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Master's Thesis of Chanmu Park

Stock Price Informativeness, Managerial Myopia, and CEO Equity Incentives

– Evidence from Changes in Mutual Fund
Reporting Frequency –

주가정보성, 근시안적 경영, CEO 주식보상: 뮤추얼
펀드의 의무 공시 주기 변경을 중심으로

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Stock Price Informativeness, Managerial Myopia, and CEO Equity Incentives

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Abstract

I examine whether corporate boards adjust CEO equity incentives in response to changes in stock price informativeness and the possibility of corporate myopia. Previous studies document that 1) investee firms' stock price informativeness decreases and 2) mutual funds promote investee firms' myopic management following the regulation in 2004 that requires more frequent portfolio disclosure for mutual funds. Motivated by the findings, I investigate whether the affected investee firms change their CEO's equity incentive scheme to mitigate the suggested concerns. The results indicate that changes in stock price informativeness and concerns about myopic management are important factors that determine the pay-for-performance sensitivity in CEO equity compensation. While a difference-in-differences design around the 2004 regulation for the full sample shows a mild change, cross-sectional tests show that the CEOs' portfolio delta significantly reduces following the regulatory shock for firms with significant ownership held by actively managed funds that increased disclosure frequency after the regulation when 1) the CEO is less likely to focus on short-term output and 2) when the potential damage of short-termism is relatively smaller.

Keyword : mutual funds; mandatory portfolio disclosure; stock price informativeness; myopic management; CEO compensation contract

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Table of Contents

Chapter 1. Introduction.....	1
Chapter 2. Hypothesis Development	5
Chapter 3. Sample Selection and Research Design	9
Chapter 4. Results	12
Chapter 5. Conclusion.....	15
Bibliography	16
Appendix.....	19
Abstract in Korean	21
Tables	22

Chapter 1. Introduction

This paper examines whether firms try to mitigate a decrease in stock price informativeness and the possibility of myopic management by adjusting equity incentive schemes. Specifically, I study the effects of the SEC regulation amendment in 2004 that requires mutual funds to disclose portfolio holdings quarterly instead of semi-annually. The SEC has been implementing and enhancing disclosure rules on investment companies (e.g., mutual funds) to protect investors by making disclosure reports more effective vehicles for communicating information to investors. The Investment Company Act of 1940 (hereafter, the Act) that requires funds to periodically disclose information about their portfolio holdings is one of the regulations on the companies, including mutual funds, that engage primarily in investing, reinvesting, and trading in securities, and whose own securities are offered to the investing public. Though disclosure of mutual funds holdings can contribute to increasing transparency and capital allocation efficiency, it can also impose significant costs on the disclosing funds by enabling predatory trading practices such as front-running and free-riding of competitors.

The amendment of the Act in May 2004 offered a noble setting to test the costs and subsequent responses of affected mutual funds. Mainly, the amendments require mutual funds to disclose their portfolios quarterly instead of semi-annually. Also, the SEC designed the amendments to streamline shareholder reports (e.g., disclosure of summary portfolio schedule) and help investors to focus on a fund's principal holdings, and thereby better evaluate the fund's risk profile and investment strategy^①. However, more frequent and organized disclosure also means that fund managers face tighter monitoring of stakeholders such as investors and competitors. Sani, Shroff, and White (2023) argue that more frequent and streamlined disclosure requirements for fund managers have spillover effects on investee firms' investment decisions by lowering corporate

^① <https://www.sec.gov/rules/final/33-8393.htm#IIB>

managers' opportunities to learn from their firms' stock prices. As actively managed mutual funds' proprietary information can be more easily revealed after the regulation, fund managers are less likely to engage in costly private information acquisition for the trading decision, leading to decreased stock price informativeness. Meanwhile, Agarwal, Vashishtha, and Venkatachalam (2018) show evidence that the tighter monitoring after the regulation incentivizes the fund managers to demonstrate their ability early on by reporting superior investment choices in the short run, leading to creating pressure on managers of investee firms to behave myopically.

The findings generate another question about how the investee firms respond to 1) the decreased stock price informativeness and 2) pressure on corporate myopia. Especially, it is likely that the effects have a reverse impact on the importance of stock price when the firms make investment decisions. To elaborate, while decreased stock price informativeness can decrease the importance of stock price (Chen, Goldstein, and Jiang 2007), pressure on corporate myopia can increase its importance (Dikolli, Kulp, and Sedatole 2009).

