Taiwan Accounting Review
Vol. 18 No. 1 pp. 1 - 40 (2022)
DOI:10.6538/TAR.202207_18(1).0001

The Effect of the CEO Pay Ratio Disclosure Rule on CEO Compensation

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Received: February 5, 2021; After 1 rounds of review, Accepted: May 23, 2021

Abstract

The SEC required companies to disclose a pay ratio, which compares the compensation of a company's chief executive officer (CEO) to the compensation of the company's median employee in 2015. Using a sample of 487 firms, I find that firms with a higher CEO pay ratio before the rule adoption decrease the CEO's total compensation in the post adoption period. The decrease in the CEO's total compensation is attributable to the reduction in option awards. Moreover, I find that high pay ratio firms shorten the vesting schedule of the CEOs' incentive grants, set easier to achieve targets for CEOs' performance-vested awards, and increase the use of accounting-based performance provisions in the CEO's incentive compensation in the post adoption period. I do not observe similar changes to CEOs' compensation packages for low pay ratio firms. These findings are consistent with high pay ratio firms reducing the riskiness of the CEO pay to compensate for the reduced compensation after the rule adoption.

Keywords: CEO Compensation, CEO Pay Ratio, Compensation Design, Performance Vesting

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This paper received the Best Paper Award at the 2020 annual conference of Taiwan Accounting Association (TAA). The authors acknowledge the helpful comments of two anonymous reviewers, and take sole responsibility for their views. Yen-Jung Lee gratefully acknowledges the financial support from Taiwan Ministry of Science and Technology and Ministry of Education (Grant no. MOST 110-2410-H-002 -057 -MY3).

Data availability: All data are available from public sources.

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1. Introduction

This paper examines whether the adoption of the chief executive officer (CEO) pay ratio disclosure rule by the U.S. Securities and Exchange Commission (SEC) affects the design of CEO compensation. On August 5, 2015, the SEC adopted a final rule that requires firms to disclose the ratio between CEO compensation and the median employee compensation (CEO pay ratio), as directed by Section 953 (b) of the Dodd-Frank Act. In adopting the final rule, the SEC noted that the intended purpose behind the pay ratio disclosure rule is to provide investors with another piece of information to consider when determining whether the compensation of their CEO is appropriate (SEC 2015). Critics, however, argue that companies wishing to avoid a high pay ratio may outsource low-paid jobs instead of lowering the CEO pay. In addition, companies have great flexibility in calculating the median employee pay in order to reduce the pay ratio (Barusch 2015). There is thus much debate about whether the pay ratio disclosure will effectively affect the CEO compensation practices as supporters had hoped for. This paper sheds light on this debate by examining the changes in the design and efficacy of the CEO compensation packages around the adoption of the pay ratio disclosure rule.

There is growing public concern over the rapid growth in CEO pay relative to the average worker pay. Critics contend that high CEO pay ratios could destroy firm value by damaging employee morale and productivity. The idea behind Section 953(b) of the Dodd-Frank Act is that a high pay ratio indicates that the CEO is being disproportionately rewarded. Requiring firms to disclose this ratio will shame firms into lowering it so that investors, customers, and stakeholders can discipline firms with overpaid CEOs.

In this study, I investigate the effect of the CEO pay ratio disclosure rule on the design and efficacy of executive compensation. Prior research shows that firms have a tendency to respond to regulatory demand for compensation reforms (Zajac and Westphal 1994; Gerakos et al. 2007). Crawford et al. (2017) find that the fraction of votes cast against the say-on-pay proposal is significantly higher for firms in the top pay ratio decile. As a result, firms with high CEO pay ratios have incentives to reduce CEO compensation to avoid exposing their CEOs to unnecessary populist indignation over the gap between the CEO pay and the pay of their workers.

However, not all agree that the pay ratio disclosure would significantly affect the CEO compensation practices. Commentators argue that if companies feel compelled to reduce their CEOs' pay ratios, they could replace low-level, full-time employees with contractors and temporary workers, who are exempt from the ratio (Barusch 2015). Outsourcing lower paid jobs results in an increase in the median worker pay, thereby lowering the pay ratio without having to reduce the level of the CEO pay. Anecdotal evidence suggests that institutional investors are more likely to vote against a company's compensation plan not because pay levels are outrageous, but because

there is a disconnect between CEO pay and firm performance (Larker et al. 2016).[1] Therefore, it is unclear whether and how this CEO pay ratio disclosure rule affects executive compensation practices.

Using the SEC's adoption of the CEO pay ratio disclosure rule in 2015 as a quasi-experiment, I empirically examine the changes in important aspects of the CEO compensation from one year before to one year after the rule adoption to examine if the rule affects the level and the design of executive compensation packages. I employ a difference-in-differences design to control for the potential influences of micro-environments and firm characteristics on executive compensation. I expect the impact of the pay ratio disclosure on CEO compensation to be more salient for firms with higher CEO pay ratios before the rule adoption because these firms are more likely to receive negative publicity triggered by the larger disparity between CEO pay and the median worker pay.

To develop an empirical measure of the CEO pay ratio before the adoption of the CEO pay ratio disclosure rule, I obtain data from two main sources: ISS Incentive Lab and SalaryList.com for top executives and nonexecutive employees, respectively. Using a constant sample of 974 observations from 487 unique firms, I find that there is no significant change in the level of CEO compensation after the SEC adopts the new disclosure rule in my full sample. However, when I separate the full sample into high and low pay ratio firms, I find that high (low) pay ratio firms experience a significant decrease (increase) in the CEO compensation level. This result might suggest that firms use the pay ratios from its peers to form a benchmark to adjust their CEOs' compensation toward the industry median, with high pay ratio firms having incentives to lower the pay ratio to avoid bad press and low pay ratio firms having incentives to increase the pay ratio to stay competitive in the CEO labor market.

