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Incentive Realignment: Mutual Funds' Influence on Executive Compensation Contracts

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ABSTRACT

Using a regulation that increased portfolio disclosure frequency of US mutual funds as an exogenous shock shortening funds' investment horizon, we examine whether and how affected funds influence portfolio firms to achieve horizon realignment after the shock. We find that portfolio firms reduce the pay duration of their executives to incentivize them to have shorter investment horizon. We then show that funds affect this change through both voice and exit channels, i.e., voting on compensation-related issues and divesting from portfolio firms. The effect is more pronounced when funds have lower trading costs and are larger (with more reputation/resources) and when fund managers have stronger career incentives and are less distracted. We thus provide novel evidence on how institutional investors achieve incentive realignment dynamically.

1. Introduction

In publicly listed firms characterized by the separation of ownership and control, agency conflicts arise from misalignment of interests between agents (corporate managers) and principals (investors) (Jensen and Meckling 1976). One of the manifestations of agency problems is that there can sometimes be misalignment between the investment horizons, and therefore incentives/interests of corporate managers and firms' investors. Among other factors, exogenous shocks to investors' horizon can contribute to such misalignment, which can necessitate actions from investors to realign their investment horizon with that of corporate managers. Institutional investors by virtue of their significant stakes in firms and better information compared to retail investors are more likely to engage in such actions.

In this study, we exploit a shock to institutional investors' horizon to examine whether and how investors influence the horizon of compensation contracts of corporate managers to achieve horizon realignment after the shock. Specifically, we use the setting of U.S. mutual funds whose otherwise long-term investment horizons were affected by a regulatory shock in 2004 that forced funds to disclose their portfolios more frequently. Our interest in this regulatory shock is motivated by theoretical work that associates greater transparency of agents' actions with their heightened career concerns and exacerbated short-termism (Prat 2005; Hermalin and Weisbach 2012). In our setting, the increased portfolio disclosure frequency from semiannual to quarterly can potentially reveal fund managers' stock picking abilities to their investors in a timelier fashion, which helps investors assess fund managers and hold them accountable for fund performance. Indeed, Lakonishok et al. (1991) study window dressing of portfolio holdings and show that fund managers behave as if they are evaluated on portfolio holdings. Furthermore, Agarwal, Gay, and Ling (2014) find that fund flows respond to portfolio holdings over and above funds' past performance because holdings can serve as an ex ante measure of managerial ability while past performance is an ex

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post measure.[1] Consequently, the increased frequency of portfolio disclosure can exacerbate managers' career concerns. Consistent with theory, Agarwal, Vashishtha, and Venkatachalam (2018) document that career concerned fund managers focus more on short-term performance of their portfolio firms.[2] Therefore, a change in the portfolio disclosure frequency of US mutual funds is a plausibly exogenous regulatory shock that shortened funds' investment horizon.

In addition to mutual fund regulation providing us with a sharp identification, there are several other reasons why mutual fund setting is well suited to study issues related to investment horizon realignment between principals and agents. First, unlike other institutional investors such as hedge funds and venture capitalists, mutual funds are more likely to be long-term investors and therefore a negative shock to their investment horizon allows us to lend a meaningful causal interpretation to our findings. Second, mutual funds constitute the largest group of institutional investors that manage a significant amount of assets and have substantial ownership in firms.[3] Therefore, compared to relatively smaller and more dispersed retail investors, mutual funds are better positioned to exert their influence on portfolio firms. Finally, active equity mutual funds, which are the focus of our study, have strong incentives to engage with managers of portfolio firms because it helps them to create value for funds' investors and therefore attract more capital.

We use the horizon of compensation contracts to study horizon realignment because theory espouses executive compensation as an important tool to align interests of managers with those of shareholders (e.g., Ross 1973; Hölmstrom 1979, 1982; Grossman and Hart 1983; Edmans, Gabaix,

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[1] Wermers, Yao, and Zhao (2012) also argue that portfolio holdings reflect a fund manager's stock selection ability and contain valuable information about future stock returns. Agarwal, Jiang, and Wen (2022) use lottery stocks to further show that fund flows respond to disclosed portfolio holdings.

[2] Another reason for fund managers to hold stocks for a shorter period after more frequent portfolio disclosure would be to mitigate front running costs by other market participants including copycatting funds that can exploit proprietary information contained in disclosed portfolios (Agarwal et al. 2015).

[3] Worldwide, regulated funds manage $60.1 trillion in assets, which constitutes 26% of the value of equity and debt securities outstanding (see Investment Company Institute Fact Book, 2022).

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Sadzik, and Sannikov 2012; Marinovic and Varas 2019). Jensen and Murphy (1990) importantly note that what matters in executive compensation is not how much you pay, but *how* you pay. Echoing theoretical arguments, recent research on horizon incentives emphasizes the importance of certain features of compensation contracts, i.e., vesting terms that accompany equity grants, determining when executives can exercise (sell) their options (restricted stocks) (Cadman, Rusticus, and Sunder 2013; Gopalan et al. 2014). For example, shorter vesting terms (pay duration) can reduce managers' investment horizon (e.g., Kole 1997; Cadman and Sunder 2014) and lead to an increase in firms' short-term performance through inflation of accounting accruals (Gopalan et al. 2014) and reduction of investment in long-term projects (Edmans, Fang, and Lewellen 2017). Gopolan et al. (2014) futher note that pay duration captures the mix of short-term and long-term incentives in executive pay that cannot be measured using traditional compensation measures, like the delta and vega of equity compensation, which reflect the sensitivity of an executive's wealth to stock price changes and volatility, respectively. Given that pay duration is designed to influence managerial horizon and economically affect portfolio firms' short-term performance as suggested by these studies, it is an important dial to turn during the horizon realignment process. In doing so, mutual fund managers also avoid incurring significant effort and cost to analyze each portfolio firm's investment policy and to instruct firm managers on how to improve short-term performance.

Considerable anecdotal evidence supports above arguments. For example, in its proxy voting guidelines, Blackrock clearly states that it engages with portfolio firms on executive compensation and pay duration related issues:

"In many instances, we believe that direct discussion with companies, in particular with the members of the remuneration committee, can be an effective mechanism for building mutual understanding on executive remuneration issues and for communicating any concerns we may have on executive remuneration…. When evaluating executive remuneration arrangements, BlackRock will take into consideration… *the length of vesting and/or holding periods...*

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BlackRock expects executive remuneration arrangements to demonstrate *a clear link with the execution of strategy*."

Furthermore, Putnam's proxy voting guidelines suggest that shortening vesting terms may be necessary for achieving interest alignment under certain conditions. "The funds recognize that *accelerated vesting of equity incentives* … may help to align management and shareholder interests in some instances, and will evaluate shareholder proposals addressing accelerated vesting of equity incentive payments on a case-by-case basis."

Alternatively, mutual funds may not need any direct intervention to affect pay duration of firm managers. In our setting, mutual funds that become short-term focused are less willing to commit capital to stocks that appreciate in value only in the long run, as funds are motivated to show winning stocks in the short run. Their exit will inevitably result in a decline in stock prices. Lacking continuing capital allocation from mutual funds can perpetuate undervaluation over longer periods. As such, boards that are concerned about stock performance may cater to the preferences of mutual funds to avoid their exit (e.g., Stein, 1989; Shleifer and Vishny, 1990; Edmans, 2009).

The preceding discussions imply that short-term oriented mutual funds may induce portfolio firms to reduce pay duration of corporate managers. While intuitively appealing, it is not clear whether boards will accommodate mutual funds' demand for shorter pay duration to induce their firms' managers to be short-term oriented. Dikolli, Kulp, and Sedatole (2009) show that boards anticipate the preference of transient institutional investors over short-term performance and counteract their pressure on firm managers by designing compensation contracts focusing on long-term performance. Therefore, whether long-term oriented investors like mutual funds can influence pay duration of corporate managers remains an empirical question.

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One unique angle of our study is to document the channels through which funds influence portfolio firms' horizon for incentive realignment. Theoretical studies have documented two potential actions that large investors can take for horizon realignment (Grossman and Hart 1983; Shleifer and Vishny 1986; Huddart 1993; Edmans 2009). First, institutional investors can actively engage with firms' managers and try to influence their horizons such that alignment of interests is restored —the "voice" mechanism. Second, institutional investors can also divest from portfolio firms whose managers' horizon do not align well with theirs —the "exit" mechanism. In theory, mutual funds may start with "voice" to actively influence investment horizon of investee firms.[4] "Exit" is expensive for funds, especially for those with high ownership, as they have presumably exerted significant effort in acquiring and processing information about firms in the first place before making their investment decisions. Therefore, in order to rebalance their portfolios, these funds would need to re-incur information-related costs in addition to transaction costs such as price impact.

The voice mechanism often requires funds to either engage in behind-the-scenes intervention, i.e., initiating private discussions with firms' managers and boards (Carleton, Nelson, and Weisbach 1998; Becht et al. 2009; Dimson, Karakas, and Li 2015; McCahery, Sautner and Starks 2016), or publicly vote on corporate proposals at annual shareholder meetings. Mutual funds may also use the threat of exit to reinforce behind-the-scenes intervention. When portfolio firms fail to respond to funds' voice, funds may end up resorting to the "exit" mechanism, i.e., voting with their feet. Unfortunately, due to the nature of the behind-the-scenes intervention and the threat of exit, they are inherently unobservable. We sidestep this challenge by focusing on funds' voting

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[4] For theoretical models related to the voice mechanism, see e.g., Shleifer and Vishny (1986), Burkart, Gromb, and Panunzi (1997), Kahn and Winton (1998), and Maug (1998).

at shareholder meetings and changes in their ownership to provide evidence on the voice and exit mechanisms, respectively.

