plot includes a subsample of firms that were not held by families implicated in the scandal and the mutual funds that held these firms were of low types on average. "Implicated, high type" means that these firms had some shareholders who were implicated and their average type was high. The figure shows that firms that implicated families of high types held, experienced a decrease in investments, whereas firms that non-implicated high capex types held experienced an increase in capital expenditures. Firms held by low type implicated families experience a somewhat larger increase in their capital expenditures than firms held by low type non-implicated families. Of course, this simple plot does not control for important firm and time variation, and its main purpose is to illustrate the identification strategy that I will use in what follows. However, it is instructive that the raw data seems to support the hypothesis that the shock resulted in a different response of corporate investment policies in firms held by different types of mutual fund families.

Table III presents the main results of this paper. Each column in the table is the regression from equation 3, a triple-differences estimation of the consequences of the trading scandal, where the effects of the shock are allowed to vary across different shareholder types. The dependent variables, as before, are investment policies: Investments (capital expenditures over lagged net PP&E) in columns (1) and (2); R&D (R&D expenditures over lagged total assets) in columns (3) and (4); and number of acquisitions in columns (5) and (6). The first column for each dependent variable is a baseline specification and the second adds family-level

and family-firm-level controls (mutual fund family size, holding size, and the experience of the family with the firm). In addition to the variables presented in the table, the regressions control for a number of time varying characteristics. The investment regressions control for lagged total assets, lagged cash flow, and lagged Tobin's Q. The R&D regressions control for lagged total assets and lagged cash flows, and returns on assets. The M&A regressions control for lagged total assets and ROA.

The coefficients of interest are β_3 and $\beta_2 + \beta_3 * \tilde{Type_j}$, where $\tilde{Type_j}$ is a particular value of family type. F-tests (unreported) show that the coefficients on $Post * Scandal$ and $Post * Scandal * FamilyType$ are jointly significant at the 1 percent level for Investment and R&D and at the 5 percent level for M&A. Consistent with the hypothesis that the adverse shock to ownership will asymmetrically affect firms held by low versus high family types, the estimated coefficient β_3 is negative in all specifications. This result means that firms that were held by families of higher types had lower levels of investments following the scandal than firms held by families of lower types. This result holds across all specifications presented in the table.

The lower panel of Table III presents the economic interpretation of the coefficients.[26] An increase in one standard deviation of the family type results in the decrease of -0.014 in investment. In other words, following the scandal, the firms held by families whose type was 1 standard deviation higher would exhibit an additional decrease of -0.014 in investments. This effect is sizeable relative to the mean of the capex ratio of 0.28 for 2003. To highlight further the importance of mutual fund family heterogeneity, replacing families from the first percentile of type with families from the 99th percentile of type would result in a difference of -0.066 in the effect of the shock on investments.

Importantly, the lower panel of table III shows that a shock to the relatively low types (families whose type was below the 25th percentile of the type distribution) resulted in an increase in investment of their portfolio companies, whereas the shock to the high types resulted in a decrease in investments. In sum, the results in this table suggest that firms

[26]To preserve space, the economic interpretation is reported only for specifications in columns (1), (3), and (5), i.e., columns without family controls. The results are very similar for the specifications with the family controls.

held by high (low) type mutual funds had higher (lower) levels of capital expenditures than they would have without these shareholders.

Columns (3) through (6) report qualitatively similar effects for R&D and M&A. An increase of one standard deviation in R&D type would result in an additional decrease of -0.0015 in the R&D ratio following the scandal, an economically significant effect compared to the mean R&D ratio of 0.1 in 2003. For the number of acquisitions, increasing the family type by one standard deviation, would result in an additional decrease of -0.06 as a result of the scandal, compared with the average number of acquisitions of 0.23 in my sample as of 2003.[27]

The average effect of the scandal, calculated as $\beta_2 + \beta_3 * \bar{Type_j}$, is negative in all specifications. Therefore, on average, being held by implicated families during the scandal resulted in lower levels of all investment policies. In other words, the ownership by mutual fund families' had a positive effect on the levels of investments in all specifications. This effect, however, is small, which is consistent with prior literature. Together with the results described above, this supports the view that an average effect conceals an important heterogeneity across mutual fund families.

The coefficient on the *Type* variable is positive and highly statistically significant in all specifications, indicating that the family fixed effects estimated out of sample are relevant in explaining variation in firms' investment policies. The coefficient on the *Scandal* dummy is positive and significant in the case of capital expenditures, indicating that the implicated families tended to hold firms with higher levels of capex during that period than their their types and other control variables could explain.

The results presented so far support the hypotheses that mutual fund families have a significant impact on firm-level investment policies, that this impact reflects a significant heterogeneity across mutual fund families, and that shocks that adversely affect their own-

[27] As an alternative way of examining the economic magnitude of these results, a one standard deviation increase in capital expenditure type would result in a decrease of approximately 3 percent of a standard deviation in capital expenditures. An increase in one standard deviation in R&D and M&A types would result in an additional decrease in about 1 percent and 0.9 percent of a standard deviation R&D and the number of acquisitions, respectively.

ership decrease their impact. However, models of shareholder influence have additional implications that we can test in order to better understand the mechanism that drives the results. For example, a wide range of theories, as discussed above, predict that the impact of shareholders will be an increasing function of the holding size or, more generally, their importance for the firm, since the average holding size in the firm proxies for information acquisition or incentives to exert effort in monitoring. Therefore, shocks that force shareholders with the biggest holdings to change their ownership will impact firms the most. The impact will be the strongest for these shareholders because an unexpected shock forces them to withdraw the influence they were exerting before.

The regressions in Table IV test this hypothesis.[28] In particular, I run the regression in equation 3 separately for more and less important shareholders, where I define importance as follows. For each observed holding of family j in firm i at year t, I calculate α_{ijt} – the moving average holding size for the period before year t. I define a family as an important shareholder if $\alpha_{ijt} > \bar{\alpha_{it}}$, where $\bar{\alpha_{it}}$ is the mean of α_{ijt} across all mutual fund families that held shares of firm i in year t. In other words, I consider the mutual fund family an important shareholder at time t if its historical average holding in a particular firm is higher than that of an average family that holds this firm's shares.

As Table IV shows, the results for the subsample of important shareholders are qualitatively similar to the evidence presented in Table III. However, for small shareholders the coefficient β_3 is not statistically significant, and in the case of R&D, it is even slightly positive. The differences between the coefficients in the two subsamples are statistically significant at the 5 percent level for capital expenditures and R&D, but not statistically significant for the number of acquisitions.[29] The results in Table IV are thus consistent with models of shareholder influence that predict that large holdings will facilitate shareholder influence. I obtain qualitatively similar results (unreported) using family's experience with the firm before the shock as another measure of shareholder importance.

[28] In what follows, I omit the specifications with the family level controls in order to preserve space, since the results are qualitatively similar.

[29] For clarity, I present the results separately for each subsample. The tests of the differences between subsamples were performed on the pooled regression (untabulated).

The next set of results in tables V and VI addresses some predictions of the "Wall Street Rule" theories more closely. In particular, if the channel of shareholder influence works through their impact on share prices, we should observe two effects in the data. First, shareholder influence will be more effective in firms where the CEO compensation is sensitive to stock prices, because management needs to care enough about the threat of shareholder exit, in order for this channel to work. Second, shareholders facing high transaction costs would be less effective as monitors since their threat of exit should not be as effective; therefore the impact of the shock should be less pronounced in companies with illiquid stocks.

Table V addresses the link between the effect of the trading scandal and CEO compensation. In particular, I split the sample of companies based on whether the value of options granted to their CEOs is sensitive to stock prices.[30] In order to be able to classify firms by the average sensitivity of the option grants they give to their CEOs, I run a panel regression of sensitivity on lagged total assets, lagged Tobin's q, firm fixed effect, shareholder fixed effect and time fixed effects. Companies with a higher than average fixed effect are defined as "high sensitivity" firms. This exercise allows the separation of firms based on a measure of an average sensitivity of its CEO compensation over time that is clean from time effects and shareholder influence, but it incorporates important information, such as sector and idiosyncratic firm effect. Moreover, this brings us closer to a measure of the sensitivity of the CEO wealth as it is measured over a long period of time.[31]

The results in Table V are consistent with the view that the sensitivity of the CEO compensation is an important factor that facilitates the impact of mutual fund families on investment. In this table, the regression from equation 3 is run separately for low sensitivity (columns (1), (3), and (5)) and high sensitivity firms (columns (2), (4), and (6)). As the table shows, firms with high compensation sensitivity primarily drive the results. Investments of low-sensitivity companies do not show a significant response to the shock to their mutual

[30] I calculate the sensitivity as a change in the value of option grants to CEOs from a \$1000 change in shareholder wealth using the methodology described in Yermack (1995). See also Appendix C.