To examine the responses of investee firms on how to mitigate the concerns, I test whether they change the sensitivity of stock price on CEO compensation. It is because the CEO compensation scheme can significantly affect the firm's investment decision and growth, and institutional ownership is closely related to CEO compensation (e.g., Albuquerque 2014, Hartzell and Starks 2003). I predict that firms do not show significant differences in pay-for-performance sensitivity after the regulation because of the conflicting effect. To test my prediction, I employ difference-in-differences tests around the 2004 regulation. I compare changes in CEO compensation delta (pay-for-performance of equity incentives) after the 2004 regulation for firms with high pre-regulation actively managed mutual fund ownership (treated firms) with changes in their CEOs' portfolio delta over the same period for firms with low pre-regulation actively managed mutual fund ownership (control firms). In other words, I examine whether firms invested by the affected mutual funds adjust their equity incentive schemes concerning their CEOs'

portfolio delta (pay–performance sensitivity). I include time and firm fixed effects to mitigate concerns about common shocks to all firms in a year and about time–invariant firm characteristics, which could drive results. Consistent with my prediction, there is no significant change in the compensation delta of treated firms after the regulation.

I then conduct two sets of cross–sectional analyses to separate the effect of decreased stock price informativeness and increased pressure on corporate myopia. I predict that decreased stock price informativeness has a negative relationship with compensation delta when the concern of corporate myopia is relatively smaller. To test my prediction, I divide the sample into two sets of two subsamples based on 1) the situation in which CEOs’ myopic behavior is more pronounced and 2) the situation in which CEOs’ myopic behavior can have more damaging consequences and apply the same model with my main analysis. Consistent with my prediction, I find that the negative effect of the 2004 regulation on compensation delta is significant when 1) CEOs’ myopic behavior is less pronounced, and 2) CEOs’ myopic behavior has less potential damage to the investee firms. These findings suggest that the reduction was concentrated among firms facing less pressure to increase delta. To mitigate the concern that endogenous differences explain the results, I show that there are no pre–treatment differences in the trends in change of delta by estimating dynamic difference–in–differences regressions.

This paper makes several contributions. First, this paper extends empirical research on the association between CEO equity incentives and stock price informativeness. Though there are several theoretical arguments that link stock price informativeness and CEO compensation (e.g., Strobl 2014; Dow, Han, and Sangiorgi 2023), empirical evidence that reveals the link is scarce. My results indicate that corporate boards consider changes in stock price informativeness when they make CEO compensation contract.

Second, this paper extends the range of stakeholders that can be studied in accounting research with respect to the 2004 regulation. Previous studies uncovered the relationship among investors, fund managers, and corporate managers. My study complements this line

of study by examining whether boards try to mitigate concerns arising from the exogenous shock.

The rest of the paper is organized as follows. Section II develops a hypothesis after touching upon related theory and institutional background. Section III describes the sample selection process and research design. Section IV introduces test results. Finally, Section V concludes the paper.

Chapter 2. Hypothesis Development

2.1. Institutional Background

The Investment Company Act of 1940 regulates mutual funds' disclosure and the SEC has been amending the rules to improve transparency. Prior to May 2004, the SEC only required mutual funds to disclose their portfolio holdings semiannually. Prior to 2003, Form N-30D was used for annual and semiannual holding reports, and Form N-30B-2 was used for other periodic and interim holding reports. Starting in 2003, Form N-CSR and Form N-CSRS were introduced for annual and semi-annual holdings reporting. In May 2004, the SEC amended its disclosure rules and increased the frequency of mutual funds' portfolio disclosures from semi-annually to quarterly. Therefore, mutual funds should file Form N-Q for the first and third quarters in addition to Form N-CSR(S) for the second and fourth quarters.

Meanwhile, individual funds can voluntarily disclose their portfolio holdings more frequently by using Form N-30B-2 or providing information on their portfolio holdings to data vendors such as CRSP (formerly Morningstar) and Thomson Reuters (formerly CDA/Spectrum). I identify and remove those funds to distinguish 'affected mutual funds' by the regulation change.

Moreover, the amendments streamlined the disclosure contents. For example, they require to disclose fund expenses born by shareholders during the reporting period, permit a fund to include a summary portfolio schedule, and require fund reports to include a tabular or graphic presentation of a fund's portfolio holdings by identifiable categories. According to the SEC press release^②, this amendment is intended to enable interested investors to monitor whether and how a fund complies with its stated investment objective. The 2004 regulation is expected to deter fund managers'

^② <https://www.sec.gov/news/press/2004-16.htm>

manipulation, such as window dressing and portfolio pumping. It is because, by increasing the frequency, engaging in those activities becomes more expensive in terms of returns. Copycats easily front-run disclosing companies' trades, causing economically significant damage to the copycatted companies (Huddart, Hughes, and Levine 2001; Verbeek and Wang 2013; Cao, Du, Yang, and Zhang 2021). According to the cost and benefit analysis in the SEC report, the report argues that the potential costs to the funds due to outside investors' front-running and free-riding are minimal or not necessarily negative.