We document several findings that are consistent with mutual funds effecting changes in compensation contracts of corporate managers for horizon realignment. First, we find that pay duration of corporate managers experiences a significant decline post regulation when their firms have high ownership by funds affected by the regulatory shock. In evaluating our results, we take into consideration the multiple hypotheses testing (MHT) concern since there are several prior studies (i.e., Agarwal et al. 2015; Agarwal et al. 2018) investigating the same 2004 SEC disclosure regulation shock. Using the adjusted t-statistic critical values developed by Heath, Ringgenberg, Samadi, and Werner (2023), we find that the magnitude of the t-statistic (-3.21) of the coefficient on *Treat×Post* is much larger than the suggested critical value (2.26 at the 5% significance level).[5] The economic magnitude is also large. Corporate manager's pay duration, on average, reduces by 15%. This suggests that funds' short-termism because of more frequent mandatory portfolio disclosure provides them with incentives to influence the compensation contracts of corporate managers such that they also have incentives to focus on short-term firm performance. It is worth noting that our findings are unlikely to be explained by the passage of SFAS 123R, a regulation requiring firms to expense stock options during their vesting periods. Cadman et al. (2013) show that firms lengthen vesting periods to minimize the negative impact of option expenses on earnings in a given year, which is opposite from our findings that firms decrease pay duration in response to mutual funds' short-termism. Second, we find that funds use both voice and exit mechanisms to effect changes in compensation contracts. Consistent with both survey-based academic evidence (McCahery, Sautner, and Starks 2016) as well as anecdotal evidence (Kerber 2015; Morgenson

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[5] We provide the details of the adjusted t-statistic critical values in Section 4.5.2.

2016)[6] that mutual funds govern through voice, we observe that fund managers are more likely to vote on compensation-related proposals during shareholders' annual meetings after the regulatory shock, and even choose to deviate from the "one-size-fits-all" recommendations of the proxy advisory firm, Institutional Shareholder Services (ISS) (Iliev and Lowry, 2015).[7] Moreover, we find that portfolio firms that do not adjust pay duration in response to the changes in mutual funds' horizon, experience a decline in fund ownership indicating that fund managers vote with their feet and credibly use the threat of exit to influence portfolio firms' executive compensation policy.

Confounding events are unlikely to explain our results for several reasons. First, a difference-in-differences (DiD) analysis suggests that the results are not driven by contemporaneous events because control groups should be less affected by the regulation despite facing the same concurrent confounding events. Second, we do not observe a decrease in pay duration for managers of portfolio firms that are held by institutions unaffected by the portfolio disclosure regulation. These include mutual funds that voluntarily adopt more frequent portfolio disclosure prior to the regulation, non-mutual funds, and hedge funds. In addition, we conduct a placebo test using a pseudo-event year before our sample period. We do not find significant changes in pay duration, suggesting that a general temporal trend is unlikely to explain our results.

To further lend causal interpretation to mutual funds' efforts related to horizon realignment, we conduct four cross-sectional tests to identify instances where we would expect stronger/weaker effects when funds have less execution cost of trading, less attention, more resources and reputation, and greater incentives. First, prior studies have shown that institutional investors can trade stocks at a lower cost if the underlying stocks are more liquid (Bhide, 1993; Chan and

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[6] See related statements from Ed Sweeny, a spokesman for BlackRock, Michelle Edkins, head of BlackRock's investment stewardship unit (Kilroy 2018; Morgenson 2016), and Michael Kagan, a senior portfolio manager at ClearBridge (Kerber 2015).

[7] As there is no voting specifically on pay duration, we consider voting related to compensation contracts, in general.

Lakonishok, 1993). Thus, we expect that the management of portfolio firms is more likely to accede to funds' demand in the presence of high stock liquidity, as the cost of selling stocks will be lower for mutual funds, which raises boards' concern about funds exiting their firms. As predicted, we find that the reduction in compensation duration is more pronounced among firms with more liquid stocks. Second, mutual fund managers hold many different firms in their portfolios and may be able to pay only limited attention to these firms. Therefore, funds are unlikely to exert the same level of pressure on all their portfolio firms. Consistent with this argument, we find that the decline in pay duration is less pronounced when fund managers invest in firms experiencing industry-specific shocks, which can distract the attention of fund managers. Third, larger mutual funds have more resources to influence the management of portfolio firms, and as being more reputed investors, their exit can cause a greater price impact on stock portfolio firms than small funds. Indeed, we find that the reduction in pay duration is more pronounced for firms with greater ownership stakes by larger affected funds. Finally, to the extent that the new regulation significantly exacerbates career concerns of fund managers, younger fund managers who need to build their reputation in the labor market should have stronger incentives to coerce portfolio firms into focusing on short-term performance post regulation. Consistent with this prediction, we document that the decline in pay duration is more pronounced among firms in the portfolios of younger fund managers.

2. Related Literature and Our Contribution

Our study contributes to several strands of literature. First, our study adds to the vast body of research that investigates incentive alignment between principals and agents. Extant research in this area primarily focuses on determinants and economic consequences of interest misalignment between principals and agents without formulating dynamic changes between the two parties (e.g., Jensen and Meckling 1976; Jensen 1989; Mehran 1995; Core, Holthausen, and Larcker 1999). We

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depart from this line of research in that we show that investors' horizons are not necessarily static but dynamic. Using an exogenous shock, we show the underlying mechanisms through which institutional investors can facilitate incentive realignment dynamically.

Second, we extend the literature on executive compensation. Practitioners often view institutional investors as active participants involved in setting compensation policies of corporations (see Sullivan 1995 and Useem 1996). Hartzell and Starks (2003) confirm this view by showing that institutional ownership concentration improves the link between managerial compensation and firm performance. We depart from prior research in that we find specific institutional investors' characteristics, such as different disclosure requirements faced by certain institutional investors, matter for executive compensation. Moreover, we provide insights into the channels through which institutions can influence the design of executive compensation contracts. Our study complements and extends that of Cadman and Sunder (2014) who show that short-term incentives of venture capitalists around initial public offerings are associated with short-horizon incentives of corporate managers. Compared to venture capitalists (VCs) and activist hedge funds who often hold board positions to exert influence as *insiders*, mutual funds tend to intervene from *outside* using entirely different approaches compared to VCs. We show that as outsiders, mutual funds can use both voice and exit channels to achieve incentive realignment.

Third, we extend the literature on disclosure that has long centered on the consequences of *corporate* disclosure, including the cost of capital (Healy and Palepu 2001; Verrecchia, 2001), contracting efficiency (Bushman and Smith 2001; Lambert 2001; Armstrong et al. 2010), and investment decisions (McNichols and Stubben 2008; Kraft et al. 2018). In this study, we change the angle to *investors'* disclosure and its influence on compensation contracting in corporations.

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Our results shed light on the real effect of disclosure beyond the traditional focus on corporate disclosure.

Finally, our paper is related to the corporate myopia literature. Prior work in this literature often blames corporate managers' experience, capital market pressure, financial reporting by firms, and short-term oriented investors for causing corporate managers to behave myopically (Narayanan 1985; Stein 1989; Porter 1992; Graham, Harvey, and Rajgopal 2005). In particular, empirical studies show that certain institutional investors can contribute to managers' myopic behavior in terms of lower long-term investments such as R&D (Bushee 1998), less negative earnings surprises (Matsumoto 2002), and less innovation (Fang, Tian, and Tice 2014; Agarwal, Vashishtha, and Venkatachalam 2018). While this line of research advances our understanding on the influence of certain investors on corporate myopia by focusing on various corporate outcomes, it remains largely unknown *how* these investors affect managers' myopic behavior. We fill this void by revealing a specific mechanism through which institutional investors exert influence on corporate managers. Specifically, they can alter executive compensation contracts and incentivize managers to pursue myopic corporate policies. It is also worth noting that our study is different from above studies in that we focus on a more general approach that can be used by mutual funds for a broad spectrum of portfolio firms, given that many firms do not have R&D or patents.

3. Regulation Setting, Sample, and Variable definition

3.1 Institutional background of mutual fund disclosure regulation in 2004

Under the Investment Company Act of 1940, mutual funds were required to publicly disclose their portfolio holdings semi-annually using Form N-30D until May 2004. Through portfolio disclosure, the SEC aimed at improving investors' understanding and monitoring of mutual funds' asset allocation decisions. However, semiannual portfolio disclosure had been widely criticized for lacking timely information and being vulnerable to funds' manipulation such

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as window dressing closer to disclosure dates (Lakonishok et al. 1991; Sias and Starks 1997; He, Ng, and Wang 2004; Ng and Wang 2004; Agarwal, Gay, and Ling 2014) or style drift, i.e., deviation from their stated investment style (Cao, Iliev, and Velthuis 2017). As a result, the SEC amended the Investment Company Act of 1940 in May 2004 by mandating mutual funds to increase the frequency of portfolio disclosure from semiannually to quarterly.[8]   Instead of Form N-30D, the new regulation stipulated mutual funds to file two new forms, Form N-CSR and Form N-Q, within 60 days of their fiscal quarter ends.