[31] I obtain qualitatively similar results when firms are sorted by the fraction of cash bonus and the Black-Scholes value of options granted during the year out of the total CEO compensation.

fund shareholders. The differences between the subsamples are significant at the 5 percent level for capital expenditures and acquisitions. The results in Table V are consistent with the view that the impact of mutual fund families on investments is most pronounced when CEO compensation is sensitive to stock prices. This result supports the intuition behind the "voting with their feet" hypothesis, whereby shareholders discipline management through exit. Mutual funds are better positioned to impose their type on their portfolio companies when CEOs care enough about the effect of the exit on their compensation.

Table VI performs a similar analysis for firms with liquid versus illiquid shares to test the prediction that transaction costs prevent shareholders from influencing firms, and therefore the effect of shareholder-level shocks will be less pronounced. I sort firms in Table VI based on Amihud (2002) illiquidity measure,[32] where illiquid firms are those with an above average value of this measure. Most firms in my sample are below average illiquidity measure, as can be seen from the numbers of observations in the table for illiquid firms. And, indeed, the results for liquid companies are very similar to those in Table III. But I find no significant effect for mutual fund family-level shocks in the case of illiquid companies, which suggests that transaction costs could be preventing family-level conditions from influencing firm-level investment policies.

The paper so far concentrated on the effect of the scandal on corporate investment policies, abstracting from the question of whether the shock resulted in a significant change in corporate performance. For example, if being held by an implicated family of a higher capital expenditure type would result in lower performance of companies, this would suggest that having a shareholder with higher capex type could be beneficial for firms. The reason for this apparent omission is that the framework examined in this paper does not have a clear prediction about the effect of the shock on performance. This is because the optimal level of corporate investment (or the deviations from it) are unobservable, and we do not know whether a particular shareholder type is beneficial for performance. Nevertheless, in untabulated tests I find that the scandal resulted in an increase in returns on assets in the

[32]The illiquidity measure of Amihud (2002) is defined as the yearly average of $1000000 * \frac{|Return|}{(DollarTradingVolume)}$ over all days with non-zero volume, using daily data.

companies held by high capex types, but a decrease in Tobin's Q. On the other hand, for firms held by families of high (low) M&A types, the scandal resulted in an increase (decrease) in Tobin's Q[33].

ii. Trading Scandal and Financial Policies

While the analysis presented so far concentrates on the effect of the scandal on corporate investment policies, one might wonder whether the change in investments was accompanied by changes in other financial policies. For example, did a shock to higher mutual fund family types that resulted in a decrease in capital expenditures also resulted in an increase in cash holdings? This would be an intuitive short-term response to the decrease in investment. Similar intuition could be used for dividend policy and leverage – firms that experienced decreases in investments following the scandal could use the funds to increase their payout and decrease leverage.

Table VII addresses this question. Each column in the table is a triple-differences regression of a particular policy (cash, dividends, and leverage) on similar interactions as before (using the capital expenditure type of mutual fund families) and additional controls.[34] The table shows positive and significant coefficient on this interaction triple interaction $Post * Scandal * Type$ for cash, marginally significant (at the 10 percent level) and positive coefficient for dividends, and statistically insignificant result for leverage. The result for cash holdings is also economically large – an increase in one standard deviation in shareholder type would result in an additional increase in cash of 0.11 (relative to the sample mean of approximately 4 for cash).

[33]This is consistent with the intuition that since capital expenditures could decrease short term performance, it might be undesirable for the management (as suggested by the models of myopic investment), and shareholders' could mitigate this by shielding the management from short term market fluctuations. The market participants would then observe the weakening of high investment types and interpret it a negative news, which results in a lower Tobin's Q. The opposite is the case for M&A. The weakening of low M&A types could be perceived as bad news by the market, since expansion via acquisitions could be regarded as undesirable.

[34]Cash = (Cash + short term investments)/Lagged PP&E. Dividend = (Common + preferred dividends)/Earnings before depreciation, interest, and tax. Leverage = (long-term debt + current liabilities)/(Long-term debt + current liabilities + book equity). Additional controls are lagged total assets, lagged cash flow, lagged Tobin's q, ROA.

The results from this exercise suggest that the decrease (increase) in capital expenditures that followed the shock and was due to the variation in mutual fund family types was accompanied by an increase (decrease) in cash holdings. There was no corresponding change in leverage and only marginally statistically significant change in dividend policy, suggesting that these policies take longer time to adjust.

iii. Robustness Tests

First, as an alternative to the scandal, I examine the effect of the flows of capital into and out of mutual fund families. Despite the endogeneity concerns discussed above, this test is useful as it allows an examination whether the results hold when I use a more conventional measure and over a longer period.

Using the flows as a proxy for ownership changes, we can now modify equation 1 to allow the effect of flow to vary across shareholders:

$$I_{it} = \beta X_{it} + \theta_i + Type_J + \delta Flow_{Jt} + \gamma Type_J * Flow_{Jt} + \epsilon_{it}, \tag{4}$$

where the hypothesis is that the coefficient on the flow variable $(\delta + \gamma \tilde{Type_j})$ will be more positive for high types than for low types.

I calculate $Flow_{jt}$ as a weighted average of individual mutual fund holdings, such that $Flow_{iJt} = \sum_{j=1}^{J} \frac{\alpha_{jit} Flow_{jt}}{\sum_{j=1}^{J} \alpha_{jit}}$, where J denotes a fund family, j is an individual mutual fund, and α_{ijt} is a holding of fund j in firm i. The flow of individual mutual fund j is $Flow_{jt} = [TNA_{jt} - TNA_{jt-1} * (1 + R_{jt})]/TNA_{jt-1}$, where TNA is total net assets under management of the fund and R_{jt} is the return of fund j at time t. Hence, flows of mutual funds that hold larger parts of the overall family-level holding in firm i will get a bigger weight in the flow variable. The purpose of this weighting is to introduce a measure of flow that would be more relevant for the firm-family match than the simple weighted average of individual mutual fund flows.[35] This weighting approach reflects an assumption that the flows of individual

[35]The results are qualitatively similar but weaker when I instead use simple weighted average of individual mutual fund flows.

funds that hold more of the firm's stock would be more relevant for the decision to buy and sell the stock.

Table VIII presents the results from the estimation of the triple fixed effect model similar to the one in equation 4 on the post-2000 sample of mutual fund families' holdings. The dependent variables are investments (capital expenditures over lagged net PP&E) in columns (1) and (2), R&D (R&D expenditures over lagged total assets) in columns (3) and (4), and the number of acquisitions in columns (5) and (6). The coefficient of interest here is the coefficient on the flow, that is, $\delta + \gamma \tilde{Type}_j$. As before, I estimate the $Type_j$ variable out of sample (on the pre-2000 data) separately for each of the dependent variables in Table VIII.

Columns (1), (3), and (5) are the baseline specifications. Consistent with the prediction that inflows of money into mutual fund families will help the families project their styles on portfolio companies, the estimated coefficient on $Flow_{ijt} * Type_j$ is positive and significant in all specifications. Because of the endogeneity concerns, a meaningful economic interpretation for these coefficients is not possible, but taken at their face value, they mean that for each of the dependent variables, inflows of capital into the families of the low types result in a decrease in the dependent variables of the firms they hold. For firms held by high types, on the other hand, inflows result in an increase in corporate investments, R&D ratios, and number of acquisitions.

Columns (2), (4), and (6) add mutual fund family size, holding size, and the experience of the family with the firm (number of periods that funds during which belong to family j reported holding the stock of firm i). Adding these controls does not significantly change the coefficients on the flow. Family size tends to be positively correlated with the level of capital expenditures of the portfolio companies and negatively correlated with the level of R&D. The correlation between the holding size and corporate investment policies is only significant (and negative) in the R&D regression.

Next, I perform additional robustness checks that address important concerns related to the analysis of the effects of the trading scandal. The goal of these tests is to verify that spurious correlations in the data do not drive the results. In order to preserve space,

Table IX presents the results of three different robustness tests with capital expenditures as a dependent variable. Identical tests on R&D and number of acquisitions provided similar results.

First, I run a placebo test by randomly assigning types to families, using the empirical distribution of types from the sample (by generating a random variable from a normal distribution with the mean and standard deviation that match the sample distribution of type). I perform this test in order to verify that the results are indeed driven by the content of the type variable. Column (1) in Table IX presents the result of one such test. The estimated coefficients on the type variable alone, as well as on all of its interactions with the *Post* and *Scandal* dummies, are not statistically different from zero. The average effect of the scandal is similar to the one estimated in Table III. This test was repeated fifty times, in order to verify its robustness. In each test, as before, I simulated the type variable based on the sample distribution. In none of the specifications the coefficients on any of the the interactions of the type variable turned out to be statistically significant.