I next explore potential changes to the CEO compensation details after the issuance of the new disclosure rule. It is well known that managers demand a risk premium for receiving risky pay (e.g., Meulbroek 2001; Hall and Murphy 2002; Conyon et al. 2011). Conyon et al. (2011) find that the higher pay received by U.S. CEOs when compared to U.K. CEOs are attributable to the larger risk premium required for holding greater incentive compensation by U.S. CEOs. Firms are trading off between the risk premium and the incentive benefits of incentive compensation. The riskier the compensation, the greater the nominal amount a firm has to pay its CEO (Hall and Murphy 2002). Performance compensation is incentive pay that rewards the manager based on how his/her performance is assessed relative to stated performance criteria. Perfor-

[1] Consistent with this notion, research has shown that the largest contributor to CEO pay increases is the growing size of companies as a whole. Gabaix and Landier (2008) show that the sixfold increase in CEO pay since 1980 can be explained by the sixfold increase in firm size. While it makes sense to pay CEOs more to run bigger companies, there is no need to pay lower level employees any more just because firm sizes are bigger. Therefore, it is not obvious that investors are concerned about the disparity between the CEO's and median employees' compensation, especially for large companies.

mance pay is risky in the sense that the manager receives nothing from the performance plan if he/she does not achieve the performance thresholds. To the extent that firms are pressured to lower the CEO's compensation for fear of the public outcry provoked by a high CEO pay ratio, I expect that firms reduce the risky components of the CEO pay in order to make the CEO indifferent between riskier yet higher pay before the rule adoption and less risky but lower pay after the rule adoption.

Consistent with the notion that firms reduce the riskiness of their CEO compensation packages, I find that after the SEC issued the CEO pay ratio disclosure rule, high pay ratio firms (1) decrease the equity-based compensation, and especially the employee stock option awards; (2) reduce the duration (vesting period) of CEO compensation; (3) set easier to achieve performance targets for performance-based vesting awards; and (4) use more accounting-based performance provisions in incentive compensation. I do not observe similar changes to the CEO compensation packages for low pay ratio firms.

I further examine whether the changes made to the CEO compensation package in response to the SEC's pay ratio disclosure rule are beneficial to shareholders by looking at the changes to the link between CEO pay and firm performance from the pre- to the post-adoption period. I find that the pay-performance link is weaker for low pay ratio firms when compared to high pay ratio firms in the pre-adoption period. In the post adoption period, I find some evidence albeit weak that there is a decrease in the pay for performance sensitivity for the high pay ratio firms, suggesting that adjustments made to the CEO compensation by high pay ratio firms in response to the pay ratio disclosure rule might unfavorably affect the efficacy of CEO compensation.

This study makes several contributions to the literature. First, it extends the literature examining the effects of the pay disparity between the CEO and the median employee. The existing literature focuses on whether firm-level pay disparity affects employee morale and firm performance (Faleye et al. 2013; Kelly and Seow 2015; Crawford et al. 2018; Cheng, et al. 2017; Rouen 2020). I extend the literature by investigating how the CEO pay ratio disclosure rule affects the design of the CEO compensation and providing insights into the debate over whether the new disclosure rule influences the compensation practices. Researchers (e.g., Edmans 2017) argue that CEOs and average workers operate in entirely different labor markets, it would be meaningless to compare the pay for these two groups. This study informs this debate by showing that firms with high pay ratios were still concerned about the possible negative publicity and made changes to the design of their CEOs' compensation in response to the new disclosure rule.

Second, this study adds to the literature on design of compensation contracts. Prior studies generally examine how the agency problem and corporate governance structure (including CEO power) affect the amount of CEO compensation (Bebchuk et al. 2002) and pay-for-performance sensitivity. In recent years with the availability of detailed compensation data, researchers start to look at the CEO compensation design, such as the CEO compensation duration (Gopalan et al.

2014), and performance-vested provisions (Choudhary et al. 2009; Carter et al. 2009; Bettis et al. 2010; Bettis et al. 2018). [2] I contribute to this literature by showing that firms with relatively high CEO pay ratios reduce both the level of the CEO's total compensation and the riskiness of their CEOs' compensation design in response to the regulatory demand for more transparent pay disparity disclosures.

The rest of the paper proceeds as follows. Section 2 discusses the related literature and hypotheses development. Section 3 presents the research design. Section 4 addresses the sample and univariate analyses. Empirical findings are presented in section 5. Section 6 concludes this paper.

2. Background and Research Questions

Pay disparity between the CEO and employees has been criticized as unfair and creates dissatisfaction among employees, weakening employee morale and performance. To provide more information about the pay disparity, the U.S. Congress enacted Section 953 (b) of Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010, which requires companies to calculate and disclose the ratio of annual CEO compensation to the median annual employee compensation. The final rule of Section 953 (b) became effective on October 19, 2015 and applies to firms filed proxies on or after January 1, 2018.

Two major theories describe the pay disparity between the CEO and employees – tournament theory and equity theory. Tournament theory has long served as the cornerstone of pay dispersion research (Connelly et al. 2011; Henderson and Fredrickson 2001; Lazear and Rosen 1981). Tournament theorists propose that employees compete against one another for high level positions and pay. Those who "win" the tournament is promoted to their firms' top levels and receive higher pay. Because firms are resource-constrained, compensation policies are essentially a zero-sum game. Increased pay at one level imposes limits at other levels (Bloom 1999). For this reason, "tournaments are invariably present in common internal labor markets" (Grund and Westergaard-Nielsen 2008). Labor economists, therefore, developed and used the tournament theory to explain the presence of large differentials in prize structures, such as disproportionately high top manager salaries (Ehrenberg and Bognanno 1990; Lazear and Rosen 1981; Nalebuff and Stiglitz 1983).

In organizational contexts, tournament theory's main prediction is that employee effort increases with the differences in pay between organizational levels. Under this view, high upper echelon level pay is thought to effectively motivate employees at all levels to perform well.

[2] In 2006, the Securities and Exchange Commission (SEC) adopted extensive amendments to the disclosure requirements for executive compensation. The amendments were intended to provide investors with more detailed and comprehensive disclosure about the compensation paid to top executives. The availability of compensation details enables researchers to examine executive compensation more closely.