Proponents of the 2004 mutual fund disclosure regulation believe that quarterly disclosure provides investors with timely information on fund managers' specific stock picks, thus facilitating better evaluation of fund managers' ability and close monitoring of fund performance and investment style. Consistent with this argument, Agarwal, Vashishtha, and Venkatachalam (2018) present evidence that disclosed portfolios provide useful information over and above that from fund performance, and fund managers behave as if they are evaluated based on their stock picks and not just fund returns.

However, tighter monitoring from investors may in turn increase career concerns of fund managers and motivate them to focus more on near-term performance of portfolio firms. Prat (2005) theoretically analyze greater transparency achieved through more frequent portfolio holdings disclosure. He shows that greater transparency about specific stock picks can encourage agents to take actions that are considered to be signals of high ability by the principal. That is, fund managers become more short-term focused as they are less willing to show losing stocks in their disclosed portfolios even if these stocks have greater long-term potential and just "appear" as bad picks to fund investors because of poor short-term performance. Anecdotal evidence supports this

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[8] For details, see the SEC Final Rule IC-26372 on May 10, 2004 at http://www.sec.gov/rules/final/33-8393.htm.

theoretical prediction. For example, Investment Company Institute (ICI), an association representing regulated investment funds, opposed this regulation by arguing that "it would focus undue attention on individual portfolio securities and could encourage a short-term investment perspective" (Tyle, 2001). Therefore, we believe the 2004 regulatory change regarding mutual funds' portfolio disclosure frequency provides a natural shock to fund managers' horizon. Specifically, it creates incentives for funds to influence portfolio firms' compensation policies such that corporate managers will focus on short-term results, and necessitates changes in compensation contracts from portfolio firms because of increased concerns about adverse price reaction due to mutual funds divesting from firms.

3.2 Data and sample selection

Following Agarwal et al. (2015), we identify mutual funds affected by the regulation requiring more frequent portfolio disclosure. Specifically, we collect portfolio disclosure dates from multiple data sources (SEC EDGAR, Morningstar, and Thomson Reuters S12). Prior to the increase in the frequency of mandatory portfolio disclosure, several funds voluntarily disclosed their portfolios to the SEC through Form N-30B2 or to commercial data vendors such as Morningstar and Thomson Reuters. We carefully identify all the dates that do not correspond to mandatory disclosures and exclude voluntary reporters. We also exclude passive funds from the treatment group in our analysis because – by construction – they mimic their benchmarks and therefore investors learn little from their portfolio disclosure. Accordingly, we identify 1,459 actively managed equity mutual funds that were affected by the SEC regulation change. Next, we obtain data on portfolio holdings of our sample funds from the Thomson Reuters S12 database to compute funds' ownership in portfolio firms during the period 2001-2007. We exclude the year 2004 from our analysis because it is the event year. We obtain contracting terms of executive compensation from the Institutional Shareholder Services (ISS) Incentive Lab database during

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three years before (2001-2003) and after (2005-2007) the regulation change.[9] An important advantage of Incentive Lab over ExecuComp is that it has a comprehensive coverage on vesting terms of each equity grant awarded to executives. The ISS Incentive Lab universe has 12,819 CEO/CFO-Year observations from 2001 to 2007 excluding the event year of 2004. After merging the CEO/CFO compensation data with necessary variables from Compustat and Execucomp, we have 8,077 CEO/CFO-year observations in our final sample.

3.3 Variable definition

Following Gopalan et al. (2014), we focus on annual compensation duration instead of cumulative horizon incentives because the latter contain equity compensation granted before the regulation change in 2004, which makes it difficult to disentangle changes in compensation contracting attributable to the regulatory shock. We use detailed vesting information of annual stock options and restricted stock grants to compute the duration of equity-based compensation. Stock option grants can have multiple tranches vesting at the same time or on different dates. Therefore, we calculate the duration of stock options as follows:

$$Stkopt\ duration = \frac{1}{Stkopt\ grant}\sum_{i=1}^{n}t\times Vest_i \qquad (1)$$

where $Vest_i$ is the number of options in grant i, and t is the vesting period for all the options of a given grant. *Stkopt grant* is the total number of stock options granted in a given fiscal year.

Similarly, we compute the duration of restricted stock grants as follows:

$$Rststk\ duration = \frac{1}{Rststk\ grant}\sum_{i=1}^{n}t\times Vest_i \qquad (2)$$

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[9] The ISS Incentive Lab database covers the largest 750 firms in the U.S. (based on their market capitalization) each year.

where $Vest_i$ is the number of restricted stocks in grant i, and t is the vesting period for all the restricted stocks of a given grant. *Rststk grant* is the total number of restricted stocks granted in a fiscal year.

We then construct an overall measure of annual compensation duration by taking into account both cash and equity-based compensation as follows:

$$Compensation\ Duration = \frac{Stkopt\ Duration \times Opt\ Value + Rststk\ Duration \times Rststk\ Value}{Salary + Bonus + Otherann + Opt\ Value + Rststk\ Value} \quad (3)$$

Opt Value is the Black and Scholes (1973) value of option grants and *Rststk Value* is the market value of restricted stock grants. *Salary, Bonus,* and *Othann* are the salary, bonus, and other annual cash components, respectively, which should have zero compensation duration by definition.[10]

We use mutual fund ownership data from the Thomson Reuters S12 database. First, for each firm in a given quarter, we calculate the total ownership of the 1,459 mutual funds that are affected by the 2004 SEC regulation change. Affected mutual fund ownership in a firm is computed as the sum of shares owned by these funds divided by the total number of outstanding shares. When stock holdings during a quarter are not available, we use holdings as of the end date of the previous quarter. If the previous holding information is missing, we set holdings to zero. Next, we identify treatment firms as those with above-median average ownership by affected funds, where the average ownership is measured over three years prior to the regulation change.

We control for a host of firm-level and executive-level characteristics that can affect the duration of executive compensation. These include *Size* measured as the natural logarithm of total assets at the fiscal year end, and *Leverage* computed as the book value of debt scaled by total assets

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[10] While salaries, bonuses, stock options, and restricted stocks constitute the majority of an executive's compensation package, we acknowledge that the compensation duration measure does not take into consideration other compensation components (e.g., inside debt and clawback provisions) that may have a bearing on the managerial horizon. One of the challenges associated with incorporating those components lies in the lack of a widely accepted method to quantify their value and duration. Therefore, it is common practice in the literature to exclude components such as inside debt and clawback provisions.

at the fiscal year end. Following Gopalan et al. (2014), we control for firms' growth opportunities through the book-to-market ratio (*BM*), calculated as the book value of equity over the market value of equity at the end of the fiscal year. We also control for firms' accounting performance through return on assets (*ROA*), measured as the net income before extraordinary items over the average of total assets. Because Gopalan et al. (2014) document significant differences in the capital expenditure intensity and the R&D intensity between firms with long and short executive compensation duration, we control for these two intensities. Specifically, we compute *Capex* as capital expenditure scaled by total assets, and *R&D* as R&D expenditures scaled by total assets. We include *STD_ROA* to capture the risk in firms' operations, estimated as the standard deviation of ROA over the prior five fiscal years. Following Hartzell and Starks (2003) who find the influence of external forces on compensation design, we include two additional controls: *Nanalyst*, the average number of analysts providing quarterly earnings forecasts on the firm during the fiscal year, and *INST_OWN*, institutional ownership measured at the end of each fiscal year. To consider the pay difference between CEOs and Chief Financial Officers (CFOs) we control for, *ANN_CFO,* an indicator variable set equal to 1 for the CFOs, and 0 otherwise. Since managerial horizons may differ for executives close to retirement, we include another indicator variable (*RET_AGE*) that is set equal to 1 for executives older than or equal to the age of 62, and 0 otherwise.

3.4 Descriptive statistics

Table 1 presents descriptive statistics for the variables used in our empirical analysis. The mean compensation duration is about 15 months in our sample, comparable to the mean duration of 1.2 years reported in Gopalan et al. (2014). Our sample firms are relatively large and exhibit good accounting performance, with an average *Size* of \$3,928 million ($e^{8.276}$) and an average ROA of 4.4%. The mean values of *Leverage* and *BM* are 23.5% and 47.8%, respectively. The mean values of *Capex* and *R&D* are 5.7% and 3.3% of total assets, respectively. The average sample

firm is followed by around 15 analysts and has 71.8% of its shares being held by institutional investors. CFO-related observations constitute about 46% of our sample. There are about 10% of firm-year observations in which executives are of retirement age.

4. Empirical findings

4.1 Baseline analysis

We adopt a difference-in-differences (DID) approach to compare changes in compensation duration after the 2004 regulatory shock between firms with high ownership by affected mutual funds (treatment firms) and firms with low ownership by affected mutual funds (control firms) using the following specification:

$$Compensation\ Duration_{i,t} = \alpha_i + \beta_t + \gamma Treat_i \times Post_t + \delta X + \varepsilon_{i,t} \qquad (4)$$

where *Compensation Duration* is the measure of annual compensation duration as defined in the Section 3.3. *Treat* is an indicator for firms with high (above-median) ownership by mutual funds affected by the SEC regulation where ownership is the average ownership during three years prior to the regulation. *Post* is an indicator variable that equals one for observations in which the fiscal year end is after the regulatory shock in May 2004, and zero otherwise. Given that it is difficult to observe whether firms' compensation policies in 2004 are set before or after the effective date of the regulation, we exclude the year of 2004 from our sample. *X* is a vector of time-varying control variables defined previously in Section 3.3. α and β are firm and time fixed effects, respectively. The main effects of *Post* and *Treat* are subsumed in time and firm fixed effects, respectively. In our estimation, we include data for up to three fiscal years before and after the regulation to focus on the regulatory shock and mitigate any other confounding effects.