2.2. Literature Review

2.2.1. Stock Price Informativeness and CEO Compensation

Different from the SEC's expectations, previous studies show that the concern about costs on funds generated from predatory trading practices such as front-running and free-riding was not insignificant. This possibility of decreasing fund performance also applies to the 2004 regulation. Agarwal, Mullally, Tang, and Yang (2015) find that stocks held by more informed funds or subject to more significant information asymmetry experience larger increases in liquidity and greater performance deterioration after the 2004 regulation change. Sani et al. (2023) apply the concept of managerial learning and argue that the requirements for funds have spillover effects on corporate investment by lowering corporate managers' opportunities to learn from their firms' stock prices. It is because funds have less incentive to collect and trade on private information. Their proprietary information acquired from information acquisition can be more easily revealed by competitors. As fund managers invest less effort in acquiring information about investee firms, stock price informativeness of the investee firms decreases.

Several papers study the relationship between stock price informativeness and monitoring of firm performance. Holmstrom and Tirole (1993) argue that stock price informativeness facilitates

market monitoring. Ferreira, Ferreira, and Raposo (2011) develop and test the hypothesis that stock price informativeness affects the structure of corporate boards as stock price informativeness and board monitoring are substitutes. Dow, Han, and Sngiorgi (2023) theoretically show that more informative stock prices reduce the agency cost of incentivizing corporate managers by making stock-based compensation more effective.

After the regulation, as stock price informativeness decreases, it is likely that 1) the market's monitoring role is relatively limited, 2) board monitoring became stronger, and 3) the agency cost when using stock-based compensation increases. Moreover, Sani et al. (2023) show that managers place less emphasis on stock prices when making investment decisions, decreasing investment-price sensitivity. As a result, I predict that the corporate boards of investee firms have incentives to decrease the importance of stock price in CEO compensation to mitigate the decreased stock price informativeness.

2.2.2. Corporate Myopia and CEO Compensation

However, the 2004 regulation also generated another incentive for corporate boards to increase the importance of stock price in CEO compensation. Prior research documents an association between institutional ownership and managerial behavior (Bushee 1998; Matsumoto 2002). Specifically, Moreover, Agarwal et al. (2018) find that improved transparency puts pressure on fund managers to focus on short-term performance. This evidence is aligned with the theoretical discussion of Gigler, Kanodia, Sapra, and Venugopalan (2014), which proved that the cost of increased frequency of financial reporting increases the probability of inducing managerial short-termism. This pressure leads to subsequent stress for investee firms' managers to engage in myopic management. As a result, Agarwal et al. (2018) document that corporate innovation activity declines after the regulatory shock.

Yang, Yu, and Zheng (2021) find evidence that CEO

compensation design reflects the effect of a change in exogenous factors. To mitigate the CEO's incentives to engage in financial misreporting, firms decrease the CEO's equity portfolio vega after the misreporting inducing shock. Dikolli et al. (2009) suggest that firms consider CEOs' implicit short-term incentives incurred by transient ownership when designing explicit CEO compensation contracts. Motivated by Core and Guay (1999), Dikolli et al. (2009) test and find that both the likelihood of granting equity and the magnitude of annual equity grants to CEOs are highly related to transient ownership. These results can be interpreted as methods for firms to encourage their CEOs to focus on long-term value. The underlying mechanism of those findings can be applied to the 2004 regulation of mutual funds. As transient owners create implicit incentives for CEOs to exert effort toward increasing current earnings, Agarwal et al. (2018) also show that affected mutual funds are likely to encourage myopic management of their investee firms.

In summary, the 2004 regulation generated contradicting forces with regard to determining CEO equity incentives. While decreased stock price informativeness makes incentives for firms to decrease the importance of stock price in CEO compensation, the pressure on myopic management creates incentives to increase the importance of stock price in CEO compensation. From the inference, I make the following hypotheses.

Ha: Overall, firms with high affected mutual fund ownership will experience a significant change in the sensitivity of stock prices to compensation contracts.

Hb: For firms with less risk of myopic management, firms with high affected mutual fund ownership will experience a significant reduction in the sensitivity of stock prices to compensation contracts.

Chapter 3. Sample Selection and Research Design

3.1. Sample Selection and Data

I followed the method of Agarwal et al. (2018) and Sani et al. (2022) to identify actively managed mutual funds. I first obtain a comprehensive list of disclosure dates for funds over the year (one year) prior to the 2004 regulation from Thomson Reuters S12 and the CRSP Mutual Fund database. I use MFLIKNS to merge these datasets^③. Among the list, I exclude funds that voluntarily disclose more frequently before the 2004 regulation. The remaining funds have changed the disclosure period after the 2004 regulation and can be referred to as affected funds. The key identifier used in the process is WFICN, and this process yields a sample of 947 actively managed affected funds. Next, to calculate firm-level ownership by the affected funds, I merge the portfolio holdings data from the Thomson Reuters S12 database to the list of affected funds.