Second, I replace the true year of the scandal with different placebo years to address the concern that mean reversion could drive the results. Column (2) of Table IX presents the result of one such placebo replacement test where I re-estimate the type variable using the sample until the year 1995, and run the regression in equation 3 on the post-1995 sample, using 2000 as the placebo scandal year. The regression with placebo effects do not show significant results for the relevant coefficients.[36].

Third, in order to mitigate the concern that nonlinearities inherent in the differences-in-differences specification I use in my analysis drive the results, I add the interactions of *Post* and *Scandal* dummies with the types other than capex. In other words, in the regression of capex, I use the R&D and M&A types of families alone and interacted with *Post* and *Scandal* dummies. None of these additional variables seem to play a significant role in explaining capital expenditures over and above the variables used in Column (1) of Table III.

[36]Various similar tests with other placebo years have shown similar lack of significant results.

Fourth, in untabulated tests I address a selection concern that implicated families decreased their holdings in companies that did not match their type. That is, responding to scandal-induced outflows, families could have simply decreased holdings in companies that were expected to change investments in a direction opposite to the types of these families. However, according to this hypothesis, if some companies were less compatible with the types of the families, then in years prior to the scandal families would have decreased their holdings in those companies. This is because regardless of the scandal those firms were anticipated to shift investments in a direction opposite to the types. However, I do not find any evidence that prior to the scandal families decreased their holdings in companies that significantly changed their investment policies following the scandal in directions opposite to the types of these families. Moreover, there was no significant cross-sectional correlation between holdings of particular types just before the scandal and changes in investments that firms experienced following the scandal, whereas according to the selection hypothesis families of higher types would be expected to have smaller holdings in firms that would eventually experience biggest drops in investments.

An additional concern could be that a spurious correlation could drive the results since although type variable was estimated on the pre-2000 sample, I do not restrict the set of firms used in the estimation of the type and in the main analysis. Ideally, I would like to perform the analysis where the type variable for each mutual fund-firm match would be estimated without this firm. In order to save time, I run a simplified version of this test (untabulated). In particular, I verify that the results hold when I separate between the in-sample and out-of-sample set of firms. I run the estimation of the type variable on a subset of firms separate from the set of firms I used for the main analysis. The results are qualitatively similar to the ones presented in Table III. Moreover, I find that using a bigger sample of firms for the estimation of types, results in more precise the estimates from the differences-in-differences regressions that closer resemble the results in Table III.

VII. Conclusion

Mutual funds hold a significant portion of publicly traded U.S. firms, but little empirical evidence exists on their importance for the real activity of these firms. The lack of empirical evidence of a real impact of such a large group of investors is particularly intriguing since many theoretical papers suggest the impact should exist.

I provide evidence on the impact of mutual fund families on the real investment activities of these companies. In the core of the identification strategy I use in this paper, lies the observation that the mutual funds' holdings, and thus their ownership in publicly traded companies, are tied to flows of capital into and out of these funds. Therefore, an exogenous shock to the funds' liabilities would provide a natural experiment where the ownership of these investors is changing for reasons unrelated to the fundamentals of the portfolio companies. For this purpose, I utilize the 2003/4 mutual fund trading scandal, where 25 large mutual fund families in my sample were implicated in illegal trading practices that included market timing and late trading. Using a triple-difference framework, I allow the effect of the shock to vary across mutual fund families along the type dimension – a measure of their historical impact on firm investment policies. I estimate the type as an individual mutual fund family effect from an (out-of-sample) regression that decomposes investment policies of firms into time varying and fixed firm, year, and shareholder components. This variable allows for classification of mutual fund families according to their historical relation to firms' investment policies.

The results of this paper are consistent with the theories on shareholder influence. I find that firms held by mutual fund families experience a change in the level of their investment policies as measured by capital expenditures , R&D, and number of acquisitions. In particular, I document that for firms held high type families, that is, families whose portfolio companies tend to have higher investment levels, the scandal resulted in a decrease in investments. The same shock to shareholders of lower types resulted in an increase in investments level of their portfolio companies. Moreover, important shareholders (as defined by holding

sizes), firms with higher sensitivity of CEO compensation to stock prices, and firms with liquid shares drive these results.

The contribution of the paper is twofold. First, it provides evidence on the causal impact of mutual funds, and, more generally of institutional shareholders, on real investments. The results are consistent with the view that institutional investors have a real impact on the companies they hold. In addition, as part of the identification strategy, I show that the effect of the same shock has different implications for firms held by different shareholders. This finding highlights the importance of taking into account individual shareholder heterogeneity when assessing shareholders' influence on the companies they hold.

Second, the paper provides micro-level evidence of a link between the real and the financial sides of firms. I provide a direct test of the hypothesis that exogenous shocks to the liability side of institutional investors alter the effect of these investors on the real activities of their portfolio companies. In particular, I show that the exposure of mutual funds to shocks unrelated to the fundamental characteristics of their portfolio companies affect the funds' ability to participate in the process of managing these firms. This link is especially important given the significance of these shareholders in the ownership of the U.S. firms.

References

Abowd, John M., Robert H. Creecy, and Francis Kramarz, 2002, Computing person and firm effects using linked longitudinal employer-employee data., Discussion paper.

Abowd, John M., Francis Kramarz, and David N. Margolis, 1999, High wage workers and high wage firms, *Econometrica* 67, 251–333.

Acemoglu, Daron, Victor Chernozhukov, and Muhamet Yildiz, 2006, Learning and disagreement in an uncertain world, NBER Working Papers 12648 National Bureau of Economic Research, Inc.

Admati, Anat R., and Paul Pfleiderer, 2009, The "wall street walk" and shareholder activism: Exit as a form of voice, *Review of Financial Studies*.

——— , and Josef Zechner, 1994, Large shareholder activism, risk sharing, and financial market equilibrium, *Journal of Political Economy* 102, 1097–1130.

Amihud, Yakov, 2002, Illiquidity and stock returns: Cross-section and time-series feffects, *Journal of Financial Markets* 5, 31–56.

Bertrand, Marianne, and Antoinette Schoar, 2003, Managing with style: The effect of managers on firm policies, *Quarterly Journal of Economics* 118, 1169–1208.

Boot, Arnoud W. A., Radhakrishnan Gopalan, and Anjan V. Thakor, 2006, The entrepreneur's choice between private and public ownership, *Journal of Finance* 61, 803–836.

——— , 2008, Market liquidity, investor participation, and managerial autonomy: Why do firms go private?, *Journal of Finance* 63, 2013–2059.

Burkart, Mike, Denis Gromb, and Fausto Panunzi, 1997, Large shareholders, monitoring, and the value of the firm, *The Quarterly Journal of Economics* 112, 693–728.

Bushee, Brian J., 1998, The influence of institutional investors on myopic r&d investment behavior, *The Accounting Review* 73, 305–333.

Chen, Xia, Jarrad Harford, and Kai Li, 2007, Monitoring: Which institutions matter?, *Journal of Financial Economics* 86, 279–305.

Cripps, Martin W., Jeffrey C. Ely, George J. Mailath, and Larry Samuelson, 2008, Common learning, *Econometrica* 76, 909–933.

Cronqvist, Henrik, and Rudiger Fahlenbrach, 2008, Large shareholders and corporate policies, *Review of Financial Studies* 12.

Edmans, Alex, 2009, Blockholder trading, market efficiency, and managerial myopia, *The Journal of Finance* p. Forthcoming.

——— , and Gustavo Manso, 2009, Governance Through Exit and Voice: A Theory of Multiple Blockholders, *SSRN eLibrary*.

Faure-Grimaud, Antoine, and Denis Gromb, 2004, Public trading and private incentives, *The Review of Financial Studies* 17, 985–1014.

Garmaise, Mark, 2001, Rational Beliefs and Security Design, *Rev. Financ. Stud.* 14, 1183–1213.

Graham, John R., Si Li, and Jiaping Qiu, 2008, Managerial attributes and executive compensation, *Working Paper*.

Hansen, Gary S., and Charles W. L. Hill, 1991, Are institutional investors myopic? a time-series study of four technology- driven industries, *Strategic Management Journal* 12, 1–16.

Hirshleifer, David, and Yoon Suh, 1992, Risk, managerial effort, and project choice, *Journal of Financial Intermediation* 2, 308–345.

Holmstrom, Bengt, and Laurence Weiss, 1985, Managerial incentives, investment and aggregate implications: Scale effects, *The Review of Economic Studies* 52, 403–425.

Kahan, Marcel, and Edward B. Rock, 2006, Hedge funds in corporate governance and corporate control, Law Working Paper N. 76/2006.

Kahn, Charles, and Andrew Winton, 1998, Ownership structure, speculation, and shareholder intervention, *Journal of Finance* 53, 99–129.

Kurz, Mordecai, 1994a, On rational belief equilibria, *Economic Theory* 4, 859–76.

——— , 1994b, On the structure and diversity of rational beliefs, *Economic Theory* 4, 877–900.

Lambert, Richard A., 1986, Executive effort and selection of risky projects, *The RAND Journal of Economics* 17, 77–88.