This view suggests that employees are inspired by the appeal of high pay at the top levels of their firms and will expend greater effort and commit themselves to organizational interests and priorities (Becker and Huselid 1992). In support, scholars have shown that top managers and CEOs serve as salient referents to employees (Wade et al. 2006) and found a positive link between pay dispersion and firm performance (Heyman 2005; Main et al. 1993).

A second body of research that incorporates equity theory arguments proposes the opposite. The assumptions underlying this perspective suggest that pay imbalances motivate feelings of inequity, injustice, and jealousy, which decrease employee satisfaction and commitment (see Finkelstein et al. 2009, for a comprehensive review). Scholars taking this perspective generally assert that pay dispersion reduce motivation, effort, and cooperation (Cowherd and Levine 1992). Some empirical evidence supports this perspective and demonstrates a negative relation between pay dispersion and a number of performance-related outcomes (Bloom 1999; Fredrickson et al. 2010; Grund and Westergaard-Nielsen 2008; Siegel and Hambrick 2005).

Empirical studies yield mixed evidence on whether a high CEO pay ratio impairs firm performance. Cheng et al. (2017) find that industry-adjusted CEO pay ratios are positively associated with both firm value and performance. They also find that high CEO pay ratios are associated with higher quality acquisitions and stronger CEO turnover-performance sensitivity. Rouen (2020) finds evidence that pay disparity unexplained (explained) by economic factors is negatively (positively) associated with future firm performance. Faleye et al. (2013) show that employees do not perceive higher pay ratios as an inequitable outcome and the authors do not find a negative relation between relative pay and employee productivity. Kelly and Seow (2016) demonstrate experimentally that disclosing a higher-than-industry pay ratio in addition to higher-than-industry CEO pay decreases perceived pay fairness and employee satisfaction.

In terms of of the empirical evidence on the effects of large pay disparity/pay ratios, Cowherd and Levine (1992) suggest that a large pay differential between lower-level employees and upper-echelon managers leads to perceptions of unfairness by lower-level employees and decreases employees' commitments to top managers' goals, leading to poor product quality. Using U.S. commercial banks as the sample, Crawford et al. (2020) find that shareholders' voting dissent on say-on-pay (SOP) proposals is significantly higher in banks with a higher pay ratio, consistent with shareholders viewing high pay ratios as harming shareholder value. Kelly and Seow (2016) demonstrate experimentally that disclosing a higher-than-industry pay ratio incrementally (in addition to disclosing only higher-than-industry CEO pay) significantly decreases perceived CEO pay fairness and marginally deceases perceived workplace climate. While the above studies yield results consistent with the Equity theory, there is evidence supporting the Tournament theory. Using comprehensive firm-level data on employee pay from UK firms, Mueller et al. (2017) find that firms with higher pay differentials between top- and bottom-level jobs are larger and have higher valuations and stronger operating performance. They argue that their results support

that differences in pay inequality across firms represent the value of managerial talent. Cheng et al. (2017) provide evidence, consistent with Mueller et al. (2017), that industry-adjusted CEO pay ratios are positively associated with both firm value and performance. Given the mixed results of the performance effects of CEO pay ratios, Rouen (2020) separate the total pay ratio driven by economic factors (explained) from the pay ratio due to other reasons (unexplained) and examine their relation to subsequent firm accounting performance. The evidence shows a negative (positive) relation between unexplained (explained) pay disparity and future firm performance, consistent with Equity Theory (Tournament Theory).

One might argue that the CEO pay ratio does not provide any new information to the market since the CEO pay has long been disclosed in a firm's proxy statement. Prior research (e.g., Crawford et al. 2017) calculate the annual total compensation of all employees by subtracting the annual total compensation of the CEO from the total compensation expense reported in the income statement and then divide by the number of employees at the end of the fiscal year minus one to obtain the average annual total compensation expense of all employees. However, not all firms report compensation expense on the income statement. Only about 15% of ExecuComp firms disclosed total compensation of all employees during our sample period. As a result, while the CEO compensation is known by investors, the median employee pay and how many times the CEO makes relative to the median employee is new information to the market. Pan et al. (2010) find that firms disclosing high pay ratios experience significantly negative abnormal announcement returns. They also find that it is the high pay disparity rather than high CEO pay or low worker pay that drives the results. These results are consistent with the pay disparity provides incremental information to the CEO compensation and total compensation for all employees.

Regulators' intended purpose of the pay ratio disclosure rule was to increase transparency by providing investors with additional information useful for investors to make informed decisions when exercising their say-on-pay voting rights.[3] Crawford et al. (2019) find that the proportion of votes cast against the say-on-pay proposal is significantly higher for firms with high pay ratio. Although CEOs are public figures, many would prefer to avoid notoriety in the eyes of the public. An eye-catching disparity in pay may elicit disapproval from investors in their say-on-pay voting and is negatively associated with the tone of media coverage (Boone 2020). Firms therefore have incentives to lower the CEO compensation in order to decrease the CEO pay ratio.

However, reducing the CEO pay is not the only way to lower the pay ratio. Critics contend that if companies feel pressured to reduce their pay ratios, they can start from the bottom by outsourcing their low-skilled, lower paid workers to a third party, which will increase the median employee pay, resulting in a lower pay ratio (Barusch 2015). Moreover, because collecting and

[3] Say on pay refers to shareholders' ability to approve executive compensation. Say on pay gives shareholders a nonbinding advisory vote on a company's pay practices for its top executives. The SEC adopt the say-on-pay votes rule required under the Dodd-Frank Act on Jan. 25, 2011.

verifying the data that goes into the calculation of the median payroll is challenging for many companies, especially those with global operations and/or multiple payroll systems, the SEC has allowed substantial flexibility to ease the compliance burden in computing the median employee pay, including the permitted use of reasonable estimates, assumptions, adjustments and statistical sampling (McKenzie 2017). Given the Rule's more flexible approach and the fact the firms can outsource the lower paid workers, it raises critical questions and concerns as to whether the pay ratio disclosure would in fact be useful to limit excessive executive compensation.