Note that firms can adjust their executive compensation terms during a year without waiting until their annual shareholder meetings. For example, a survey conducted by the National

Association of Corporate Directors (2017) indicates that compensation committees on average meet in person four to five times and on the phone twice per year. The main purposes of these meetings include but are not limited to approving incentive-based compensation and equity-based plans for all executives, drafting new incentive plans, and setting or approving plan goals and grant-level features like vesting schedules (PwC 2018). Therefore, it is appropriate to consider 2005 as the first year after the regulatory shock for our empirical analysis.

Table 2 presents results from the estimation of our baseline specification in equation (4). Our primary coefficient of interest is γ, the coefficient on the interaction term, *Treat×Post*, which measures the average change in compensation duration of treatment firms relative to the average change in compensation duration of control firms. Columns (1) and (2) differ in terms of whether we include other control variables besides the fixed effects in the model. In Column (1) where control variables are excluded, we find γ is negative and statistically significant at the 1% level (coefficient = −2.080; *p*-value<0.01), providing supporting evidence that compensation duration of portfolio firms decreases after the regulation shortens the investment horizon of mutual fund managers.

Column (2) presents the regression results after including time-varying controls. The coefficient on *Treat×Post* remains negative and statistically significant (coefficient = −2.168; *p*-value < 0.01). In terms of economic significance, the decrease in compensation duration after the regulatory shock is about 15% of the unconditional mean of compensation duration.[11] The economic significance is comparable or even larger than that documented in prior research. For example, Gopalan et al. (2014) find that compensation duration increases by 0.102 years when the

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[11] The economic magnitude is calculated as the estimated coefficient (−2.168) divided by the sample mean of compensation duration (14.771) in Table 1.

book-to-market ratio increases from the 25th percentile to the 75th percentile. In column (3), we test the parallel trend assumption for the validity of the DID design and simultaneously examine the persistence in the decline of compensation duration. We replace *Treat×Post* with two interaction terms where we interact *Treat* with each of the two years prior to the regulation (*Pre2×Treat* and *Pre1×Treat*), and three interaction terms where we interact *Treat* with each of the three years following the regulation (*Post1×Treat, Post2×Treat*, and *Post3×Treat*). We find that neither *Pre2×Treat* nor *Pre1×Treat* is significant, suggesting that compensation duration of treatment firms is not significantly different from that of control firms before the regulation shock. That is, compensation duration follows a parallel trend for treatment and control firms prior to the regulation. In contrast, the coefficients on *Post1×Treat, Post2×Treat,* and *Post3×Treat* are all negative, and are both statistically and economically significant. For ease of illustration, we plot the coefficient estimates in Figure 1. This evidence suggests that the negative effect of the SEC regulation on compensation duration persists during the post-event period.

4.2 Placebo tests

In this section, we conduct both cross-sectional and time-series placebo tests to further draw causal inferences from our results.

4.2.1 Cross-sectional placebo test

One concern related to our main findings is that they may be capturing a general trend in compensation duration among firms with large holdings by institutional investors. To investigate this possibility, we use four groups of institutional investors whose frequency of portfolio disclosure was unaffected by the SEC regulation and examine whether firms with large ownership by those unaffected institutional investors also exhibit similar declines in compensation duration. If we continue to find similar results for this unaffected group, it would indicate the presence of a general trend in the effect of institutional ownership on compensation duration.

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The first placebo group comprises of mutual funds that voluntarily disclose their portfolio holdings on a quarterly basis prior to the SEC regulation (voluntary adopters). One limitation with using this placebo group is that such voluntary reporting may not be a random choice and therefore voluntary reporters can be fundamentally different from their peers disclosing their portfolios mandatorily (Ge and Zheng 2006). To address this concern, we follow Agarwal et al. (2015) and use a propensity-score-matched sample of voluntary reporters.[12] The second and third placebo groups involve non-mutual fund investors and hedge funds, respectively. These institutional investors are subject to different disclosure requirements under Section 13(f) of the Securities and Exchange Act of 1934, and therefore are unaffected by the 2004 SEC regulation, which applies only to mutual funds.

To conduct the cross-sectional placebo test, we construct an indicator variable for large ownership by unaffected institutional investors (*Unaffected*) and include a new interaction term, *Unaffected×Post*, in our baseline specification in equation (4). Specifically, *Unaffected* is set equal to one for above-median ownership of an unaffected investor group in a firm. Using this approach, we can compare the effect of affected mutual funds' ownership on compensation duration to that of similar ownership of unaffected (i.e., placebo) investor groups.

Panel A of Table 3 provides firm charactertics of our treatment and placebo (unaffected) samples. We do not find these firm characteristics to be significantly different between the treatment and placebo samples. Panel B of Table 3 presents the results from our cross-sectional placebo tests. Across all specifications (propensity-score-matched voluntary reporters in Column 1, non-mutual funds in Column 2, and hedge funds in Column 3), the coefficients on *Treat×Post* continue to be negative and significant at the 1% level, while the coefficients on *Unaffected×Post*

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[12] We construct the propensity-score-matched sample of mutual fund voluntary disclosers by estimating a logistic model that includes fund characteristics such as expense ratio, turnover, size, and manager age.

are neither statistically nor economically significant for each placebo group. This evidence confirms that our primary results are unlikely to be driven by unobserved trends in compensation duration that coincide with the SEC regulation.

4.2.2 Time-series placebo test

To further alleviate the concern that we may be observing a time trend of decreasing compensation duration, we conduct a time-series placebo test. Specifically, we compare the DID coefficient estimate of our baseline model in Table 2 for the event year of 2004 with the DID estimate using 2001 as a pseudo-event year. We choose 2001 as the pseudo-event year because our compensation sample starts in 1998 and we need three years before and after the pseudo-event without overlapping with the post-regulation period. Results reported in Panel C of Table 3 show that the DID estimate using the pseudo-event year is not statistically significant and is significantly different from the DID coefficient for the actual event year of 2004.

4.3 Channels through which mutual funds influence executive compensation

In this section, we evaluate potential channels through which mutual funds influence portfolio firms' compensation contracting. Specifically, we look at the role of mutual funds in shareholder voting on compensation-related issues during annual shareholder meetings. We also examine whether mutual funds divest from portfolio firms that fail to respond to their demands.

4.3.1 Shareholder voting during annual meetings

Mutual fund managers can use their voting power at shareholder meetings to directly influence portfolio firms' executive compensation (Kerber 2015; Morgenson 2016). By virtue of large holdings in portfolio firms, mutual funds can easily influence voting outcomes that favor compensation policies advancing their own interests. While details of compensation-related issues discussed during shareholder meetings and voting outcomes are not directly observable, we use the frequency of compensation-related votes in both management and shareholder proposals to

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infer whether mutual funds actively increase their involvement in voting on compensation-related proposals after the SEC regulation. An increase in the frequency of votes on executive compensation would be supportive of mutual funds' attempt to change compensation structure to advance their own interests. We collect data on compensation-related votes by affected mutual funds from the Institutional Shareholder Services (ISS) Voting Analytics database. Because voting information became available only after June 2003, we use 11 months before May 2004 as the pre-event period and 11 months after May 2004 as the post-event period.[13] It is worth noting here that the SEC had not adopted say-on-pay rules until 2011. Therefore, our results regarding compensation-related votes are unlikely to be driven by say-on-pay votes. We estimate the following regression:

$$MF\_VOTE_{i,t} = \kappa_i + \lambda Treat_i \times Post_t + \theta Post_t + \vartheta Controls + \xi_{i,t} \qquad (5)$$

MF_VOTE is the frequency of mutual fund votes on compensation-related proposals. To be specific, we count the number of mutual funds' votes on these proposals for each firm in the pre-event period and post-event period. Furthermore, given that ISS generally adopts a one-size-fits-all approach to governance by issuing 'blanket" recommendations (Iliev and Lowry 2015), affected funds that focus on short-term firm performance may deviate their votes from ISS recommendations. Thus, our second measure of the mutual fund voting frequency only counts funds' votes that deviate from recommendations by ISS. We control for a host of firm characteristics including the firm size, leverage, book-to-market ratio, ROA, R&D expenditure, capital expenditure, board size, and institutional investors' ownership that can simultaneously

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[13] Our findings are not likely to be driven by the rule on mandatory disclosure of mutual fund voting passed in June 2003, as both pre- and post-event periods here are after June 2003.

influence funds' voting decisions. Following Ashraf, Jayaraman, and Ryan (2012), we also control for CEO tenure, which serves as a proxy of potential executive entrenchment.