Maug, Ernst, 1998, Large shareholders as monitors: Is there a trade-off between liquidity and control?, *Journal of Finance* 53, 65–98.

McConnell, John J., and Henri Servaes, 1990, Additional evidence on equity ownership and corporate value, *Journal of Financial Economics* 26, 595–612.

Merton, Robert, 1973, Theory of rational option pricing, *Bell Journal of Economics and Management Science* 4, 141–183.

Narayanan, M P, 1985, Managerial incentives for short-term results, *Journal of Finance* 40, 1469–84.

Pagano, Marco, and Ailsa Rell, 1998, The choice of stock ownership structure: Agency costs, monitoring, and the decision to go public, *The Quarterly Journal of Economics* 113, 187–225.

Parrino, Robert, Richard W. Sias, and Laura T. Starks, 2003, Voting with their feet: institutional ownership changes around forced ceo turnover, *Journal of Financial Economics* 68, 3–46.

Scharfstein, David S., and Jeremy C. Stein, 1990, Herd behavior and investment, *American Economic Review* 80, 465–479.

Shleifer, Andrei, and Robert Vishny, 1986, Large shareholders and corporate control, *Journal of Political Economy* 94, 461–488.

Stein, Jeremy, 1989, Overreactions in the options market, *Journal of Finance* 44, 1011–1022.

Stein, Jeremy C, 1988, Takeover threats and managerial myopia, *Journal of Political Economy* 96, 61–80.

Wahal, Sunil, and John J. McConnell, 2000, Do institutional investors exacerbate managerial myopia?, *Journal of Corporate Finance* 6, 307–329.

Yermack, D., 1995, Do corporations award ceo stock-options effectively, *Journal of Financial Economics* 39, 237–269.

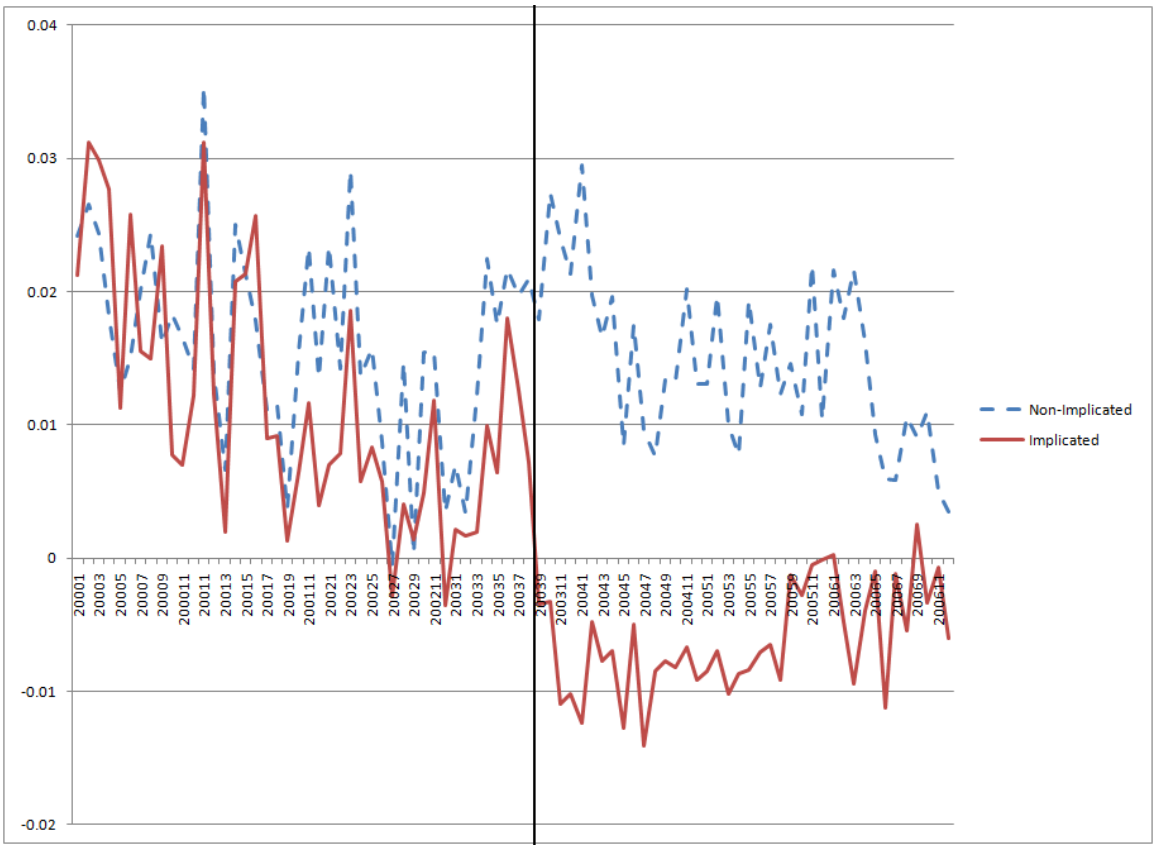

Figure I:

Monthly Flows by Implicated and Non-Implicated Funds.

This figure plots monthly flows separately for funds that were implicated in the 2003/4 trading scandal and funds that were not implicated. Flows for fund j are defined as $Flow_{jt} = [TNA_{jt} - TNA_{jt-1} * (1 + R_{jt})]/TNA_{jt-1}$, where TNA_{jt} is total net assets of fund j in period t. The vertical line is placed at September 2003, the beginning of the scandal.

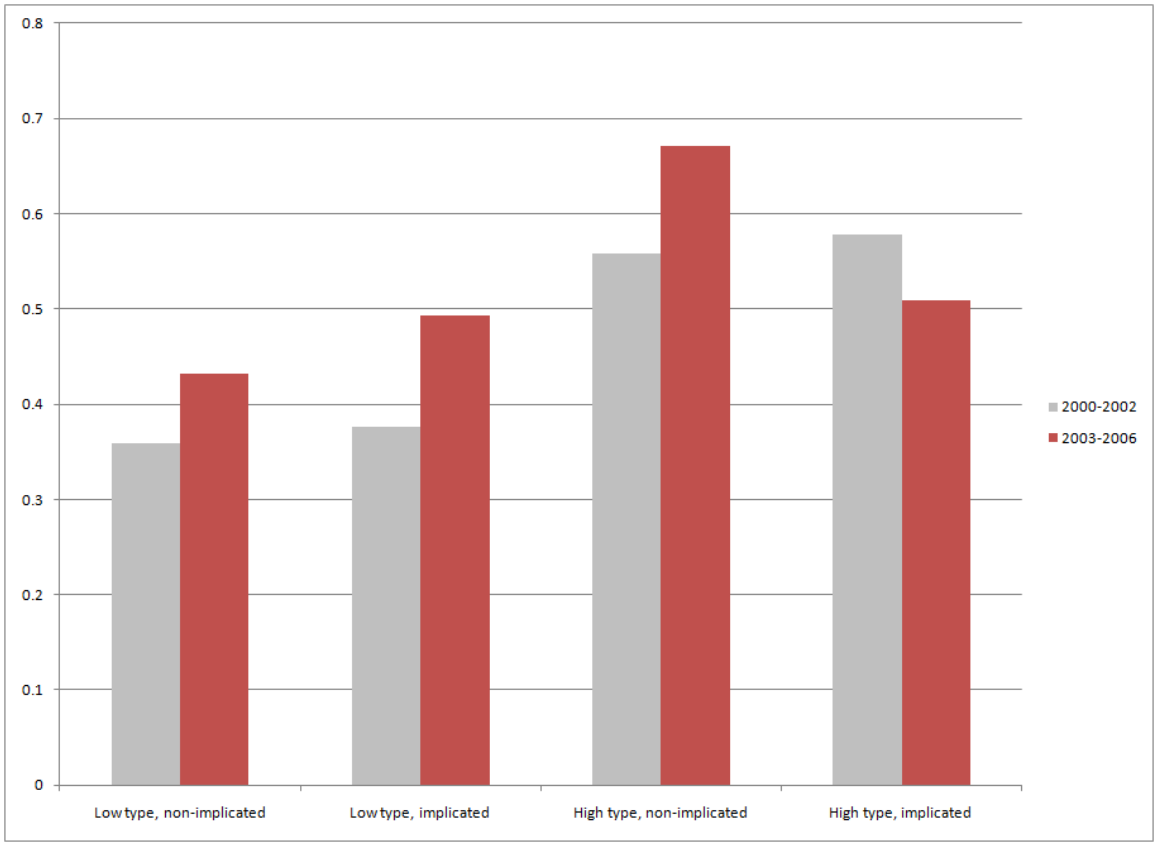

Figure II:

Average Capital Expenditures Ratio by Mutual Fund Family Type Before and After the Scandal.