Table 1 summarizes the sample selection process. To construct the sample of firm-year observations, I start with all ExecuComp firms with positive CEO compensation delta, and apply the following filters. I exclude observations that include May 2004 in the fiscal year. (i.e., when fiscal year end month equals five and fiscal year is 2003, or when fiscal year end month is not five and fiscal year is 2004) and retain observations for up to five years before and after the 2004 regulation (i.e., 1999 to 2009). I delete observations with missing control variables. Each firm is required to have at least one value in each pre- and post-treatment. I exclude financial firms (SIC between 6000 and 6999). The final sample consists of 10,360 firm-year observations. The number of observations is different from

^③ For initial data processing I refer to http://www-2.rotman.utoronto.ca/simutin/aw_code.asp that offers code to construct that identifies actively managed equity fund sample.

other related studies because I confine each observation to have a non-missing delta.

3.2. Identifying Treated and Control Firms

Following Agarwal et al. (2018), I compute mutual fund ownership for each firm-quarter as the aggregate percentage of a firm's outstanding shares owned by affected funds. I define MFOwn for each firm-year as the average ownership of the mutual funds over the four quarters during the fiscal year. If stock holdings are not available for a quarter, I use the holdings for the previous quarter; otherwise, I set the holdings to zero. If firms' average MFOwn over the five years prior to the 2004 regulation is higher (lower) than the median, I classify the firms as treatment (control) firms.

3.3. Research design

My hypothesis predicts that the affected investee firms will try to reduce CEO compensation's sensitivity to stock prices when designing CEO compensation contracts. To test the idea, I use compensation delta (a CEO's wealth sensitivity to stock price changes) as a dependent variable (Dikolli et al., 2009). I followed Core and Guay (2002) to calculate delta using Execucomp^④. I employ a difference-in-differences design to study the changes in delta around the 2004 regulation for the treatment group, as compared to the control group using the following specification:

$$\begin{aligned} \Delta_{i,t} = & \alpha_0 + \alpha_1 Treat_i \times Post_t + \alpha_2 Size_{i,t} + \alpha_3 BTM_{i,t} + \alpha_4 ROA_{i,t} \\ & + \alpha_5 Leverage_{i,t} + \alpha_6 Tenure_{i,t} + \alpha_7 CEO_age_{i,t} \\ & + \alpha_8 Firm_age_{i,t} + \alpha_9 CEO_Ownership_{i,t} + \alpha_{10} Duality_{i,t} \\ & + Firm\ FE + Year\ FE + \varepsilon_{i,t} \end{aligned} \quad (1)$$

where $\Delta_{i,t}$ is the natural logarithm of firm i's CEO delta in year t; $Treat_i$ is an indicator for firms with high ownership by the affected

^④ To calculate delta, I refer to <http://kaichen.work/?p=211>.

funds. Specifically, $Treat_i$ equals one for firms with above–median average ownership (over the five years prior to the 2004 regulation). $Post_t$ is an indicator variable that equals one for fiscal years starting after the 2004 regulation in May 2004. I choose control variables following previous studies^⑤; the explanation is in the appendix. I include firm–fixed effects in the regression to identify within–firm changes in delta following the regulation, and year–fixed effects to control for common time–series changes in delta, unrelated to the regulation that affect both treated and control firms^⑥. All continuous variables are winsorized at the 1% and 99% levels to reduce the influence of outliers. Standard errors are clustered at the firm level to control for the serial correlation within the affected firms^⑦.

3.4. Descriptive Statistics

Table 2 presents the summary statistics of the main variables used in my regression analysis. The mean (median) affected fund ownership for all sample firms is about 5.1% (4.2%).

The mean value of Delta is 5.413, indicating that CEO wealth increases about \$224,303, on average, for a 1 percent increase of a firm’ s stock price. Considering that even a 2% ownership poses a threat of exit (McCahery, Sautner, and Starks 2016), the mean ownership shows that mutual funds exert influence over investee firms.

^⑤ I refer to Billett, Garfinkel, and Yu (2017); Armstrong, Glaeser, and Huang (2021); Dikolli et al. (2009); and Jayaraman, Milbourn, Peters, and Seo (2021).

^⑥ Those fixed effects subsume the main effects of *Treat* and *Post*.

^⑦ There are too few (i.e., ten) clusters at the year–level to reliably estimate standard error clustered at the year–level (Thomson 2011).

Chapter 4. Results

4.1. Main Results

Table 3 reports the difference-in-differences analysis results of Equation (1). When I do not control other characteristics, the coefficient of $Treat \times Post$, which captures the impact of the exogenous increase in the disclosure period on the CEO's portfolio delta, is insignificantly negative. However, when other related variables are controlled, the coefficient of $Treat_i \times Post_t$ is significantly negative at a 10% level ($p < 0.1$); this suggests that investee firms with high mutual fund ownership decrease CEO's portfolio delta after the May 2004 regulation relative to the control firms. Overall, though the negative relationship is relatively weak, it is inconsistent with my prediction that there will be an inconsistent change in compensation delta for the treated firms after the 2004 regulation.