Table 4 presents results of regression in equation (5). In Column (1), the dependent variable is the frequency of compensation-related votes by mutual funds. The coefficient on *Treat×Post*, λ, is significantly positive (coefficient = 18.756; *p*-value = 0.08), suggesting that affected funds increase their votes on compensation-related proposals after the SEC regulation compared to other funds. In terms of economic magnitude, affected funds increase their votes by two-thirds during the post-regulation period compared to the pre-regulation period.[14] In Column (2), we present estimation results where the dependent variable is the frequency of mutual funds' compensation-related votes that deviate from ISS recommendations. The coefficient on *Treat×Post*, λ, is again significantly positive (coefficient = 10.540; *p*-value = 0.05), indicating that affected funds' participation in compensation-related voting that deviates from ISS recommendations increases after the SEC regulation.

Taken together, this evidence of an increase in funds' involvement in compensation-related voting suggests that shortened compensation duration after more frequent portfolio disclosure that we document earlier is associated with mutual funds' use of voice mechanism.

4.3.2 The Exit Channel

The exit channel (the so called "voting with the feet" phenomenon) is another effective way through which mutual funds can influence corporate policies. Large shareholders exiting a firm is often viewed as a negative signal regarding the firm's future growth prospects, resulting in a stock price decline. Since corporate boards are generally concerned about stock performance,

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[14] The unconditional mean of the frequency of mutual fund votes on compensation-related proposals (*MF_VOTE*) is 28.158. In our sample, about seven proposals are voted on per meeting, and 58 mutual funds participated in voting each meeting, on average.

threat of exit by mutual funds can pressurize boards to yield to funds' demand for policy changes that can include compensation contracts. In a survey conducted by McCahery, Sautner, and Starks (2016), two-thirds of respondents, who are institutional investors, believe that they can threaten exit with as little as 2% ownership and coerce corporations into changing their policies. While threat of exit is not directly observable, we can infer its existence from examining whether mutual fund managers indeed sell their holdings in firms that do not yield to their demand for shorter compensation duration. To this end, we compute ownership of mutual funds affected by the SEC regulation in the post-event period and examine whether funds reduce their ownership in firms that do not decrease executives' compensation duration. We estimate the regression as follows:

$$Treat\_ownership_{i,t} = \mu_i + \nu_t + \omega Duration\_No\_Decrease_i \times Post_t + \rho Controls + \eta_{i,t} \qquad (6)$$

where $Treat\_ownership$ is ownership of funds affected by the SEC regulation and $Duration\_No\_Decrease$ is set equal to one if a firm's average compensation duration during the post-event period is higher than or equal to the average compensation duration before the regulatory shock, and zero otherwise. We control for a host of other factors that affect fund ownership as identified in prior research. These include firms' size, leverage, book-to-market ratio, Tobin's Q, dividend yields, market capital, operating cash flows, and analyst following. In addition to controlling for their contemporaneous values, we also include the lagged values of the book-to-market ratio, Tobin's Q, and dividend yields into the model. Lastly, we control for time and firm fixed effects. We expect ω to be negative if firms whose boards do not yield to mutual fund pressure experience declines in ownership by affected funds.

Results in Table 5 show that the coefficient ω on *Duration_No_Decrease×Post* is significantly negative (coefficient = −0.007; *p*-value = 0.06), supporting the exit channel. This result also indicates that the threat of exit is credible in that affected mutual funds indeed reduce

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their ownership in firms that do not decrease compensation duration. In terms of economic significance, the average drop in the ownership of affected mutual funds is 6% among firms that do not shorten compensation duration.

4.4 Cross-sectional tests based on firm and institutional characteristics

In this section, we conduct four cross-sectional tests to corroborate that mutual fund managers influence the duration of executive compensation contracts to facilitate a better alignment of corporate managers' horizons with those of fund managers. Specifically, we identify instances where we would expect stronger/weaker effects using four characteristics that include stock liquidity, fund managers' distraction, funds' resources and reputation, and career concerns of fund managers.

4.4.1 The effect of stock liquidity

As discussed previously, one of the factors that prevent affected funds from exiting their portfolio firms is transaction costs. Prior research documents that institutional investors' execution cost of trading stocks is much lower if underlying stocks are more liquid (Bhide 1993; Chan and Lakonishok 1993). That is, mutual funds should more easily sell their positions in those portfolio firms that have more liquid stocks if the firms do not yield to funds' demand, presenting a real threat to the boards of portfolio firms. Thus, we expect the decrease in compensation duration to be more pronounced for firms with more liquid stocks. We also acknowledge the possibility that the price impact is lower for more liquid stocks. That is, if mutual funds exit, stock prices may not fall enough to really hurt firms.

We use three measures of stock liquidity: (1) the Amihud measure (Amihud, 2002), (2) the relative bid-ask spread weighted by trade size (Size-weighted relative spread), and (3) two times the absolute value of the percentage difference between the execution price and the bid-ask midpoint (with the denominator being the bid-ask midpoint) averaged daily. The latter two

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measures are calculated using the high-frequency TAQ data. Next, we compute the average of the liquidity measures for each firm during the post-regulation period and split our sample using the corresponding median values.

Table 6 presents regression results estimated using each subsample. In Panel A where stock liquidity is measured using the Amihud measure, we find that the negative effect of the regulatory shock on compensation duration is more pronounced in the higher-liquidity sample. In Panels B and C, where liquidity is measured using the trade-size weighted spread and the effective spread, respectively, we find that the effect of the SEC regulation on compensation duration is much stronger among firms with more liquid stocks. The difference in the coefficient estimates between the more liquid and less liquid subsamples is statistically significant at the 10% level or better in the three panels. The findings in Table 6 support our expectation that portfolio firms may be more willing to align their managers' incentive with that of mutual fund managers when mutual funds can more easily liquidate a firm's stock.

4.4.2 Distraction of mutual fund managers

Investors, even sophisticated ones, can have limited attention. Kempf, Manconi, and Spalt (2017) document that institutional investors can be distracted by exogenous shocks that affect part of their portfolios and shift their attention away from the rest of the firms in their portfolios. This would suggest that distracted mutual fund managers may not be able to influence portfolio firms to alter compensation contracts. Thus, we conjecture that larger ownership by distracted funds should be associated with less pronounced effect on compensation duration.

To test this prediction, we modify the fund-level distraction measure of Kempf, Manconi, and Spalt (2017) to compute a firm-level proxy for the degree to which mutual funds are distracted in a given firm-quarter. To be specific, we identify distracted funds within our sample of funds affected by the SEC disclosure regulation. The main intuition behind the distraction measure is

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that a fund is more likely to be distracted towards an industry if an attention-grabbing event occurs in that industry, and the industry is important in the fund's portfolio, i.e., large ownership. Therefore, we first construct a fund-level distraction score, and then aggregate the scores across all affected funds in a given firm-quarter. The distraction measure, *D*, for each firm-calendar quarter is defined as follows:

$$D_{fq} = \sum_{i \in F_{q-1}} \sum_{IND \neq IND_f} w_{ifq-1} \times w_{iq-1}^{IND} \times IS_q^{IND} \qquad (7)$$

where F_{q-1} refers to the set of firm *f*'s mutual funds at the end of quarter *q*-1, *IND* denotes a given industry in the Fama and French (1997) 12-industry classification, and IND_f denotes firm *f*'s industry. IS_q^{IND} takes a value of one if a distracting event occurs in an industry other than IND_f and zero otherwise. An industry experiences distracting events if it has the highest or lowest stock return among all 12 industries in a given quarter. w_{iq-1}^{IND} is defined as the weight of industry *IND* in the portfolio of fund *i*, which captures how much fund *i* cares about the industry. It is inappropriate to use equal weights to aggregate distraction scores across affected mutual funds for firm *f*, as different funds have different levels of holdings in firm *f* and therefore have different incentives to monitor firm *f*. To this end, we give more weight, w_{ifq-1}, to fund *i* if firm *f* has more weight in fund *i*'s portfolio during quarter *q*-1, and if fund *i* owns a larger fraction of firm *f*'s shares. The former captures the degree to which fund *i* will spend time and effort in analyzing firm *f* in its portfolio (Fich, Harford, and Tran 2015), and the latter captures the extent to which firm *f* will respond to fund *i*'s attention. Therefore, we define w_{ifq-1} as:

$$w_{ifq-1} = \frac{QPFweight_{ifq-1} + QPercOwn_{ifq-1}}{\sum_{i \in Fq-1} \left(QPFweight_{ifq-1} + QPercOwn_{ifq-1} \right)} \qquad (8)$$

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where $QPercOwn_{ifq-1}$ is the quintile rank of the fraction of firm f's shares held by fund i, and

$QPFweight_{ifq-1}$ is the quintile rank of the market value weight of firm f in fund i's portfolio.

Following Kempf, Manconi, and Spalt (2017), we use quintile ranks to minimize the impact of

outliers and potential measurement errors. Finally, we compute the average of distraction scores

for each firm during the post-regulation period and split our sample into two groups, firms where

fund managers are more distracted and less distracted, based on the median value of distraction

scores.

Table 7 presents regression results estimated for each subsample. Consistent with our

prediction, firms with less distracted fund managers experience larger decreases in compensation

duration compared to firms with more distracted fund managers. The difference is both statistically

and economically significant. The decrease in compensation duration of firms with less distracted

fund managers is about four times greater than that of firms with more distracted peers, and

statistically significant at the 1% level.