Moreover, there is evidence suggesting that investors might not worry about the high CEO pay ratio. Fisch et al. (2018) find that shareholders do not appear to vote against executive compensation plans unless the firms is performing badly. In other words, say on pay is essential say on performance. Based on a survey conducted by the Rivel Research Group, the majority of buy-side (institutional) investors reported that they do not vote against a company's compensation plan simply because of the pay size, but because there is a disconnect between CEO pay and performance (Larker et al. 2016). The survey further revealed a consensus among the majority that the pay ratio disclosure is not useful information. These results suggest that institutional investors care more about the pay-for-performance sensitivity than the high CEO pay ratio. In fact, the majority of respondents in the survey vote in favor of say on pay between 70 percent and 90 percent of the time, which casts doubt on whether the firms with higher CEO pay ratios prior to the adoption of the pay ratio disclosure rule (hereafter, high pay ratio firms) would change the magnitude of their executive compensation after the adoption of the pay ratio disclosure rule. Thus, I pose my first research question as follows:

RQ1: *Do firms with a higher CEO pay ratio before the adoption of the SEC pay ratio disclosure rule increase (or reduce) CEO's total compensation less (more) in response to the adoption of the CEO pay ratio disclosure rule than firms with a lower CEO pay ratio?*

Prior research show that firms have incentives to respond to regulatory demand for compensation reforms (Abernethy et al. 2015). Crawford et al. (2017) examine the relation between pay ratios and say-on-pay voting for U.S. commercial banks and find that voting dissent on say-on-pay proposals is increasing in the level of the pay ratio, particularly for banks in the highest pay ratio decile. Firms with a high CEO pay ratio have incentives to downsize the CEO compensation package to avoid populist criticism over the gap between their pay and that of their workers. Nevertheless, to remain competitive in the CEO labor markets, firms need to find ways to compensate their CEOs so that while the "cost" of the compensation to the firm is reduced, the "value" of the compensation to the manager is largely unaffected (Meulbroek 2001; Hall and Murphy 2002).

It is well known that managers would demand risk premium for receiving risky pay (e.g., Meulbroek 2001; Hall and Murphy 2002; Conyon et al. 2011). If firms want to reduce the total compensation, they can lower the risk premium of the compensation package by cutting the risky components of the CEO pay. I next explore possible pay arrangement changes that can reduce the

riskiness of the CEO pay.

Meulbroek (2001) and Hall and Murphy (2002) find that the "value" of equity-based compensation to undiversified managers may be much less than the "cost" of providing this compensation to the firm. Specifically, Meulbroek (2001) show that undiversified managers at the average NYSE (rapidly growing) firm value their options at 70% (53%) of the options' market value.[4] Because undiversified managers are exposed to the firm's total risk, but rewarded only for the systematic portion of that risk, managers will value equity-based compensation at less than its market value (that is, the cost to the firm). Hall and Murphy (2002) report a case where a company conducted explicit exchanges of cash for stock-based compensation. Executives participating in the exchanges typically receive a ''risk premium'' for accepting stock-based pay rather than cash. Specifically, the exchange plan provides the participants with the choice to have all or a portion of any cash compensation paid either (i) in cash, (ii) in shares of restricted stock valued at 130% of the foregone cash payment, or (iii) stock options valued at 250% of the foregone cash payment. This exchange plan illustrates that firms have to pay their CEO a substantial risk premium if the compensation is risky pay (e.g., stock or options).

Equity-based compensation is a risker form of the CEO remuneration than cash compensation; and among equity-based compensation, stock options are risker than restricted stock (Hall and Murphy 2002). As a result, I expect that firms with a higher CEO pay ratio reduce the equity-based compensation, and in particular stock options awards, to make up for the decrease in the nominal amount of total CEO pay in response to the issuance of the CEO pay ratio disclosure rule. I pose the following research questions:

RQ2a: *Do firms with a higher CEO pay ratio before the adoption of the SEC pay ratio disclosure rule reduce more equity-based compensation in response to the issuance of the pay ratio disclosure rule than those with a lower CEO pay ratio?*

RQ2b: *Do firms with a higher CEO pay ratio before the adoption of the SEC pay ratio disclosure rule reduce more option awards in response to the issuance of the pay ratio disclosure rule than those with a lower CEO pay ratio?*

Incentive contracts typically contain vesting terms, which determine when the ownership of the back-end instruments (such as stock, options, or cash) transfers to managers. Vesting requirements impose significant risks on the manager. First, vesting increases the risk of forfeiting the back-end instruments in the case of early departure. Second, longer vesting terms impose liquidity risk by tying the manager's wealth up in unvested incentive grants and exposing the manager to firm-specific equity risk during the vesting period. Huddart and Lang (1996) and Fu and Ligon (2010) show that managers exercise a considerable portion of their options soon after the options

[4] The market value of options is this compensation's cost of to the firm.

vest and well before the expiration date, which highlights managers' strong preference for shorter vesting.

Given that CEOs demand risk premium for bearing risk, it is likely that firms with a higher CEO pay ratio shorten the vesting schedule of the incentive awards in an attempt to reduce riskiness and thus the nominal amount (i.e., "cost") of the incentive pay. I pose the following research question:

RQ3: *Are firms with a higher CEO pay ratio before the adoption of the SEC pay ratio disclosure rule more likely to shorten the vesting schedule of the CEO pay in response to the issuance of the pay ratio disclosure rule than those with a lower CEO pay ratio?*

There is an increasing trend for firms to attach performance targets to incentive grants, as advocated by regulators and shareholder activists, to strengthen the association between executive compensation and performance.[5] Bettis et al. (2018) find that the usage of performance-vested (p-v) equity awards in top executive compensation in large U.S. companies has grown from 20 to 70 percent from 1998 to 2012. Performance-vested (p-v) provisions either accelerate or trigger the vesting of stock, option and cash grants to executives. The criteria for the number of units vested or accelerated are based on one or more accounting, stock-price, and other performance targets, such as market share or customer satisfaction. Failure to meet the performance conditions results in the forfeiture of the awards.