4.2. Cross-sectional Tests

To further examine the hypotheses, I perform cross-sectional tests based on the situation in which CEOs' myopic behavior can have more damaging consequences. The proxy for the more significant damage of myopic behavior is 1) market to book ratio and 2) research and development expenses scaled by assets, as high growth-option firms invest more in R&D and capital expenditure (Albuquerque 2014; Kim and Shin 2017). As these firms invest more in R&D and Capital expenditure, CEO's myopic behavior can have more damaging consequences. Therefore, these firms are likely to have more incentive to keep high delta to prevent myopic management of CEOs. *MTB_Above_Med* is an indicator variable that equals one if a firm's average pre-period market-to-book ratio is higher than the median of the ratio. I follow Billet, Garfinkel, and Yu

(2017) to calculate the market-to-book ratio. When testing the effect of potential damage, I exclude the book-to-market ratio from a set of control variables to avoid collinearity. *RND_Above_Med* is an indicator variable that equals one if a firm's average pre-period research and development expenses scaled by assets is higher than the median of the ratio. Meanwhile, *RND_Above_Med* = 0. I predict that the tendency of decreasing delta because of decreased stock price informativeness is minor for subsamples in 1) *MTB_Above_Med* = 1 or 2) *RND_Above_Med* = 1. It is because these subsamples are also affected by delta increasing force as another method to mitigate the short-term oriented management.

Table 4 reports the cross-sectional analysis results. Consistent with my prediction, the coefficients are negatively significant only 1) when *MTB_Above_Med* = 0 and 2) when *RND_Above_Med* = 0. Firms in these subsamples have fewer incentives to increase portfolio delta as 2) the potential damage of short-termism is relatively smaller. These findings suggest that when the concern about myopic management is relatively small, the concern about the loss of stock price informativeness drives the results.

4.3. Parallel Trend Assumption

To further validate the parallel trend assumption, I follow prior studies by estimating a dynamic Difference-in-Differences regression (e.g., Armstrong et al., 2022; Yang et al., 2021). Specifically, I replace the time dummy Post in Equation (1) with nine dummy variables and employ the following specification:

$$\begin{aligned}
\Delta_{i,t} = & \beta_0 + \beta_1 \text{Treat}_i \times 1999_t + \beta_2 \text{Treat}_i \times 2000_t \\
& + \beta_3 \text{Treat}_i \times 2001_t + \beta_4 \text{Treat}_i \times 2002_t \\
& + \beta_5 \text{Treat}_i \times 2003_t + \beta_6 \text{Treat}_i \times 2005_t \\
& + \beta_7 \text{Treat}_i \times 2006_t + \beta_8 \text{Treat}_i \times 2007_t \\
& + \beta_9 \text{Treat}_i \times 2008_t + \beta_{10} \text{Size}_{i,t} + \beta_{11} \text{BTM}_{i,t} + \beta_{12} \text{ROA}_{i,t} \\
& + \beta_{13} \text{Leverage}_{i,t} + \beta_{14} \text{Tenure}_{i,t} + \beta_{15} \text{CEO_age}_{i,t} \\
& + \beta_{16} \text{Firm_age}_{i,t} + \beta_{17} \text{CEO_Ownership}_{i,t} + \beta_{18} \text{Duality}_{i,t} \\
& + \text{Firm FE} + \text{Year FE} + \varepsilon_{i,t}
\end{aligned} \tag{2}$$

where the numbers represent each year, the sample period comprises five years pre-regulation (i.e., [1999, 2003] – 1999 as a benchmark year) and five years post-regulation (i.e., [2005–2009]), excluding the event year (i.e., 2004). The dependent and control variables are the same as the control variables in Equation (1). I also apply the regression to subsamples used in cross-sectional tests, as well as the full sample.

Table 5 presents the results of the dynamic effect of the 2004 regulation on CEOs' portfolio delta. The coefficients of interaction terms before 2004 are statistically insignificant, suggesting that the parallel trend assumption holds. The coefficients do not show significant change after their regulation in column 1 (full sample), column 2 (*MTB_Above_Med* = 1), and column 4 (*RND_Above_Med* = 1). Meanwhile, in column 3 (*MTB_Above_Med* = 0) and column 5 (*RND_Above_Med* = 0), the coefficients of interaction terms after 2004 are significantly negative, meaning that portfolio delta started to decline significantly after the 2004 regulation for treatment firms, compared to control firms.

Chapter 5. Conclusion

Exploiting the exogenous increase in mutual funds' portfolio disclosure period, I examine whether firms try to mitigate a decrease in stock price informativeness and the possibility of myopic management by adjusting equity incentive schemes. I find that the decrease in compensation delta is concentrated on the firms that have less incentive to increase delta by myopic management concern. My results provide empirical support for the theoretical prediction that stock price informativeness determines the degree of equity incentives in compensation contracts. It also contributes to the growing literature examining the effect of mutual fund ownership by incorporating the concept of corporate board and CEO compensation.