4.4.3 The resources of funds

We proxy a fund's resources by its size. We expect that larger mutual funds have more

resources and hence are more able to influence the management of portfolio firms (Chen, Hong,

Huang, and Kubik 2004; Morgan, Poulsen, Wolf, and Yang 2011). In addition, the exit of larger

funds is likely to create a greater price impact on portfolio firms compared to that of small funds.

Together, we predict that the decrease in compensation duration will be more pronounced among

firms with greater ownership by larger affected funds.

To test the prediction, for each sample firm, we calculate the weighted average of affected

funds' net assets weighted by each fund's ownership, and then split our sample using its median

value. Table 8 presents the results from estimating our baseline regression using the two

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subsamples. The effect of the SEC regulation on compensation duration is more pronounced for firms owned by larger mutual funds, consistent with our prediction. The difference in the coefficient estimates is also statistically significant at the 1% level.

4.4.4 Career concerns of mutual fund managers

One of the reasons for short-termism of mutual fund managers after more frequent portfolio disclosure can be their heightened career concerns. As compared to experienced fund managers, young managers lack established track records and are constantly under pressure to prove their performance in the short run (Chevalier and Ellison 1999). Following the SEC regulation, young fund managers face greater career concerns and therefore should be more vulnerable to the pressure of building up reputation in the near term compared to their experienced peers. Therefore, younger fund managers should have greater incentives to reduce corporate managers' investment horizon than their experienced counterparts.

To examine this prediction, we first obtain data on fund managers' age from the Morningstar database and compute the weighted average age of fund managers in each portfolio firm based on each fund's ownership in the firm. Next, we split our sample using the median value of the firm-level measure of fund managers' age. Table 9 reports the results from estimating the baseline specification in equation (4) using two subsamples separately. Consistent with our prediction, we find that the decline in compensation duration is about two times greater for firms owned by funds run by younger managers compared to their more experienced peers. A further coefficient comparison test suggests that our results are in the predicted direction and statistically significant (p-value = 0.05).

4.5 Robustness tests

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In this section, we test the robustness of our main findings to board independence, multiple hypothesis correction, the use of alternative measures of compensation duration and mutual fund ownership, and the use of an alternative event window.

4.5.1. Board independence

A counter argument to our hypothesis is that not all corporate boards are willing to yield to mutual funds' demand for shorter compensation duration that aims to induce corporate managers to be short-term oriented. Prior research documents that independent boards serve shareholder interests and constrain managerial short-termism (Fama and Jensen 1983; Rosenstein and Wyatt 1990; Beasley 1996; Ryan and Wiggins 2004; Nguyen and Nielsen 2010; Knyazeva, Knyazeva, and Masulis 2013). Thus, the influence of affected mutual funds on compensation duration of portfolio firms' managers may be muted in case of more independent boards. To investigate this possibility, we first compute the percentage of independent board directors for each sample firm's board, *Board_Ind*, and then use the median cutoff of *Board_Ind* to split our sample into subsamples of high and low levels of board independence. In untabulated results, we do not find board independence affects the influence of affected funds on compensation duration of corporate managers. This result may not be surprising, as survey evidence (McCahery et al. 2016) points out that mutual funds' large ownership increases price impact of "exit," which may pressurize even independent boards to yield to funds' demands.

4.5.2. Multiple hypothesis correction

Heath et al. (2023) note that reusing natural experiments to test many different hypotheses may increase the likelihood of false positives. The underlying reason is that each separate hypothesis test is only part of a "family" of tests exploring the same source of exogenous variation. Using the step-down procedure developed by Romano and Wolf (2005, 2016) and simulations, Heath et al. (2023) derive adjusted *t*-statistic critical values based on how many times a natural

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experiment was previously examined. Because there are several prior studies (e.g., Agarwal et al. 2015; Agarwal et al. 2018; Dyakov, Harford, and Qiu 2022; Bourveau, Li, Macciocchi, and Sun 2023; Sani, Shroff, and White 2023) that investigate the same mutual fund setting (the 2004 SEC disclosure regulation), we acknowledge the possibility that reusing the same shock in this study can introduce a bias in favor of our findings. Therefore, we follow Heath et al. (2023) and use adjusted *t*-statistic critical values to reevaluate our primary finding. The comparison shows that our *t*-statistic (−3.21) of the coefficient on *Treat×Post* is higher than the Romano-Wolf adjusted critical value of 2.94 even if there were 20 prior studies using the same shock.

4.5.3. Entropy balancing

While we conduct a series of placebo tests to rule out potential confounding effects, prior work shows that DiD estimation on a matched sample can be effective in mitigating potential endogeneity concerns (Heckman, Ichimura, Smith, and Todd 1998). Therefore, we perform an additional test to examine whether our main results are robust to a matched sample based on entropy balancing, which is a reweighting technique balancing the moments of covariates between the treatment and control samples (Hainmueller 2012). To construct the entropy-balanced sample, we use all the variables in our baseline model in addition to lagged compensation duration variables (measured in *t*-1 and *t*-2). In an untabulated test using the entropy-balanced sample, we continue to find the coefficient on *Treat×Post* to be significantly positive (coefficient = 1.915; *p*-value = 0.09).

4.5.4. An alternative measure of compensation duration

Some U.S. public firms may provide their executives with non-equity performance plans such as cash-based incentive pay contingent on firms' long-term performance. Similar to stock options and restricted stocks, non-equity performance plans aim at extending managerial horizons. We use an alternative compensation duration measure of Li and Peng (2021), which incorporates

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non-equity performance pay as a compensation component in addition to salaries, bonuses, stock options and restricted stocks.[15] Table 10 presents results from the estimation of our baseline specification. Columns (1) and (2) differ in terms of whether we include other control variables besides the fixed effects in the model. We find that the coefficient on the interaction term, *Treat×Post*, is significantly negative in both columns, indicating that portfolio firms decrease compensation duration after the regulatory shock. In terms of economic significance, the decrease in compensation duration after the regulatory shock is about 10% of the unconditional mean of this alternative compensation duration measure.[16]

4.5.5. Alternative measures of mutual fund ownership

To evaluate the robustness of our results, we re-estimate our baseline specification in equation (4) using two alternative measures of mutual fund ownership of affected funds. We first create a continuous measure of fund ownership to replace the *Treat* indicator. Next, to further mitigate the concern about potential measurement errors, we compute decile ranks of affected mutual funds' ownership. Table 11 reports our findings. Columns (1) and (2) differ in terms of the alternative variables used to capture mutual fund ownership by affected funds. In both columns, we find the coefficient on *Ownership×Post* to be negative and significant, consistent with our key result that portfolio firms decrease compensation duration after the regulation shortens investment horizons of mutual funds.

4.5.6. An alternative event window

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[15] We thank Zhi Li and Qiyuan Peng for generously sharing their data with us.
[16] The economic magnitude is calculated as the estimated coefficient (−1.967) divided by the sample mean of the alternative measure of compensation duration (19.726).

To rule out the possibility that our results are driven by the specific event window used in the analysis, we extend the event window to 5 years before and after the SEC regulation, i.e., [−5, 5]. In untabulated results, we find qualitatively similar effects using this alternative event window.

5. Conclusion

In this paper, we investigate whether and how mutual funds, as outsiders who do not hold board positions, can significantly influence executive compensation of their portfolio firms to achieve incentive realignment. Using the 2004 SEC regulation that increases the frequency of mutual fund mandatory portfolio disclosure as an exogenous shock to fund managers' investment horizon, we find that firms with larger ownership by affected mutual funds reduce the duration of executive compensation. Both cross-sectional and time-series falsification tests show that these results are not driven by concurrent confounding events or a general temporal trend in the duration of executive compensation. Further analyses reveal that mutual funds affected by the regulation play a more active role in voting on compensation-related proposals during shareholder annual meetings after the regulation change. We also show that mutual funds affected by the regulation reduce their ownership among firms without decreasing compensation duration post-regulation, indicating that the threat of exit is credible. Additional cross-sectional tests corroborate these findings by showing that the effect of regulatory shock on compensation duration is more pronounced in instances where we expect it to be the case. Specifically, we find stronger effects when funds have less execution cost of trading and have more resources, and when fund managers are less distracted and have stronger incentives. Overall, we document evidence that mutual fund managers successfully influence portfolio firms to reduce executive pay duration after the regulatory shock shortens fund managers' horizons.

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Our study should be of interest to academic researchers, practitioners, and regulators in that we document that institutional investors are actively involved in influencing firm compensation policies to advance their interests. Our findings should also be of interest to market participants who seek to identify channels behind corporate myopia.