To minimize compensation risk, a CEO's preference will be to choose vesting hurdles that are easier to achieve. In this case, the provisions would specify low hurdle rates that are easy to attain. Abernethy et al. (2015) find that firms with powerful CEOs attach less challenging targets in the initial PVSOs granted to their CEOs. As a result, my fourth research question investigates whether high pay ratio firms set easier to achieve performance targets after the passage of the pay ratio disclosure rule?

RQ4: *Do firms with a higher CEO pay ratio before the adoption of the SEC pay ratio disclosure rule set easier to achieve performance targets for the CEOs' performance- vested awards in response to the issuance of the pay ratio disclosure rule than those with a lower CEO pay ratio?*

Researchers argue that CEOs prefer to set easier targets ex ante or targets that can be easier to manipulate ex post (Morse et al. 2011). There is evidence that CEOs "rig" the choice of perfor-

[5] A typical form of performance-vested grant conveys back-end instruments such as stock, stock options, or cash, with the number of back-end instruments granted equal to zero up to certain performance threshold, a discrete jump in back-end instruments granted at that minimum performance threshold, and a ceiling number of back-end instruments granted beyond a maximal performance level. In between the threshold and ceiling, a range which contains a "target" number of shares granted at a corresponding "target" performance level, is a piecewise-linear schedule, specifying how the number of back-end instruments granted increases in the performance measure.

mance measures in their contracts to ensure that their personal wealth is not negatively affected by compensation reforms (Morse et al. 2011; Abernethy et al. 2015). Managers have much more discretion in the process of achieving accounting-based targets than market-based targets (Healy and Wahlen 1999). As a result, boards have incentives to choose a performance metric that managers have greater control over if they want to reduce the riskiness of the CEO not being able to achieve the performance targets. Moreover, it is well known that while equity based compensation is linked to stock performance, cash based incentive compensation is generally linked to accounting measures. If the board reduces the equity–based compensation in the CEO's compensation package to reduce the riskiness of the CEO's compensation, the importance of cash-based incentive compensation increases and so are accounting-based performance metrics. I therefore expect that high pay ratio firms increase the use of accounting-based performance provisions in CEOs' incentive plans. I posit the following research question:

RQ5: *Are firms with a higher CEO pay ratio before the adoption of the SEC pay ratio disclosure rule more likely to increase the use of accounting-based performance provisions for the CEOs' incentive awards in response to the issuance of the pay ratio disclosure rule than those with a lower CEO pay ratio?*

3. Research Design

3.1 Changes in the CEO's compensation package

I estimate the following equation to examine whether firms reduce the CEO's total compensation and compensation components in response to the adoption of the CEO pay ratio disclosure rule:

$$\begin{aligned} ln(Compensation\ Components_{it}) = {} & \alpha_0 + \alpha_1\, HIGHRATIO_i + \alpha_2\, POST_{it} + \alpha_3\, HIGHRATIO_i \times \\ & POST_{it} + \alpha_4\, SALES_{it\text{-}1} + \alpha_5\, BM_{it\text{-}1} + \alpha_6\, ROA_{it\text{-}1} + \\ & \alpha_7\, RET_{it\text{-}1} + \alpha_8\, STDROA_{it\text{-}1} + \alpha_9\, STDRET_{it\text{-}1} + \\ & Industry\ fixed\ effects + \varepsilon_{it} \end{aligned} \quad (1)$$

ln(*Compensation Components*) is the logarithm of (1+ one of the following): *TOTAL_COMP, CASH_COMP, EQUITY_COMP, NONEQ_INCENT, PENSION_CHG, and OTHCOMP. TOTAL_COMP* is the sum of the *SALARY, BONUS, OPTION, STOCK, NONEQ_INCENT, PENSION_CHG*, and *OTH_COMP. SALARY* (*BONUS*) is the dollar value of the base salary (bonus) earned by the named executive officer during the year. *OPTION* is the grant date fair value of all options awarded during the year. *STOCK* is the grant date fair value of all stock awards during the year. *NONOEQ_INCEN* is value of amounts earned (the performance criteria was satisfied)

during the year pursuant to non-equity incentive plans. *PENSION_CHG* is the sum of (a) above-market or preferential earnings from deferred compensation plans, and (b) aggregate increase in actual value of defined benefit and actual pension plans during the year. *OTH_COMP* is the amount listed under "All Other Compensation" in the Summary Compensation Table of the firm's proxy statement.[6] *CASH_COMP* is the sum of *SALARY* and *BONUS*. *EQUITY_COMP* is the sum of *OPTION* and *STOCK*.

I create an indicator variable, labeled as *HIGHRATIO*, based on the firm's CEO pay ratio in the pre-adoption period, which is year 2014 in my sample. *HIGHRATIO* is set equal to one if the firm's CEO pay ratio in the pre-adoption period is equal to or greater than the median CEO pay ratio of all firms from the same two-digit SIC industry, and zero otherwise.[7] The CEO pay ratio is calculated as the CEO compensation scaled by the median employee compensation. CEO compensation is taken from the total compensation column in the Summary Compensation Table of the firm's proxy statement. The median employee compensation is obtained through SalaryList.com. SalaryList.com is a private company that provides information online about salaries for positions in many firms in the United States. Salary information available on SalaryList.com is from official United States Department of Labor reports or from firm reports released on a voluntary basis. The salary information is for actual positions within the firm, including the job title, number of similar positions listed for that firm, location of the position, year of posting, and either exact salary values or a range of salaries for that position. For the job position that provides a range of salaries, I use the midpoint of the range to represent the salary for the position. Because SalaryList.com does not disclose the number of employees under each position, I approximate the median employee salary by calculating the median salary of listed positions within each firm by each year.