This figure shows average capex (capital expenditures over lagged PP&E) before and after the 2003/4 trading scandal separately for firms held by low versus high types and implicated versus non-implicated mutual fund families. The non-implicated category represents firms that were not held by mutual fund families implicated in the scandal. Low (high) family type is a type below (above) the mean. Investment is defined as capital expenditures over lagged net PP&E.

Table I
Descriptive Statistics: Comparison between Implicated and Non-Implicated Families

This table presents descriptive statistics as of 2002 separately for implicated and non-implicated families. Shareholder Types are mutual fund family fixed effects estimated using the pre-2000 sample. The sample is mutual fund family-firm matched panel. Investment is defined as capital expenditures over lagged PP&E. R&D is R&D expenditures over lagged total assets. M&A is the number of acquisitions. Shareholder Type is a mutual fund family type – fixed effect ($\hat{\psi}_j$) estimated out of sample (before the year 2000) by running a three-way fixed effects regression $I_{it} = \beta X_{it} + \theta_i + \psi_j + \epsilon_{it}$. Average Firm Types is $\hat{\theta}_i$ from the same regression averaged across all the holdings of a given mutual fund family.

	2002			
	Implicated		Not Implicated	
N Families	25		544	
N Funds (mean)	43.56		8.43	
N Firms	2934		4858	
	Investment Variables			
	Mean	Std. Dev	Mean	Std. Dev
Investment	0.2866	0.3195	0.2797	0.0749
R&D	0.0760	0.1160	0.0749	0.1132
M&A	0.3506	0.9760	0.3329	0.9498
	Shareholder Types			
	Mean	Std. Dev	Mean	Std. Dev
Investment	-0.0230	0.0143	-0.0228	0.0307
R&D	0.0034	0.0030	0.0036	0.0072
M&A	-0.1011	0.0538	-0.0923	0.2873
	Average Firm Types			
	Mean	Std. Dev	Mean	Std. Dev
Investment	1.2211	0.0399	1.2137	0.0790
R&D	0.3001	0.0161	0.2963	0.0298
M&A	-0.2350	0.0279	-0.2313	0.0982

Table II
Estimation of Mutual Fund Family Types

a. The dependent variables are Investment (capital expenditures over lagged net PP&E), R&D (R&D expenditures over lagged total assets), and Number of acquisitions. The sample is mutual fund family-firm matched panel. Details on the definition of variables are available in Appendix A. Standard errors are clustered at the firm level.
b. Each row in the table represents a three-way fixed effect regression $I_{it} = \beta X_{it} + \theta_i + \psi_j + \epsilon_{it}$, where I_{it} is one of the dependent variables of firm i at time t, X_{it} is a set of time-varying firm-level characteristics and year fixed effects, θ_i is a firm fixed effect, ψ_j is a mutual fund family fixed effect, and ϵ_{it} is a residual. The first row for each dependent variable is a base-line specification. The second row adds family-level controls: log (family size), holding size, experience of the family with the firm.
c. F-statistics for joint significance of mutual fund family fixed effects are reported in parentheses for each specification, together with the p-value and the number of constraints. R^2 and the number of observations are reported for each specification.
d. Additional controls in X_{it} include: For Investment – Lagged Total Assets, Lagged Cash Flow, Lagged Tobin's Q. For R&D – Lagged Total Assets, Lagged Cash Flows, ROA. For M&A – Lagged Total Assets, ROA.
e. Panel 2 is a correlation table of family fixed effects for the pre-2000 estimation.

Panel 1

	F-stat, family FE		N	Adj. R^2	Family Controls
Full Sample					
Investment	4.509	(<0.0001, 969)	2306954	0.525	No
Investment	4.168	(<0.0001, 960)	2292205	0.525	Yes
R&D	6.432	(<0.0001, 966)	1547031	0.802	No
R&D	5.18	(<0.0001, 957)	1536956	0.802	Yes
N of acquisitions	2.039	(<0.0001, 973)	2380379	0.605	No
N of acquisitions	1.868	(<0.0001, 964)	2364917	0.605	Yes
Before 2000					
Investment	2.711	(<0.0001, 730)	848814	0.640	No
Investment	2.584	(<0.000, 720)	839955	0.640	Yes
R&D	3.128	(<0.0001, 724)	559062	0.855	No
R&D	2.857	(<0.0001, 714)	553141	0.856	Yes
N of acquisitions	1.809	(<0.0001, 735)	884758	0.685	No
N of acquisitions	1.776	(<0.0001, 725)	875452	0.685	Yes

Panel 2

	Investment	R&D	M&A
Investment	1		
R&D	0.134	1	
M&A	-0.064	0.133	1

Table III
The Effect of the Trading Scandal on the Corporate Investment Policies

a. The dependent variables are Investment (capital expenditures over lagged net PP&E) in columns (1)and (2), R&D (R&D expenditures over lagged total assets) in columns (3) and (4), and M&A (number of acquisitions) in columns (5) and (6). Sample is mutual fund family-firm matched panel. The date range is 2000 - 2006. Details on the definition of variables are available in Appendix A. Standard errors are clustered at the firm level.
b. All columns in the table represent the regression $I_{it} = \beta_1 X_{it} + \theta_i + \beta_2 Post * Scandal + \beta_3 Post * Scandal * Type_j + \beta_4 Type_j + \beta_5 Post + \beta_6 Scandal + \beta_7 Post * Type_j + \beta_8 Scandal * Type_j + \epsilon_{it}$, where I_{it} is one of the dependent variables of firm i at time t, X_{it} is a set of time-varying firm-level characteristics and year fixed effects, θ_i is the firm fixed effect, *scandal* is a dummy variable that equals 1 if a family was implicated in the 2003/4 trading scandal, *post* is a dummy variable that gets a value of 1 for the years including and after 2003, and ϵ_{it} is the residual. $Type_j$ is a mutual fund family type – fixed effect ($\hat{\psi_j}$) estimated out of sample (before the year 2000) by running a three-way fixed effects regression $I_{it} = \beta X_{it} + \theta_i + \psi_j + \epsilon_{it}$. Columns (1), (3), and (5) are base-line specifications for each of the dependent variables. Columns (2), (4), and (6) add mutual fund family-level time-varying controls, as well as time-varying family-firm-level controls.
c. The lower panel of the table presents the economic interpretation of the coefficients of the impact of the scandal. The average effect is calculated as $\beta_2 + \beta_3 * \bar{Type}_j$, where $\bar{Type}_j$ is an average type. The entry "1 std increase in type" means a change in the effect of the shock on the dependent variable as a result of a one-standard-deviation change in the type of the implicated family. The entry $1\% -> 99\%$ compares the effect of the shock to the investor from the 1st percentile to the effect of the shock to the investor from 99th percentile. Mean for 2003 represents the mean value of the dependent variable in my sample as of 2003.
d. Additional controls in X_{it} include: For Investment – Lagged Total Assets, Lagged Cash Flow, Lagged Tobin's Q. For R&D – Lagged Total Assets, Lagged Cash Flows, ROA. For M&A – Lagged Total Assets, ROA. All regressions include year and firm fixed effects.

	(1)	(2)	(3)	(4)	(5)	(6)
	Investment		R&D		M&A	
Post*Scandal	-0.0160***	-0.0154***	0.00121**	0.00168***	-0.0197	-0.0157
	(0.00420)	(0.00381)	(0.000514)	(0.000554)	(0.0365)	(0.0380)
Post*Scandal*FamilyType	-0.472***	-0.484***	-0.217**	-0.282***	-0.199**	-0.178**
	(0.126)	(0.137)	(0.104)	(0.108)	(0.099)	(0.090)
Post	-0.110***	-0.108***	0.0219***	0.0104***	-0.0750	0.00833
	(0.0116)	(0.0122)	(0.00335)	(0.00154)	(0.113)	(0.116)
Scandal	0.0133***	0.0104***	-0.000106	0.000483*	0.0138	0.0109
	(0.00313)	(0.00234)	(0.000239)	(0.000259)	(0.0305)	(0.0312)
Family Type	0.0373***	0.0183**	0.123***	0.0681***	1.056***	1.061***
	(0.00682)	(0.00879)	(0.0227)	(0.0206)	(0.264)	(0.364)
Post*Family Type	0.0583**	0.0877***	0.173***	0.178***	-0.507	-0.483
	(0.0275)	(0.0179)	(0.0622)	(0.0595)	(0.334)	(0.328)
Scandal*Family Type	0.322***	0.416***	0.0665	0.103**	0.134	0.201
	(0.0780)	(0.105)	(0.0488)	(0.0513)	(0.256)	(0.187)
Family Controls	N	Y	N	Y	N	Y
Observations	906157	903488	620950	619123	925370	922590
R-squared	0.570	0.587	0.848	0.849	0.567	0.567
Average Effect:	-0.005		-0.0009		-0.0008	
1 Std Increase in Type	-0.014		-0.0015		-0.060	
1% –> 99%:	0.029 to -0.037		0.004 to -0.003		0.089 to -0.121	
Mean for 2003	0.28		0.1		0.23	