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Appendix

Variables	Definition
Compensation Duration	(stock option value × stock option duration + restricted stock value × restricted stock duration) / (Salary + Bonus + Other cash compensation + Stock option value + Restricted stock value) for year t
Treat	Firms with above-median ownership by mutual funds affected by the SEC regulation where average ownership is calculated using observations three years prior to the regulation
Post	An indicator variable that equals one for observations in which the fiscal year end is after the regulatory shock, and zero otherwise
Pre1 and Pre2	Indicator variables for observations of one and two years prior to the SEC regulation
Post1, Post2, and Post3	Indicator variables for the year of regulation, one year, two years, and three years after the SEC regulation, respectively
Size	Log(1+total assets), at the end of year t
Leverage	(Long term debt + Current liabilities) / Total assets at the end of year t
BM	Book value of equity / Market value of equity at the end of year t
ROA	Net income before extraordinary items / Average of assets
Capex	Capital expenditure / Total assets at the end of year t
R&D	R&D expenditure / Total assets at the end of year t
STD_ROA	Standard deviation of ROA for previous 5 years
Nanalyst	Average of quarterly analyst following for year t
INST_OWN	Institutional ownership at the end of year t
ANN_CFO	An indicator variable for CFO (Chief Financial Officer)
RET_AGE	Retirement age (age >=62) at the end of year t

Figure 1

This figure plots point estimates of the difference between the annual compensation duration of firms with above-median ownership of funds affected by the SEC regulation in 2004 (the treatment group) and firms with below-median ownership of affected funds (the control group) over a five-year period around the year of the regulation: two years before (2002 and 2003) and three years after (2005, 2006 and 2007). The point estimates are the coefficient estimates on *Pre2×Treat*, *Pre1×Treat*, *Post1×Treat*, *Post2×Treat*, and *Post3×Treat* in Column (3) of Table 2. The vertical bars correspond to 95% confidence intervals.

Figure 1
Dynamic Treatment Effects

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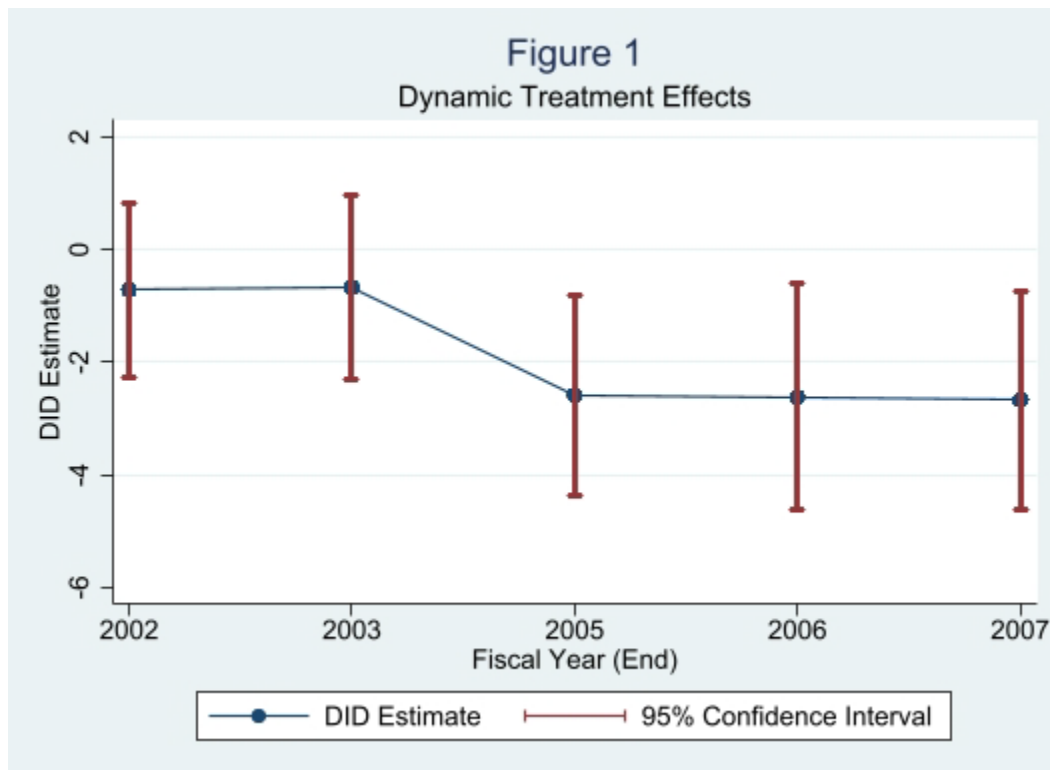
Table 1: Descriptive Statistics

This table presents descriptive statistics of the main variables in our empirical analysis. The Appendix provides detailed variable descriptions.

Variable	N	Mean	Std.Dev	P25	P50	P75
Compensation Duration	8,077	14.771	10.110	7.817	14.628	20.809
Treat	8,077	0.625	0.484	0.000	1.000	1.000
Post	8,077	0.531	0.499	0.000	1.000	1.000
Size	8,077	8.276	1.479	7.291	8.086	9.252
Leverage	8,077	0.235	0.179	0.088	0.228	0.343
BM	8,077	0.478	0.362	0.247	0.401	0.631
ROA	8,077	0.044	0.105	0.016	0.050	0.094
Capex	8,077	0.057	0.060	0.020	0.039	0.070
R&D	8,077	0.033	0.059	0.000	0.000	0.043
STD_ROA	8,077	0.011	0.050	0.000	0.001	0.003
Nanalyst	8,077	15.473	8.825	0.609	0.750	0.862
INST_OWN	8,077	0.718	0.216	8.750	14.250	20.750
ANN_CFO	8,077	0.462	0.499	0.000	0.000	1.000
RET_AGE	8,077	0.100	0.299	0.000	0.000	0.000

Table 2: Change in Mandatory Portfolio Disclosure Frequency and Compensation Duration

This table presents the OLS regression estimates of our baseline specification. Columns (1) and (2) report the regression results without and with control variables, respectively. We include data up to 3 fiscal years before and after the regulation to focus on the regulatory shock and mitigate any other confounding effects. Column (3) presents evidence on the timing of the effects on executive compensation duration. The Appendix provides detailed variable descriptions. The corresponding *p*-values are reported in parentheses below each coefficient. We cluster standard errors by firm. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

	(1)		(2)		(3)	
Treat×Post	−2.080	***	−2.168	***		
	(0.00)		(0.00)			
Pre2×Treat					−0.718	
					(0.36)	
Pre1×Treat					−0.667	
					(0.42)	
Post1×Treat					−2.583	***
					(0.00)	
Post2×Treat					−2.615	**
					(0.01)	
Post3×Treat					−2.669	***
					(0.01)	
Size			2.883	***	2.892	***
			(0.00)		(0.00)	
Leverage			−3.979	**	−4.030	**
			(0.05)		(0.04)	
BM			−2.417	***	−2.399	***
			(0.00)		(0.00)	
ROA			0.345		0.301	
			(0.88)		(0.89)	
Capex			−2.211		−2.310	
			(0.68)		(0.67)	
R&D			8.371		8.240	
			(0.17)		(0.18)	
STD_ROA			6.708		6.533	
			(0.30)		(0.31)	
Nanalyst			0.071		0.073	
			(0.19)		(0.17)	
INST_OWN			0.431		0.510	
			(0.78)		(0.74)	
ANN_CFO			−2.242	***	−2.243	***
			(0.00)		(0.00)	
RET_AGE			−1.800	***	−1.798	***
			(0.00)		(0.00)	
Firm and Year FE	Yes		Yes		Yes	
Observations	9,464		8,077		8,077	
R-Squared	0.502		0.516		0.516	

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Table 3: Cross-sectional and Time-series Placebo Tests

This table presents results of cross-sectional and time-series placebo tests. Panel A provides sample characteristics of treatment group (firms with higher than median ownership by mutual funds affected by the SEC regulation) and placebo groups (firms with higher than median ownership by placebo (unaffected) institutional investors). We examine four placebo investor groups: (1) propensity-score-matched voluntary quarterly reporters, (2) non-mutual funds, and (3) hedge funds. Panel B compares the effect of the ownership of mutual funds affected by the SEC regulation to the effect of ownership of placebo institutional investor groups whose portfolio disclosure frequency was unaffected by the regulation. *Unaffected* is set equal to 1 for observations with above-median ownership of the respective unaffected institutional investor group, and 0 otherwise. Panel C reports time-series placebo test results. We compare the difference-in-differences (DID) estimate in the baseline specification in Table 2 to the DID estimate using 2001 as a placebo year. The corresponding *p*-values are reported in parentheses below each coefficient. We cluster standard errors by firm. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Sample characteristics of treatment group and unaffected (placebo) groups

| | | | Unaffected (Placebo) Group | | | | | |
| | Treatment Group (TREAT=1) | | PS Matched Voluntary Quarterly Reporters | | Non-MFs | | Hedge Funds | |
Variable	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Compensation Duration	15.914	15.813	15.128	15.042	15.389	15.181	15.132	15.186
Treat	1.000	1.000	0.782	1.000	0.774	1.000	0.760	1.000
Post	0.507	1.000	0.511	1.000	0.508	1.000	0.512	1.000
Size	8.312	8.111	8.058	7.914	8.456	8.291	8.036	7.889
Leverage	0.225	0.213	0.228	0.218	0.244	0.235	0.241	0.234
BM	0.470	0.394	0.476	0.403	0.476	0.398	0.478	0.402
ROA	0.047	0.052	0.053	0.054	0.053	0.055	0.045	0.051
Capex	0.057	0.038	0.062	0.040	0.058	0.040	0.060	0.039
R&D	0.038	0.001	0.032	0.000	0.031	0.000	0.034	0.000
STD_ROA	0.007	0.001	0.007	0.001	0.006	0.001	0.009	0.001
Nanalyst	17.052	0.796	15.892	0.808	16.467	0.795	15.322	0.810
INST_OWN	0.783	16.000	0.793	14.750	0.786	15.250	0.792	14.250
ANN_CFO	0.458	0.000	0.460	0.000	0.458	0.000	0.464	0.000
RET_AGE	0.100	0.000	0.090	0.000	0.102	0.000	0.095	0.000