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Appendix

Variable Definitions	
Variable	Definition
<i>MFOwn</i>	= Thomson Reuters S12 stock ownership of actively managed U.S. equity funds whose number of mandatory portfolio disclosures increased due to the May 2004 regulation change. It is measured as the average ownership over the 5-year period prior to the 2004 regulation (Agarwal et al., 2018). (Data source: Thomson Reuters S12)
<i>Delta</i>	= The natural logarithm of portfolio vega, which is the sensitivity of CEO wealth to stock prices measured as the increase in value of the CEO' s stock- and option-based portfolio for a 1% increase in stock price calculated using the methodology in Core and Guay (2002). (Data source: Compustat, CRSP and Execucomp)
<i>Treat</i>	= Indicator variable coded as one for firms with above-median average ownership (measured over the five years prior to the 2004 regulation) by affected funds, and zero otherwise (Agarwal et al., 2018).
<i>Post</i>	= An indicator variable that equals one for fiscal years subsequent to the passage of the SEC regulation in May 2004, and zero otherwise (Agarwal et al., 2018).
<i>Size</i>	= Natural logarithm of a firm' s total asset (AT). (Data source: Compustat)
<i>BTM</i>	= Book value of equity divided by market value of equity. Following Fama and French (2008), book value of equity equals total assets (AT) minus liabilities (LT), plus deferred taxes and investment tax credit (TXDITC) (if available), minus the value of preferred stock. The value of preferred stock is estimated by liquidating value (PSTKL), redemption value (PSTKRV), or total value of preferred stock (PSTK) depending on the availability. Market value of equity is the product of stock price (PRC) and shares outstanding (SHROUT) divided by 1,000. Market value of equity is measured three months prior to the brokerage merger/closure date. (Billett et al., 2017) (Data source: Compustat and CRSP)

<i>ROA</i>	=	Operating income before depreciation (OIBDP), scaled by total assets. (Billett et al., 2017) (Data source: Compustat)
<i>Leverage</i>	=	Long-term debt (DLTT) plus short-term debt (DLC), all scaled by total assets (Billett et al., 2017) (Data source: Compustat).
<i>Tenure</i>	=	The natural logarithm of the CEO's tenure in years. (Data source: Execucomp)
<i>CEO_Age</i>	=	The natural logarithm of CEO age variable in Execucomp
<i>Firm_Age</i>	=	The natural logarithm of number of years a firm appears in the CRSP database
<i>CEO_Ownership</i>	=	SHROWN_TOT_PCT variable in Execucomp
<i>Duality</i>	=	An indicator variable equal to one if the CEO is the chairman of the corporate boards, and zero otherwise (Data source: Execucomp)
<i>MTB</i>	=	Total assets minus book equity plus market equity (shares outstanding times fiscal year-end stock price (PRCC_F*CSHO)), all divided by total assets. Book value of equity is following Fama and French (2008). It equals totals assets (AT) minus liabilities (LT), plus deferred taxes and investment tax credit (TXDITC) (if available), minus the value of preferred stock. The value of preferred stock is estimated by liquidating value (PSTKL), redemption value (PSTKRV), or total value of preferred stock (PSTK) depending on the availability (Billett et al., 2017) (Data source: Compustat).
<i>MTB_Above_Med</i>	=	An indicator variable that equals one if a firm's average pre-period market-to-book ratio is higher than the median of the market-to-book ratio, and zero otherwise
<i>RND</i>	=	Development expenses scaled by assets (XRD / AT) in Compustat
<i>RND_Above_Med</i>	=	An indicator variable that equals one if a firm's average pre-period R&D expenses scaled by assets is higher than the median of the market-to-book ratio, and zero otherwise

Abstract in Korean

이 논문은 주가정보성의 변화와 근시안적 경영의 가능성이 발생한 상황에서 이에 대응해 이사회가 CEO 주식 보상을 조정하는지에 대해 연구한다. 선행연구에 따르면 2004년경 상호투자회사(mutual funds)의 포트폴리오 공시를 더 자주 하도록 규제가 변화한 이후 1) 피투자회사의 주가정보성이 하락하고, 2) 상호투자회사들이 피투자회사로 하여금 근시안적인 경영에 더 집중하도록 유도했다. 이 발견을 바탕으로, 해당 상황에 영향을 받는 피투자회사들이 CEO의 주식 기준 보상을 조정하는지에 대해 조사한다. 연구 결과는 주가정보성의 변화와 근시안적 경영에 대한 염려가 CEO 보상의 주가민감성을 결정하는 중요한 요인임을 보여준다. 2004년 규제 변화에 이중차분법(difference-in-differences) 연구 디자인을 전체 샘플에 대해 적용했을 때 상호투자회사의 지분률이 높은 피투자회사여도 CEO 보상의 주가민감성이 크게 변화하지 않는다. 한편 횡단연구(cross-sectional tests) 결과는 1) CEO가 근시안적인 경영에 집중할 가능성이 낮을 때, 2) 근시안적인 경영의 잠재적인 피해가 상대적으로 작을 때 상호투자회사의 지분률이 높은 피투자회사의 경우 CEO 보상의 주가 민감도가 유의미하게 줄어든다.