POST is an indicator variable set equal to one if the observation comes from the post adoption period. *HIGHRATIO*×*POST* is my primary variable of interest, which captures the differences-in-differences effect of the pay ratio disclosure rule on CEO compensation. If firms with a high CEO pay ratio cut the CEO's total compensation and compensation components after the issuance of the SEC pay ratio disclosure rule more so than firms with a low CEO pay ratio, I expect a negative coefficient on *HIGHRATIO*×*POST*. Following Core et al. (1999), I control for the economic determinants of CEO compensation, including prior year's firm size, growth opportunities, operating complexity, and firm performance. I expect that larger firms with greater growth opportunities and more complex operations will demand higher-quality managers with higher equilibrium wages. I proxy for firm size and complexity with firm sales (*SALES*). *SALES* is the logarithm of sales. I proxy for the firm's investment opportunity set with the firm's year-end

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[6] All Other Compensation includes perquisites and other personal benefits, termination or change-in-control payments, contributions to defined contribution plans (e.g. 401K plans), life insurance premiums, gross-ups and other tax reimbursements, discounted share purchases etc.

[7] Empirical results reported in this study are robust to the use of the mean (as opposed to the median) CEO pay ratios of all firms from the same two-digit SIC industry to create the *HIGHRATIO* indicator variable.

book-to-market ratio (*BM*). BM is the book value of equity divided by the market value of equity.

Firm performance is measured using both the accounting return on assets (*ROA*) and the annual stock market return on the common stock (*RET*). *ROA* is computed as the ratio of income before extraordinary items to total assets at the beginning of the year. *RET* is the buy-and-hold stock return for the current year. Firm risk, which measures the risk of the firm's operating environment, is an important determinant of the level of CEO compensation. I proxy for firm risk using the standard deviation of *ROA* and the standard deviation of *RET* over the past five years. Finally, I include 47 industry-indicator variables based on Fama-French 48 industry classifications as controls for industry differences in the demand for managerial talent.[8]

3.2 Changes in the vesting schedule of the CEO compensation

Gopalan et al. (2014) develop a "duration" measure of executive compensation, which weighs each grant by its vesting period. The duration measure takes into account all of a CEO's compensation components and their respective (estimated) vesting periods. I use Gopalan et al.'s (2014) duration of executive compensation measure to examine the change in the vesting schedule of the CEO's compensation.

Similar to Gopalan et al. (2014), for those grants that the number of the back-end instruments provided is fixed but the vesting schedule depends on future performance, I assume that these grants vest all at once at the end of the performance measurement period. For grants with an accelerated vesting schedule, I assume that they vest according to the original vesting schedule without acceleration. I make this assumption because it is difficult to determine if and when these grants will vest on an accelerated basis. For those long-term incentive plans in which the number of securities offered is contingent on future performance, I assume that the vesting starts right after the performance measurement period and use the target number of securities to be granted in the calculation.

The pay duration is the weighted average duration of the five components of pay (i.e., salary, bonus, restricted stock, stock options, and performance cash grants). In cases in which the stock and option awards have a cliff vesting schedule, I estimate pay duration as:

$$DURATION = \frac{(SALARY + BONUS) \times 0 + \sum_{k=1}^{n_s} STOCK_k \times t_i + \sum_{j=1}^{n_0} OPTION_j \times t_j + \sum_{l=1}^{n_c} PERF\,CASH_l \times t_l}{SALARY + BONUS + \sum_{k=1}^{n_s} STOCK_k + \sum_{j=1}^{n_0} OPTION_j + \sum_{l=1}^{n_c} PERF\,CASH_l} \quad (2)$$

[8] I do not include the year fixed effect in the regression analyses throughout the paper because my sample period covers only 2014 and 2016. The POST indicator variable identifies the observations that come from 2016 and serves as the control for the year effect.

where k indicates a restricted stock grant, j indicates an option grant, and l indicates a performance cash grant. $STOCK_k$ is the grant date fair value of restricted stock grant k with corresponding vesting period t_i (in years). The firm may have multiple stock grants with different vesting periods (different t_i), and n_s is the total number of such stock grants. $OPTION_j$ is the grant date fair value of option grant j with corresponding vesting period t_j (in years). $PERF\ CASH_l$ is the target payout of a performance grant paid in cash with corresponding vesting period t_l (in years). n_o and n_c is the total number of such stock option grants and performance cash grants, respectively. In cases where the performance-vested grant has a graded vesting schedule, I modify the equation (2) by replacing t_k, t_j, and t_l with $(t_k + 1)/2$, $(t_j + 1)/2$, and $(t_l + 1)/2$, respectively.

I use the following regression model to examine if the duration of the CEO compensation changes after the adoption of the CEO pay ratio disclosure rule:

$$\begin{aligned} DURATION_{it} = {} & \beta_0 + \beta_1 HIGHRATIO_i + \beta_2 POST_{it} + \beta_3 HIGHRATIO_i \times POST_{it} + \beta_4 SIZE_{it} + \\ & \beta_5 BM_{it} + \beta_6 LTASSETS_{it} + \beta_7 RD_{it} + \beta_8 DEBTit + \beta_9 VOLATILITY_{it} + \\ & \beta_{10} STDCFO_{it} + \beta_{11} STDSALES_{it} + \beta_{12} RET\text{-}1YR_{it} + \beta_{13} SPREAD_{it} + \\ & Industry\ fixed\ effects + \varepsilon_{it} \end{aligned} \tag{3}$$

Following Gopalan et al. (2014), I include firm size (*SIZE*), growth opportunities (*BM*), asset structure (*LTASSETS*), R&D intensity (*RD*) to control for the "duration" of the firm's assets. Firms with longer-duration assets should grant their CEOs longer-duration compensation. *SIZE* is the logarithm of the firm's market capitalization. *LTASSETS* is the ratio of book value of property, plant, and equipment plus goodwill over noncash total assets. *RD* is the ratio of research and development expenditure over book value of total assets. I code missing values of research and development expenditure as zero. *DEBT* is the ratio of the sum of long-term and short-term debt to the book value of total assets, and is used to control for the firm's financial leverage. Gopalan et al. (2014) find a negative association between compensation duration and firm leverage.