Table IV
The Effect of the Trading Scandal on Corporate Investment for Large and Small Holdings

a. The dependent variables are Investment (capital expenditures over lagged net PP&E) in columns (1),(2), R&D (R&D expenditures over lagged total assets) in columns (3) and (4), and M&A (number of acquisitions) in columns (5) and (6). Sample is mutual fund family-firm matched panel. The date range is 2000 - 2006. Details on the definition of variables are available in Appendix A. Standard errors are clustered at the firm level.
b. All columns in the table represent the regression $I_{it} = \beta_1 X_{it} + \theta_i + \beta_2 Post*Scandal + \beta_3 Post*Scandal*Type_j + \beta_4 Type_j + \beta_5 Post + \beta_6 Scandal + \beta_7 Post*Type_j + \beta_8 Scandal*Type_j + \epsilon_{it}$, where I_{it} is one of the dependent variables of firm i at time t, X_{it} is a set of time-varying firm-level characteristics and year fixed effects, θ_i is the firm fixed effect, *scandal* is a dummy variable that equals 1 if a family was implicated in the 2003/4 trading scandal, *post* is a dummy variable that gets a value of 1 for the years including and after 2003, and ϵ_{it} is a residual. $Type_j$ is a mutual fund family type – fixed effect ($\hat{\psi_j}$) estimated out of sample (before the year 2000) by running a three-way fixed effects regression $I_{it} = \beta X_{it} + \theta_i + \psi_j + \epsilon_{it}$. Columns (1), (3), and (5) show the result for the subsample of small holders for investments, R&D, and number of acquisitions, respectively. Columns (2), (4), and (6) are regressions for the subsamples of large holders, for each of the dependent variables. Small (large) shareholders are defined as shareholders whose average holding in this firm is smaller (larger) than the average mutual fund holding in this firm.
c. Additional controls in X_{it} include: For Investment – Lagged Total Assets, Lagged Cash Flow, Lagged Tobin's Q. For R&D – Lagged Total Assets, Lagged Cash Flows, ROA. For M&A – Lagged Total Assets, ROA. All regressions include year and firm fixed effects.

	(1)	(2)	(3)	(4)	(5)	(6)
	Investment		R&D		M&A	
	Small	Large	Small	Large	Small	Large
Post*Scandal	-0.0221*	-0.0177***	-0.000161	0.00187***	-0.0147	-0.00944
	(0.0130)	(0.00349)	(0.00122)	(0.000374)	(0.0262)	(0.00978)
Post*Scandal*FamilyType	-0.263	-0.554***	0.0574	-0.277**	-0.226	-0.279**
	(0.467)	(0.140)	(0.269)	(0.138)	(0.208)	(0.138)
Post	0.0348***	-0.108***	0.00975***	0.0207***	-0.0178	-0.154
	(0.00943)	(0.0125)	(0.00183)	(0.00296)	(0.0522)	(0.149)
Scandal	0.0305***	0.00399	0.000220	-0.000273	0.0120	-0.0115
	(0.0109)	(0.00370)	(0.000944)	(0.000453)	(0.0217)	(0.00745)
Family Type	0.0123	0.0578***	0.162**	0.122**	0.159	1.071***
	(0.0102)	(0.0115)	(0.0679)	(0.0615)	(0.105)	(0.255)
Post*Family Type	0.0642***	0.0491**	-0.0937	0.203***	-0.176	-0.407
	(0.0166)	(0.0245)	(0.0826)	(0.0675)	(0.156)	(0.377)
Scandal*Family Type	0.755**	0.287***	0.0302	0.0787	0.196	0.127
	(0.384)	(0.104)	(0.202)	(0.0812)	(0.209)	(0.122)
Observations	353844	551799	240156	380467	362535	570457
R-squared	0.567	0.618	0.847	0.861	0.626	0.628

Robust stderr in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table V
The Effect of the Trading Scandal on Corporate Investment for Companies with Low/High Sensitivity of CEO Compensation to Prices

a. The dependent variables are Investment (capital expenditures over lagged net PP&E) in columns (1) and (2), R&D (R&D expenditures over lagged total assets) in columns (3) and (4), and M&A (number of acquisitions) in columns (5) and (6). Sample is mutual fund family-firm matched panel. The date range is 2000-2006. Details on the definition of variables are available in Appendix A. Standard errors are clustered at the firm level.
b. All columns in the table represent the regression $I_{it} = \beta_1 X_{it} + \theta_i + \beta_2 Post*Scandal + \beta_3 Post*Scandal*Type_j + \beta_4 Type_j + \beta_5 Post + \beta_6 Scandal + \beta_7 Post*Type_j + \beta_8 Scandal*Type_j + \epsilon_{it}$, where I_{it} is one of the dependent variables of firm i at time t, X_{it} is a set of time-varying firm-level characteristics and year fixed effects, θ_i is the firm fixed effect, *scandal* is a dummy variable that equals 1 if a family was implicated in the 2003/4 trading scandal, *post* is a dummy variable that gets a value of 1 for the years including and after 2003, and ϵ_{it} is a residual. $Type_j$ is a mutual fund family type – fixed effect ($\hat{\psi_j}$) estimated out of sample (before the year 2000) by running a three-way fixed effects regression $I_{it} = \beta X_{it} + \theta_i + \psi_j + \epsilon_{it}$. Columns (1), (3), and (5) show the result for the subsample of companies with high sensitivity of the value of CEO stock option grants to prices for investments, R&D, and number of acquisitions, respectively. Columns (2), (4), and (6) are regressions for the subsamples of companies with low sensitivity of the value of stock option grants to prices, for each of the dependent variables. Firms are defined as high (low) sensitivity if their firm fixed effect in stock price sensitivity of CEO option grants is higher (lower) than average.
c. Additional controls in X_{it} include: For Investment – Lagged Total Assets, Lagged Cash Flow, Lagged Tobin's Q. For R&D – Lagged Total Assets, Lagged Cash Flows, ROA. For M&A – Lagged Total Assets, ROA. All regressions include year and firm fixed effects.

	(1)	(2)	(3)	(4)	(5)	(6)
	Investment		R&D		M&A	
	Low	High	Low	High	Low	High
Post*Scandal	0.00656	-0.0221***	0.000382	0.00379***	0.0132	-0.0157
	(0.00755)	(0.00600)	(0.000735)	(0.0011)	(0.0181)	(0.0141)
Post*Scandal*FamilyType	-0.139	-0.497***	-0.306	-0.329**	0.0311	-0.177**
	(0.229)	(0.185)	(0.277)	(0.165)	(0.0927)	(0.0885)
Post	-0.109***	0.0299***	0.00107	0.0289***	0.00275	-0.123
	(0.0186)	(0.00908)	(0.00265)	(0.00361)	(0.0648)	(0.0912)
Scandal	0.000300	0.0164***	-0.000140	-0.000246	-0.0121	0.0122
	(0.00366)	(0.00502)	(0.000580)	(0.000715)	(0.0135)	(0.0081)
Family Type	0.0254	0.137**	0.363***	0.127***	0.138	1.057***
	(0.0186)	(0.0542)	(0.0742)	(0.0317)	(0.0860)	(0.233)
Post*Family Type	0.194***	0.0512***	-0.0173	0.539***	-0.144	-0.549
	(0.0713)	(0.0168)	(0.0680)	(0.167)	(0.119)	(0.398)
Scandal*Family Type	0.202	0.390**	-0.174	0.0997	-0.0154	0.152
	(0.123)	(0.158)	(0.110)	(0.0912)	(0.0733)	(0.255)
Observations	571843	333800	386679	233944	585838	347154
R-squared	0.611	0.616	0.864	0.860	0.650	0.585

Robust stderr in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table VI
The Effect of the Trading Scandal on Corporate Investment for Liquid and Illiquid Stocks

a. The dependent variables are Investment (capital expenditures over lagged net PP&E) in columns (1) and (2), R&D (R&D expenditures over lagged total assets) in columns (3) and (4), and M&A (number of acquisitions) in columns (5) and (6). Sample is mutual fund family-firm matched panel. The date range is 2000-2006. Details on the definition of variables are available in Appendix A. Standard errors are clustered at the firm level.
b. All columns in the table represent the regression $I_{it} = \beta_1 X_{it} + \theta_i + \beta_2 Post*Scandal + \beta_3 Post*Scandal*Type_j + \beta_4 Type_j + \beta_5 Post + \beta_6 Scandal + \beta_7 Post*Type_j + \beta_8 Scandal*Type_j + \epsilon_{it}$, where I_{it} is one of the dependent variables of firm i at time t, X_{it} is a set of time-varying firm-level characteristics and year fixed effects, θ_i is the firm fixed effect, *scandal* is a dummy variable that equals 1 if a family was implicated in the 2003/4 trading scandal, *post* is a dummy variable that gets a value of 1 for the years including and after 2003, and ϵ_{it} is a residual. $Type_j$ is a mutual fund family type – fixed effect ($\hat{\psi_j}$) estimated out of sample (before the year 2000) by running a three-way fixed effects regression $I_{it} = \beta X_{it} + \theta_i + \psi_j + \epsilon_{it}$. Columns (1), (3), and (5) show the result for the subsample of liquid stocks for investments, R&D, and number of acquisitions, respectively. Columns (2), (4), and (6) are regressions for the subsamples of illiquid, for each of the dependent variables. Liquid firms are defined as companies whose Amihud (2002) illiquidity measure is lower than average. Amihud (2002) illiquidity measure is defined as the yearly average of $1000000 * \frac{|Return|}{(DollarTradingVolume)}$ over all days with non-zero volume, using daily data.
c. Additional controls in X_{it} include: For Investment – Lagged Total Assets, Lagged Cash Flow, Lagged Tobin's Q. For R&D – Lagged Total Assets, Lagged Cash Flows, ROA. For M&A – Lagged Total Assets, ROA. All regressions include year and firm fixed effects.