Tables

Table 1. Summary of Sample Selection Process

Sample Covers 1999 to 2009	
	<u>Firm–Years</u>
Initial sample with positive compensation delta from ExecuComp	19,508
Observations in the event fiscal year (observations that include May 2005)	(1,697)
Observations with missing control variables	(2,314)
Firms with missing observations in the year before the event year	(2,399)
Firms with no observation after the event year	(1,348)
Financial firms (SIC 6000 – 6999)	<u>(1,390)</u>
Final sample	<u><u>10,360</u></u>

Table 2. Summary Statistics

	N	Mean	SD	Min
<i>Treat</i>	10360	.526	0.499	0
<i>Post</i>	10360	.49	0.500	0
<i>MFOwn</i>	10360	.051	0.037	.002
<i>Delta</i>	10360	5.413	1.564	1.418
<i>Size</i>	10360	7.466	1.544	4.231
<i>BTM</i>	10360	.597	0.480	−.25
<i>ROA</i>	10360	.133	0.097	−.224
<i>Leverage</i>	10360	.128	0.243	−.492
<i>Firm_Age</i>	10360	3.061	0.691	1.099
<i>Tenure</i>	10360	1.849	0.776	.406
<i>CEO_Age</i>	10360	4.023	0.127	3.689
<i>CEO_Ownership</i>	10360	.628	1.960	0
<i>Duality</i>	10360	.604	0.489	0

	p25	Median	p75	Max
<i>Treat</i>	0	1	1	1
<i>Post</i>	0	0	1	1
<i>MFOwn</i>	.022	.042	.069	.173
<i>Delta</i>	4.403	5.403	6.443	9.598
<i>Size</i>	6.352	7.367	8.472	11.379
<i>BTM</i>	.285	.486	.779	2.747
<i>ROA</i>	.086	.13	.184	.411
<i>Leverage</i>	−.042	.147	.301	.711
<i>Firm_Age</i>	2.565	3.091	3.638	4.094
<i>Tenure</i>	1.271	1.833	2.398	3.584
<i>CEO_Age</i>	3.951	4.025	4.111	4.317
<i>CEO_Ownership</i>	0	0	0	13.58
<i>Duality</i>	0	1	1	1

Table 3. Impact of the Mutual Funds Regulation on CEO's Portfolio Delta

	Dep. Var.: <i>Delta</i>	
	(1)	(2)
<i>Treat X Post</i>	−0.098 (−1.449)	−0.093* (−1.882)
<i>Size</i>		0.760*** (20.782)
<i>BTM</i>		−0.936*** (−24.215)
<i>ROA</i>		1.356*** (6.728)
<i>Leverage</i>		−1.251*** (−13.069)
<i>Tenure</i>		−0.698*** (−6.294)
<i>CEO_Age</i>		0.581*** (18.842)
<i>Firm_Age</i>		−0.201 (−0.871)
<i>CEO_OWNERSHIP</i>		0.065*** (6.792)
<i>Duality</i>		0.179*** (4.519)
Constant	5.438*** (310.693)	2.020** (2.086)
Period	1999–2009	1999–2009
Observations	10,290	10,290
R-squared	0.703	0.794
Cluster	FIRM	FIRM
Firm_FE	Yes	Yes
YEAR_FE	Yes	Yes
Adj. R-squared	0.665	0.810

Robust t-statistics in parentheses

*** p<0.01, ** p<0.05,

* p<0.1

Table 3 reports the difference-in-differences regression results of Equation (1). All continuous variables are winsorized at the 1% and 99% levels. All variables are defined in Appendix.

Table 4. Cross-sectional Analysis

	Dep. Var.: <i>Delta</i>			
	(1)	(2)	(3)	(4)
	<i>MTB_Above_Med</i> = 1	<i>MTB_Above_Med</i> = 0	<i>RND_Above_Med</i> = 1	<i>RND_Above_Med</i> = 0
<i>Treat X Post</i>	−0.050 (−0.698)	−0.251*** (−3.352)	0.003 (0.036)	−0.367*** (−4.319)
<i>Size</i>	0.659*** (12.669)	0.692*** (13.033)	0.633*** (10.819)	0.731*** (10.824)
<i>BTM</i>			−1.142*** (−14.301)	−0.864*** (−19.746)
<i>ROA</i>	2.584*** (10.124)	2.552*** (8.155)	1.324*** (4.090)	2.780*** (7.293)
<i>Leverage</i>	−0.934*** (−7.678)	−1.438*** (−8.955)	−1.090*** (−7.637)	−1.478*** (−7.665)
<i>Tenure</i>	−0.619*** (−3.543)	−0.566*** (−3.757)	0.624*** (14.015)	0.605*** (11.459)
<i>CEO_Age</i>	0.603*** (13.935)	0.552*** (11.779)	−0.006 (−1.065)	−0.004 (−0.597)
<i>Firm_Age</i>	−0.265 (−0.868)	−0.080 (−0.223)	−0.033 (−0.559)	−0.021*** (−3.524)
<i>CEO_OWNERSHIP</i>	0.071*** (5.017)	0.053*** (3.845)	0.041*** (3.684)	0.025*** (3.617)
<i>Duality</i>	0.205*** (3.628)	0.162*** (2.755)	0.224*** (3.621)	0.109* (1.662)
Constant	2.214 (1.636)	0.748 (0.531)	0.731 (0.508)	−0.940* (−1.667)
Observations	5,802	4,557	3,185	7,174
R-squared	0.794	0.793	0.843	0.833
Cluster	FIRM	FIRM	FIRM	FIRM
Firm_FE	Yes	Yes	Yes	Yes
YEAR_FE	Yes	Yes	Yes	Yes
Adj. R-squared	0.765	0.763	0.820	0.809