I use the standard deviation of the firm's stock, cash flows, and sales (*VOLATILTY*, *STDCFO*, and *STDSALES*, respectively) to measure the risk in the firm's operations. *VOLATILITY* is the stock return volatility calculated as the annualized volatility of daily stock returns during the prior year. *STDCFO* is the standard deviation of the ratio of operating cash flows over lagged total assets over the previous five years. *STDSALES* is the standard deviation of the firm's annual sales growth during the prior five years.

I include the firm's stock return over the prior year (*RET-1YR*) to control for previous stock performance. I also include the liquidity of the firm's stock (*SPREAD*) to examine the potential effect of stock liquidity on pay duration. *RET-1YR* is the one-year buy-and-hold return for the firm's stock over the previous fiscal year. *SPREAD* is the average ratio of the daily bid-ask spread to the closing price during the previous year. If firms with a higher CEO pay ratio shorten the

vesting schedule of their CEO's compensation more so than firms with a lower pay ratio, I would expect a negative coefficient on *HIGHRATIO*×*POST*.

3.3 Changes in the difficulty of the performance targets

In my sample, over 90% of the firms that grant their CEOs' performance-contingent awards have at least one accounting-based vesting-provisions in their CEO's performance-vested awards. Earnings per share (EPS) is the most widely used performance metrics, appearing in 60% of the accounting-based performance-vested provisions.[9] As a result, I rely on EPS-based performance-vested provisions to examine the changes in the target difficulty in the post rule adoption period. To do so, I estimate the following regression:

$$\begin{aligned} DIFFICULTY_{it} = {} & \gamma_0 + \gamma_1 HIGHRATIO_i + \gamma_2 POST_{it} + \gamma_3 HIGHRATIO_i \times POST_{it} + \\ & \gamma_4 SIZE_{it} + \gamma_5 ADJRET\text{-}1YR_{it} + \gamma_6 DEBT_{it} + \gamma_7 AGE_{it} + \\ & \gamma_8 CEO\_POWER_{it} + Industry\ fixed\ effects + \varepsilon_{it} \end{aligned} \quad (4)$$

To measure the target difficulty, I construct a model to estimate the expected EPS performance for the year following the grant of performance-vested awards. This model regresses one year ahead scaled EPS (defined as fully diluted EPS scaled by stock price at the end of the year) on current year's scaled EPS, firm size, and sales growth rate (*SALESGROW*), and is estimated for each industry in each year. The predicted value from this regression is the expected scaled EPS for the following year. *SALESGROW* is sales in year t minus sales in *t*-1, and scaled by sales in *t*-1. I find that next year's scaled EPS is positively associated with current year's scaled EPS and firm size, and inversely related to sales growth rate. I define *DIFFICULTY* as the target EPS disclosed in the proxy statements scaled by stock price at the end of the year (i.e., scaled target EPS), minus predicted scaled EPS, with a higher value indicating a more difficult target.[10] If a firm grant multiple performance-vested awards to its CEO, *DIFFICULTY* is first computed at the individual grant level and then average across the performance-vested awards granted to the same CEO in the same year to obtain the firm-year level measure of *DIFFICULTY*.

I use several control variables identified in the literature as potential determinants of firms' target-setting practices (Indjejikian et al. 2014; Abernethy et al. 2015). I control for *SIZE* as it captures several potential omitted variables, such as organizational complexity, CEO talent, ex-

[9] The prevalence of accounting-vesting provisions relative to stock price-vesting provisions is due to the accounting treatment prescribed by SFAS 123R. Grants with non-price vesting are adjusted for changes in the probability of the condition being satisfied, as well as for performance realizations. Awards with price conditions are not adjusted for either the probability or realization of the condition.

[10] Results are robust to an alternative definition of *DIFFICULTY*, where the current year's EPS is subtracted from the target EPS disclosed in the proxy statement.

ternal monitoring, and shareholder concerns about performance sensitivity (Carter et al. 2009). I also control for the need for the firm to take risks, measured by the book-to-market ratio (Gerakos et al. 2007), and past industry-adjusted stock return performance (*ADJRET-1YR*). *ADJRET-1YR* the annual buy-and-hold stock return for the year prior to the grant year, minus the median annual buy-and-hold stock return for all firms in the same two-digit SIC industry classifications for the same period.

Other control variables include *DEBT* (Jensen and Meckling 1976), which is used to capture the monitoring of debt holders, and CEO's age (*AGE*), which reflects the CEO'S risk-aversion and experience in management (Dechow and Sloan 1991; Cheng 2004). I control for CEO power as Abernethy et al. (2015) show that powerful CEOs attach less challenging targets in their performance-vested stock options. I follow Abernethy et al. (2015) and van Essen et al. (2015) to measure CEO power. Specifically, I perform a principal component analysis (PCA) on the following six items: (1) number of board committees on which the CEO sits, (2) CEO tenure, (3) board size, (4) proportion of independent directors on the board, (5) fraction of shares owned by the largest outside owner of the firm, and (6) institutional ownership. I obtain a common factor from the PCA and label it as *CEO_POWER*.

3.4 Changes in the weight put on the accounting performance vesting provisions

I use the following regression model to examine if firms increase the use of accounting-vesting performance provisions in the CEO's incentive payments after the adoption of the CEO pay ratio disclosure rule:

$$\begin{aligned} ACCVEST\_COMP_{it} = {} & \lambda_0 + \lambda_1 HIGHRATIO_i + \lambda_2 POST_{it} + \lambda_3 HIGHRATIO_i \times POST_{it} + \\ & \lambda_4 STKVOL/ACCVOL_{it} + \lambda_5 SEGMENTS_{it} + \lambda_6 CEO\_POWER_{it} + \\ & \lambda_7 RETIRE\_AGE_{it} + \lambda_8 NEW\_CEO_{it} + \lambda_9 INSTOWN_{it} + \\ & \lambda_{10} BOARD\_SIZE_{it} + \lambda_{11} SIZE_{it} + Industry\ fixed\ effects + \varepsilon_{it} \end{aligned} \quad (5)$$

ACCVEST_COMP is the dollar value of the CEO's incentive compensation that is tied to EPS, scaled by the dollar value of total incentive compensation granted to the CEO during the year. Previous research has shown that a firm's choice of performance measures is affected by each measure's signal-to-noise ratio with respect to managerial actions (Holmstrom 1979; Lambert and Larcker 1987). If a firm's stock performance is volatile relative to its accounting performance, the firm may assign more weight to its accounting performance and vice versa. Following the literature, I use the firm's ratio of stock volatility to accounting performance volatility to capture the relative amount of noise in different signals (*STKVOL/ACCVOL*). Stock volatility is measured as the standard deviation of monthly stock returns over the past five years, and the ac-

counting volatility is the standard deviation of return on asset (*ROA*) over past five years.