	(1)	(2)	(3)	(4)	(5)	(6)
	Investment		R&D		M&A	
	Liquid	Illiquid	Liquid	Illiquid	Liquid	Illiquid
Post*Scandal	-0.0157***	-0.0228	0.00101**	0.00911*	-0.0179	-0.0473
	(0.00412)	(0.0353)	(0.000501)	(0.00526)	(0.0377)	(0.0430)
Post*Scandal*FamilyType	-0.477***	-0.077	-0.227**	0.137	-0.201***	0.107
	(0.125)	(0.096)	(0.114)	(0.0896)	(0.0401)	(0.338)
Post	-0.112***	-0.0915**	0.0222***	-0.00413	-0.0540	-0.161***
	(0.0117)	(0.0383)	(0.00331)	(0.0121)	(0.111)	(0.0588)
Scandal	0.0111**	0.0171	0.000206	-0.00693**	0.0158	0.0593*
	(0.00444)	(0.0361)	(0.000247)	(0.00346)	(0.00865)	(0.0343)
Family Type	0.0375***	0.0435	0.121***	0.250	1.055***	0.375
	(0.00671)	(0.0553)	(0.0242)	(0.237)	(0.1507)	(0.250)
Post*Family Type	0.0517***	0.110	0.175***	-0.0553	-0.502	-0.488
	(0.0129)	(0.150)	(0.0611)	(0.358)	(0.337)	(0.323)
Scandal*Family Type	0.270***	1.129	0.0205	1.773*	0.138	0.0893
	(0.077)	(1.158)	(0.0407)	(0.959)	(0.0779)	(0.252)
Observations	883677	21966	607774	12849	909586	23406
R-squared	0.593	0.651	0.852	0.888	0.622	0.554

Robust stderr in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table VII
Cash, Dividends/Earnings, and Leverage

a. The dependent variables are Cash in column 1, Dividends in column 2, and Leverage in column 3. Cash = (Cash + short term investments)/Lagged PP&E. Dividend = (Common + preferred dividends)/Earnings before depreciation, interest, and tax. Leverage = (long-term debt + current liabilities)/(Long-term debt + current liabilities + book equity). Additional details on the definition of variables are available in Appendix A. Sample is mutual fund family-firm matched panel. The date range is 2000-2006. Standard errors are clustered at the firm level.
b. All columns in the table represent the regression $I_{it} = \beta_1 X_{it} + \theta_i + \beta_2 Post*Scandal + \beta_3 Post*Scandal*Type_j + \beta_4 Type_j + \beta_5 Post + \beta_6 Scandal + \beta_7 Post*Type_j + \beta_8 Scandal*Type_j + \epsilon_{it}$, where I_{it} is one of the dependent variables of firm i at time t, X_{it} is a set of time-varying firm-level characteristics and year fixed effects, θ_i is the firm fixed effect, *scandal* is a dummy variable that equals 1 if a family was implicated in the 2003/4 trading scandal, *post* is a dummy variable that gets a value of 1 for the years including and after 2003, and ϵ_{it} is a residual. $Type_j$ is a mutual fund family type – fixed effect ($\hat{\psi_j}$) estimated out of sample (before the year 2000) by running a three-way fixed effects regression $CapEx_{it} = \beta Z_{it} + \theta_i + \psi_j + \epsilon_{it}$, where Z_{it} includes Lagged Total Assets, Lagged Cash Flow, and Lagged Tobin's Q.
c. Additional controls in X_{it} include lagged total assets, lagged cash flow, lagged Tobin's q, ROA. All regressions include year and firm fixed effects.

	Cash	Dividends	Leverage
Post*Scandal	-0.218***	0.000199	0.00289*
	(0.0692)	(0.000782)	(0.00162)
Post*Scandal*FamilyType	3.776**	0.0494*	0.0574
	(1.606)	(0.0265)	(0.0524)
Post	1.053***	0.0124***	-0.0308***
	(0.190)	(0.00294)	(0.00667)
Scandal	0.234***	-1.45e-05	-0.00236***
	(0.0424)	(0.000469)	(0.000835)
Family Type	0.658***	-0.000729	-0.00161
	(0.115)	(0.00834)	(0.00318)
Post*Family Type	0.178	-0.0323*	-0.0555***
	(0.622)	(0.0175)	(0.0144)
Scandal*Family Type	5.074***	-0.0169	-0.0541**
	(1.328)	(0.0145)	(0.0273)
Observations	913403	908936	909491
R-squared	0.795	0.654	0.827

Table VIII
Corporate Investment Policies and Mutual Fund Family-Level Flows

a. The dependent variables are Investment (capital expenditures over lagged net PP&E) in columns (1) and (2), R&D (R&D expenditures over lagged total assets) in columns (3) and (4), and M&A (number of acquisitions) in columns (5) and (6). Sample is mutual fund family-firm matched panel. The date range is 2000 - 2008. Details on the definition of the variables are available in Appendix A. Standard errors are clustered at the firm level.
b. All columns in the table represent a three-way fixed effect regression $I_{it} = \beta X_{it} + \theta_i + \psi_j + \delta Flow_{jt} + \gamma Type_j * Flow_{jt} + \epsilon_{it}$, where I_{it} is one of the dependent variables of firm i at time t, X_{it} is a set of time-varying firm-level characteristics and year fixed effects, θ_i is firm fixed effect, ψ_j is a mutual fund family fixed effect, $Flow_{jt}$ is a measure of family-level flow of funds weighted by individual mutual funds holdings in firm i, and ϵ_{it} is a residual. $Type_j$ is a mutual fund family type – fixed effect ($\hat{\psi_j}$) estimated out of sample (before the year 2000) by running a three-way fixed effects regression $I_{it} = \beta X_{it} + \theta_i + \psi_j + \epsilon_{it}$. Columns (1), (3) and (5) are base-line specifications for each of the dependent variables. Columns (2), (4), and (6) add mutual fund family-level time-varying controls, as well as time-varying family-firm match-level controls.
c. F-statistics for joint significance of mutual fund family fixed effects (in sample) and the corresponding p-values are reported in the last two rows of the table.

	(1)	(2)	(3)	(4)	(5)	(6)
	Investment		R&D		M&A	
Flow	-0.000687	-0.000640	0.000219	0.000159	0.00632	0.00678
	(0.000852)	(0.000872)	(0.000153)	(0.000158)	(0.00438)	(0.00458)
Flow*Family FE	0.0634***	0.0593***	0.0488**	0.0611**	0.0428***	0.0449**
	(0.0225)	(0.0228)	(0.0244)	(0.0258)	(0.0141)	(0.0212)
lag(Total Assets)	-0.0256*	-0.0136	-0.0810***	-0.0660***	-0.0185	-0.0184
	(0.0134)	(0.0124)	(0.00458)	(0.00372)	(0.0328)	(0.0328)
Lag(Cash Flow)	0.00632**	0.0106***	0.00120*	0.00128**		
	(0.00316)	(0.00309)	(0.000686)	(0.000523)		
Lag(Tobin's Q)	0.0801***	0.0732***				
	(0.00574)	(0.00557)				
ROA			-0.215***	-0.215***	0.215***	0.215***
			(0.0181)	(0.0181)	(0.0821)	(0.0820)
Family Size		0.00281***		-0.000161**		0.00239
		(0.000680)		(7.24e-05)		(0.00148)
Holding Size		-0.0516		-0.105***		-0.120
		(0.0390)		(0.00985)		(0.0996)
Experience with Family		7.72e-05		-5.59e-05**		9.73e-05
		(8.25e-05)		(2.44e-05)		(0.000169)
Observations	1266737	1266285	854865	854590	1299826	1299362
F-stat, Family Effect	2.788	2.72	4.979	3.775	1.691	1.629
Prob>F	0	0	0	0	0	0