Robust t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 5. Dynamic Difference-in-Differences Analysis

	Dep. Var.: <i>Delta</i>				
	(1)	(2)	(3)	(4)	(5)
	Full Sample	<i>MTB_Above</i> _Med = 1	<i>MTB_Above</i> _Med = 0	<i>RND_Above</i> _Med = 1	<i>RND_Above</i> _Med = 0
<i>Treatx2000</i>	0.038 (0.712)	0.125 (1.407)	-0.027 (-0.333)	0.029 (0.267)	0.042 (0.702)
<i>Treatx2001</i>	0.008 (0.133)	0.074 (0.752)	0.029 (0.333)	0.018 (0.144)	0.012 (0.173)
<i>Treatx2002</i>	-0.008 (-0.119)	0.119 (1.148)	-0.081 (-0.822)	0.098 (0.778)	-0.042 (-0.569)
<i>Treatx2003</i>	-0.040 (-0.619)	0.020 (0.196)	-0.073 (-0.798)	0.007 (0.060)	-0.057 (-0.738)
<i>Treatx2005</i>	-0.071 (-0.971)	0.030 (0.268)	-0.170 (-1.557)	-0.013 (-0.096)	-0.091 (-1.052)
<i>Treatx2006</i>	-0.147* (-1.933)	-0.027 (-0.232)	-0.322*** (-2.910)	-0.004 (-0.029)	-0.207** (-2.312)
<i>Treatx2007</i>	-0.101 (-1.275)	-0.012 (-0.101)	-0.273** (-2.353)	0.059 (0.408)	-0.171* (-1.857)
<i>Treatx2008</i>	-0.079 (-0.911)	0.056 (0.411)	-0.384*** (-2.853)	0.179 (1.119)	-0.190* (-1.899)
<i>Treatx2009</i>	-0.078 (-0.914)	0.040 (0.318)	-0.271** (-2.009)	0.136 (0.846)	-0.173* (-1.761)
<i>Size</i>	0.762*** (20.915)	0.659*** (12.742)	0.694*** (13.054)	0.792*** (14.266)	0.760*** (15.946)
<i>BTM</i>	-0.936*** (-24.169)			-1.144*** (-14.279)	-0.862*** (-19.677)
<i>ROA</i>	1.356*** (6.729)	2.581*** (10.106)	2.554*** (8.117)	0.908*** (3.105)	1.622*** (5.959)
<i>Leverage</i>	-1.251*** (-13.080)	-0.931*** (-7.674)	-1.431*** (-8.867)	-1.174*** (-7.744)	-1.302*** (-10.500)
<i>Tenure</i>	-0.696*** (-6.254)	-0.620*** (-3.530)	-0.561*** (-3.729)	-0.572*** (-2.718)	-0.641*** (-4.969)
<i>CEO_Age</i>	0.581*** (18.849)	0.602*** (13.892)	0.551*** (11.752)	0.532*** (10.234)	0.602*** (15.990)
<i>Firm_Age</i>	-0.202 (-0.873)	-0.265 (-0.866)	-0.077 (-0.212)	0.279 (0.799)	-0.400 (-1.355)
<i>CEO_OWNERSHIP</i>	0.065*** (6.804)	0.071*** (5.021)	0.054*** (3.896)	0.067*** (3.880)	0.064*** (5.732)
<i>Duality</i>	0.179*** (4.514)	0.206*** (3.632)	0.160*** (2.723)	0.191*** (2.944)	0.155*** (3.162)
Constant	2.001** (2.066)	2.180 (1.607)	0.718 (0.510)	-0.277 (-0.172)	2.546** (2.131)
Observations	10,359	5,802	4,557	3,185	7,174
R-squared	0.834	0.795	0.793	0.844	0.833

Cluster	FIRM	FIRM	FIRM	FIRM	FIRM
Firm_FE	Yes	Yes	Yes	Yes	Yes
YEAR_FE	Yes	Yes	Yes	Yes	Yes
Adj. R-squared	0.810	0.765	0.763	0.820	0.809

Robust t-statistics in parentheses
 *** p<0.01, ** p<0.05, * p<0.