Panel B: Cross-sectional placebo test using institutions unaffected by the SEC regulation

DV	Compensation Duration		
Fund Type			
	PS Matched Voluntary Quarterly Reporters	Non-MFs	Hedge Funds
	(1)	(2)	(3)
Treat×Post	–2.170 ***	–2.128 ***	–2.049 ***
	(0.00)	(0.00)	(0.00)
Unaffected×Post	0.004	–0.116	–0.371
	(0.99)	(0.79)	(0.36)
Difference	–2.174 ***	–2.012 ***	–1.678 ***
	(0.00)	(0.00)	(0.01)
Controls	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Observations	8,077	8,077	8,077
R-Squared	0.516	0.516	0.516

Panel C: Time-series placebo test using pseudo-event year of 2001

Dependent Variable	Compensation Duration
	(1)
Treat×Post (event : 2004)	–2.168 ***
	(0.00)
Treat×Post (placebo event year: 2001)	1.012
	(0.18)
Difference	–3.181
Chi-square	29.24 ***
p-value	(0.00)

Table 4: Channel #1 - Compensation-related Voting by Mutual Funds

This table reports evidence on the frequency of mutual funds' participation in compensation-related votes for both shareholder and management proposals after the SEC regulation. Column (1) presents OLS estimates where the dependent variable is the frequency of mutual funds' participation in compensation-related voting. Column (2) reports OLS estimates where the dependent variable is the frequency of mutual funds' participation in compensation-related voting where their votes deviate from ISS recommendations. The corresponding *p*-values are reported in parentheses below each coefficient. We cluster standard errors by firm. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

Dependent Variable	Compensation-Related Vote Counts	Compensation-Related Vote Counts deviating from ISS recommendations
	(1)	(2)
Treat×Post	18.756 *	10.540 **
	(0.08)	(0.05)
Controls	Yes	Yes
Firm FE	Yes	Yes
Observations	1,719	1,719
R-Squared	0.550	0.549

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Table 5: Channel #2 - Exit Channel

This table reports evidence on changes in affected mutual funds' ownership conditional on change in their portfolio firms' executive compensation duration after the SEC regulation. We report OLS estimates where the dependent variable is affected mutual funds' ownership. *Duration_No_Decrease* is an indicator variable that takes a value of one for firms that do not decrease executive compensation duration after the regulation, and zero otherwise. The corresponding *p*-values are reported in the parentheses below each coefficient. We cluster standard errors by firm. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

Dependent Variable	Treat Fund Ownership	
	(1)	
Duration_No_Decrease×Post	−0.007	*
	(0.06)	
Controls	Yes	
Firm FE	Yes	
Year FE	Yes	
Observations	5,666	
R-Squared	0.786	

This table provides evidence on the effect of stock liquidity on the relation between the SEC's disclosure regulation and executive compensation duration. We split our sample into two groups using three stock liquidity measures: Amihud liquidity measure (Panel A), Trade-size weighted bid-ask spread (Panel B), and effective bid-ask spread (Panel C). We split our sample into high- and low-liquidity subsamples using the median values of the firm-level stock liquidity measures. Columns (1) and (2) report the results using the high-liquidity and low-liquidity sample, respectively. The corresponding *p*-values are reported in parentheses below each coefficient. We cluster standard errors by firm. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Amihud Measure

Dependent Variable	Compensation Duration	
Sample	Liquid	Illiquid
	(1)	(2)
Treat×Post	−2.864***	−1.761*
	(0.01)	(0.08)
Difference	−1.104**	
	(0.03)	
Controls	Yes	Yes
Firm FE	Yes	Yes
Year FE	Yes	Yes
Observations	3,947	3,953
R-Squared	0.507	0.516

Panel B: Trade-size Weighted Spread

Dependent Variable	Compensation Duration	
Sample	Liquid	Illiquid
	(1)	(2)
Treat×Post	−3.064***	−1.454
	(0.00)	(0.15)
Difference	−1.610*	
	(0.06)	
Controls	Yes	Yes
Firm FE	Yes	Yes
Year FE	Yes	Yes
Observations	3,953	3,955
R-Squared	0.490	0.530

Panel C: Effective Spread

Dependent Variable	Compensation Duration	
Sample	Liquid	Illiquid
	(1)	(2)
Treat×Post	−3.008***	−1.323
	(0.00)	(0.22)
Difference	−1.686*	
	(0.05)	
Controls	Yes	Yes
Firm FE	Yes	Yes
Year FE	Yes	Yes
Observations	3,959	3,949
R-Squared	0.494	0.546

Table 7: Cross-sectional test #2 – Distraction of mutual fund managers

This table provides evidence on the effect of distracted mutual fund managers on the relation between the SEC's disclosure regulation and executive compensation duration. We split our sample into two groups using a firm-level aggregated measure of investor (mutual fund manager) distraction. We calculate the firm-level distraction score following the methodology of Kempf, Manconi, and Spalt (2017). We first compute a fund-level distraction score, and then aggregate across all mutual funds in the firm. Then, we split our sample into high- and low-distraction subsamples using the median value of the firm-level distraction score. Columns (1) and (2) report the results using the high-distraction and the low-distraction sample, respectively. The corresponding *p*-values are reported in parentheses below each coefficient. We cluster standard errors by firm. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

Dependent Variable	Compensation Duration	
Sample	High-Distraction	Low-Distraction
	(1)	(2)
Treat×Post	−1.076	−3.974 ***
	(0.24)	(0.00)
Difference	2.898 ***	
	(0.00)	
Controls	Yes	Yes
Firm FE	Yes	Yes
Year FE	Yes	Yes
Observations	3,958	3,961
R-Squared	0.487	0.533

Table 8: Cross-sectional test #3 – Resources of Funds

This table provides evidence on the effect of mutual funds' resources on the relation between the SEC's disclosure regulation and executive compensation duration. We use funds' assets to proxy for fund resources. We compute the weighted average of funds' assets for each firm based on each fund's assets. Next, we split our sample using the median value of the firm-level measure of funds' assets. Columns (1) and (2) report the results for firms owned by smaller and larger funds, respectively. The corresponding *p*-values are reported in parentheses below each coefficient. We cluster standard errors by firm. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

Dependent Variable	Compensation Duration	
Sample	Ownership by Smaller Funds	Ownership by Larger funds
	(1)	(2)
Treat×Post	−1.150	−3.448 ***
	(0.23)	(0.00)
Difference	2.298 ***	
	(0.01)	
Controls	Yes	Yes
Firm FE	Yes	Yes
Year FE	Yes	Yes
Observations	3,905	3,914
R-Squared	0.517	0.493

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Table 9: Cross-sectional test #4 – Career Concerns of Mutual Fund Managers

This table provides evidence on the effect of mutual fund managers' career concerns on the relation between the SEC's disclosure regulation and executive compensation duration. Following Chevalier and Ellison (1999), we use fund managers' age to proxy for their career concerns. We compute the weighted average of fund managers' age for each firm based on the fund's ownership in the firm. Next, we split our sample using the median value of the firm-level measure of fund managers' age. Columns (1) and (2) report the results for firms owned by funds run by younger managers and funds run by older managers, respectively. The corresponding *p*-values are reported in parentheses below each coefficient. We cluster standard errors by firm. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

Dependent Variable	Compensation Duration	
Sample	Ownership by Younger Fund Managers	Ownership by Older Fund Managers
	(1)	(2)
Treat×Post	−2.955 **	−1.224
	(0.01)	(0.20)
Difference	−1.731**	
	(0.05)	
Controls	Yes	Yes
Firm FE	Yes	Yes
Year FE	Yes	Yes
Observations	3,912	3,908
R-Squared	0.494	0.539

Table 10: Robustness Test using Alternative Compensation Duration Measure

This table reports estimation results of the baseline specification after replacing the compensation duration measure with an alternative measure developed by Li and Peng (2021). The alternative measure includes non-equity long-term grants in calculating compensation duration. Columns (1) and (2) report results for the model specifications with and without control variables, respectively. The corresponding *p*-values are reported in parentheses below each coefficient. We cluster standard errors by firm. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

Dependent Variable	Li and Peng (2021) Compensation Duration	
	(1)	(2)
Treat×Post	−1.905 ***	−1.967 ***
	(0.00)	(0.00)
Controls	No	Yes
Firm FE	Yes	Yes
Year FE	Yes	Yes
Observations	9,114	7,820
R-Squared	0.455	0.474

Table 11: Robustness Test using Alternative Measures of Mutual Fund Ownership

This table reports estimated results of the baseline specification after replacing the treatment indicator with two alternative measures of affected mutual funds' ownership. Columns (1) and (2) report results using the ownership percentage of affected mutual funds and the decile ranking of affected mutual funds' ownership, respectively. The corresponding *p*-values are reported in parentheses below each coefficient. We cluster standard errors by firm. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

Dependent Variable	Compensation Duration			
Ownership	% Ownership		Decile Rank	
	(1)		(2)	
Ownership×Post	−19.923	***	−3.822	***
	(0.00)		(0.00)	
Ownership	12.641		1.019	
	(0.43)		(0.76)	
Controls	Yes		Yes	
Firm FE	Yes		Yes	
Year FE	Yes		Yes	
Observations	8,077		8,077	
R-Squared	0.517		0.517	

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