Robust stderr in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table IX
Robustness Tests

a.The dependent variable in all columns is capital expenditures over lagged net PP&E. Sample is mutual fund family-firm matched panel. The date range is 2000 - 2006 in columns (1) and (3), and 1995 - 2003 in column (2). Details on the definition of variables are available in Appendix A. Standard errors are clustered at the firm level.
b. Each column in the table is a robustness check for a regression in column (1) of Table III. Columns (1) and (2) represent the regression $I_{it} = \beta_1 X_{it} + \theta_i + \beta_2 Post*Scandal + \beta_3 Post*Scandal*Type_j + \beta_4 Type_j + \beta_5 Post + \beta_6 Scandal + \beta_7 Post*Type_j + \beta_8 Scandal*Type_j + \epsilon_{it}$, X_{it} is a set of time-varying firm-level characteristics and year fixed effects, θ_i is firm fixed effect, *scandal* is a dummy variable that equals 1 if a family was implicated in the 2003/4 trading scandal, *post* is a dummy variable that gets a value of 1 for the years including and after 2003, and ϵ_{it} is a residual. $Type_j$ is a mutual fund family type – fixed effect ($\hat{\psi_j}$) estimated out of sample by running a three-way fixed effects regression $I_{it} = \beta X_{it} + \theta_i + \psi_j + \epsilon_{it}$. Column (1) replaces the Type variable with a randomly assigned type. Column (2) replaces the event year for the scandal with the year 2000. Column (3) adds to the regression the set of interactions that use M&A and R&D types.
c. Additional controls in X_{it} include: For Investment – Lagged Total Assets, Lagged Cash Flow, Lagged Tobin's Q. For R&D – Lagged Total Assets, Lagged Cash Flows, ROA. For M&A – Lagged Total Assets, ROA.

	(1) Random Type	(2) Random Timing	(3) Other Types
Post*Scandal	-0.00750**	0.00364	-0.0517***
	(0.00375)	(0.00479)	(0.0177)
Post*Scandal*FamilyType	-0.0519	0.170	-0.752***
	(0.0961)	(0.182)	(0.221)
Post	-0.0991***	0.0274**	-0.0534***
	(0.0122)	(0.0123)	(0.0107)
Scandal	0.00584*	0.00516	0.0516***
	(0.00312)	(0.00333)	(0.0126)
Family Type	0.000455	0.810***	0.134***
	(0.000328)	(0.0664)	(0.0389)
Post*Family Type	0.00587	0.172***	0.0787
	(0.0727)	(0.025)	(0.0575)
Scandal*Family Type	0.0907	0.154**	0.572***
	(0.0921)	(0.077)	(0.114)
Family R&D Type			0.032
			(0.152)
Post*Family R&D Type			-0.380
			(0.280)
Scandal*Family R&D Type			-0.255
			(0.227)
Post*Scandal*Family R&D Type			1.877
			(1.433)
Family M&A Type			-0.0302
			(0.0263)
Post*Family M&A Type			0.0800
			(0.0765)
Scandal*Family M&A Type			0.218
			(0.277)
Post*Scandal*Family M&A Type			-0.019
			(0.0877)
Observations	906157	945138	897648
R-squared	0.567	0.633	0.568

Robust stderr in parentheses
*** p<0.01, ** p<0.05, * p<0.1

APPENDICES

Appendix A: Implicated Families

Table A1
Implicated Families

This table presents the list of mutual fund families implicated in the 2003/4 trading scandal. The second column is the date the news of the family being implicated was released.

Family Name	Scandal Date
ALGER	10/3/2003
PBHG	11/13/2003
SELIGMAN	1/7/2004
JANUS	9/3/2003
PUTNAM	9/19/2003
PILGRIM	11/13/2003
ALLIANCE	9/30/2003
STRONG	9/3/2003
INVESCO	12/2/2003
MFS	12/9/2003
PIMCO	2/13/2004
ONE MUTUAL	9/3/2003
EVERGREEN	8/4/2004
LOOMIS SAYLES	11/13/2003
PRUDENTIAL	11/4/2003
NATIONS	9/3/2003
EXCELSIOR	11/14/2003
ING	3/11/2004
COLUMBIA	1/15/2004
FRANKLIN	9/3/2003
FEDERATED	10/22/203
FREMONT	11/24/2003
AMERICAN	12/29/2003
HEARTLAND	12/11/2003
SCUDDER	1/23/2004

Appendix B: Estimation of Family Types

This appendix provides a short description of the procedure used to estimate shareholder types, following Abowd et al. (1999). For a more rigorous description, see, e.g., Abowd, Creecy, and Kramarz (2002). Rewrite equation 2 as:

$$\begin{aligned} I_{it} &= x'_{it}\beta + \psi_{J(i,t)} + \theta_i + \epsilon_{it} \\ &= x'_{it}\beta + \sum_{j=1}^{J} \psi_j d^j_{it} + \theta_i + \epsilon_{it} \end{aligned} \tag{5}$$

where d^j_{it}, $j \in \{1, \dots J\}$ are indicator variables:

$$d^j_{it} = \begin{cases} 1 & \text{if } J(i,t) = j \\ 0 & \text{otherwise.} \end{cases} \tag{6}$$

Abowd et al. (1999) estimate all the parameters of a similar type of equation by OLS. In particular, the OLS estimator of ψ is the within estimator:

$$I_{it} - I_i = (x_{it} - x_i)'\beta + \sum_{j=1}^{J} \psi_j (d^j_{it} - d^j_i) + \epsilon_{it} - \epsilon_i, \tag{7}$$

where $z_i = \frac{1}{T}\sum_{t=1}^{T} z_{it}$ for any variable z_{it}.

The methodology requires observing movers in every family j for the identification of ψ_j. If only one firm is observed for shareholder j and it is not observed elsewhere, then ψ_j is not identified. Moreover, the OLS estimator of ψ requires an exogenous firm-family assignment, that is, if $(d^j_{it})_{t\in\{1,\dots T\}} \perp (\epsilon_{it})_{t\in\{1,\dots T\}}$, $\forall \in \{1, \dots, N\}$.

After estimating ψ, we can obtain the OLS estimator of θ :

$$\hat{\theta}_i = I_i - x'_i\hat{\beta} - \sum_{j=1}^{J} \hat{\psi}_j d^j_i. \tag{8}$$

Appendix C: Variable Definitions

- Investment equals capital expenditures over lagged net property, plant, and equipment.
- R&D equals the ratio of R&D expenditures over lagged total assets.
- ROA equals the ratio of EBITDA over lagged total assets.
- Operating return on assets is the ratio of operating cash flow over lagged total assets.
- Tobin's Q equals the ratio of the market value of assets (book value of assets plus the market value of common equity less the sum of the book value of common equity and deferred taxes) over the book value of assets.
- Total assets is the log of book assets.
- Amihud (2002) illiquidity measure is defined as the yearly average of $1000000 * \frac{|Return|}{(DollarTradingVolume)}$ over all days with non-zero volume, using daily data.
- Mutual fund-level flow: $Flow_{jt} = [TNA_{jt} - TNA_{jt-1} * (1 + R_{jt})]/TNA_{jt-1}$, where TNA denotes total net assets, R is the return of the mutual fund j. Mutual fund family-level flows are calculated for each family-firm-year and are weighted average of individual mutual fund flows, where the weights represent the importance of the mutual fund holdings in the firm relative to the rest of the holdings of the family. I.e., $Flow_{iJt} = \sum_{j=1}^{J} \frac{\alpha_{jit} Flow_{jt}}{\sum_{j=1}^{J} \alpha_{jit}}$, where J denotes a fund family, j is an individual mutual fund, and α_{ijt} is a holding of fund j in firm i.
- Sensitivity of executive stock options to stock price, is based on Black-Scholes formula for valuing European call options, as modified by Merton (1973) (see, e.g., Yermack (1995)):

Option value: $V_o = [Se^{-dt}N(Z) - Xe^{-rT}N(Z - \sigma T^{(1/2)})]$,

where

$Z = [\ln(S/X) + T(r - d + \sigma^2/2)]/\sigma T^{(1/2)}$,

Φ = Cumulative probability function for the normal distribution,

S = price of the underlying stock,

X = exercise price of the option,

σ = expected stock-return volatility of the life of the option,

$r = \ln(1 + \text{interest rate})$, where interest rate is the rate on 7-Year Treasury Notes at the end of the indicated fiscal year,

T is a time to maturity of the option,

$d = \ln(1 + \text{dividend yield})$, where dividend yield is the expected dividend yield over the life of the option. This is the company's average dividend yield over the past three years.

The sensitivity of stock option value with respect to \$1000 change in the stock price is:

$$\text{Option Sensitivity } = 1000 * e^{-dt}\Phi(Z) * \frac{\text{shares granted in the option award}}{\text{shares outstanding at start of year}}.$$