Companies with complex business structures are more difficult for outsiders to evaluate and their stock prices would be less informative than those of single segment firms. I expect that complex firms prefer to incorporate internal accounting performance measures to supplement external stock price signals when evaluating executive actions. I measure the complexity of a firm's operations using the number of business segments (*SEGMENTS*). Lambert and Larcker (1987) argue that high-growth firms would prefer to use stock performance because stock prices better impound the future consequences of managerial actions. Accounting-based measures, however, are generally less sensitive due to the constraint of the cost-based generally accepted accounting principles. Therefore, I expect high-growth firms to give more weight to stock-based measures than to accounting-based measures. I control for several CEO and firm characteristics that have been shown to affect compensation design in the literature. These variables include, CEO power (*CEO_POWER*), a binary variable that indicates if the CEO is approaching retirement (*RETIRE_AGE*), an indicator variable that captures if the CEO is new (*NEW_CEO*), institutional ownership (*INSTOWN*), size of the board (*BOARD_SIZE*), and firm size (*SIZE*). *RETIRE_AGE* is an indicator variable that equals one if CEO's age is greater than or equal to 65 and zero otherwise. *NEW_CEO* is an indicator variable that equals one if the CEO tenure is less than or equal two years, and zero otherwise. *BOARD_SIZE* is the total number of directors on the board.

4. Sample and Univariate Analyses

My initial sample consists of the 750 largest firms covered by Incentive Lab. Incentive Lab provides compensation data disclosed in proxy statements on the largest 750 firms by stock market value each year. Incentive Lab data contain the specific performance measures, targets and schedules used to determine vesting. I use Compustat for financial statement data and CRSP for prices and returns. Institutional holdings data are obtained from Thomson Reuters Institutional (13f) Holdings. I use the Institutional Shareholder Services (ISS) Directors database to obtain the corporate governance data. The median employee compensation before the pay ratio disclosure rule is computed based on data retrieved from SalaryList.com. The SEC issues the CEO pay ratio disclosure rule in 2015. I retain compensation data from one year before (i.e., 2014) and one year after (i.e., 2016) the adoption of the new rule to examine the changes in the CEO compensation practices. I employ a constant sample to ensure that any changes in the CEO's compensation package are not attributable to the changes in the sample composition. My primary sample includes 974 firm-years (represent 487 unique firms) that have sufficient data to compute the CEO pay ratio in 2014.

Table 1 compares the mean values of the key variables across the pre and post rule adoption periods for high and low pay ratio firms separately. On average, both the high and low pay ratio firms cut down the CEO's total compensation but high pay ratio firms decrease total compensa-

Table 1 Descriptive Statistics on Executive Compensation

Panel A: Mean compensation before and after the rule adoption

Compensation Components		*POST* = 0 (1)	*POST* = 1 (2)	Difference (2) – (1)
TOTAL_COMP	*HIGHRATIO* = 0	4,310,651	4,223,504	−87,147**
	HIGHRATIO = 1	15,303,218	13,977,275	−1,325,943**
CASH_COMP	*HIGHRATIO* = 0	820,694	874,659	53,965**
	HIGHRATIO = 1	1,430,683	1,440,481	9,798**
SALARY	*HIGHRATIO* = 0	744,057	799,632	55,575***
	HIGHRATIO = 1	1,180,279	1,187,608	7,329***
BONUS	*HIGHRATIO* = 0	76,637	75,027	−1,610
	HIGHRATIO = 1	250,404	252,873	2,469
EQUITY_COMP	*HIGHRATIO* = 0	2,278,960	3,060,592	781,632***
	HIGHRATIO = 1	9,440,077	9,292,992	−147,085***
OPTION	*HIGHRATIO* = 0	557,516	697,547	140,031**
	HIGHRATIO = 1	2,817,599	2,277,012	−540,587 **
STOCK	*HIGHRATIO* = 0	1,721,443	2,363,045	641,602***
	HIGHRATIO = 1	6,622,477	7,015,980	393,503***
NONEQ_INCEN	*HIGHRATIO* = 0	743,269	894,485	151,216***
	HIGHRATIO = 1	2,601,393	2,566,107	−35,286
PENSION_CHG	*HIGHRATIO* = 0	285,939	217,867	−68,072*
	HIGHRATIO = 1	1,199,020	717,497	−481,523**
OTH_COMP	*HIGHRATIO* = 0	182,139	162,374	−19,765
	HIGHRATIO = 1	632,044	868,432	236,388***
Median employee compensation	*HIGHRATIO* = 0	92,812	96,620	3,808*
	HIGHRATIO = 1	78,736	80,211	1,475*
PAY_RATIO	*HIGHRATIO* = 0	58.35	61.81	3.46
	HIGHRATIO = 1	197.57	180.62	−16.95**
N		487	487	

Note: *POST* is an indicator variable set equal to one if the observation comes from the post adoption period. *,**,*** denote $p < 0.1$, $p < 0.05$, and $p < 0.01$(two tailed). # denote $p < 0.1$ (one tailed).

tion substantially more than low pay ratio firms (p-value < 0.01). Decomposing total compensation into its major components, it appears that the decrease in CEO's total compensation for high ratio firms are driven by the decrease in the grant day fair value of employee stock options. The median employee pay increases both for the high and low pay ratio firm, although the increase is more pronounced in low pay ratio firms (p-value < 0.10). The CEO pay ratio does not have a significant change for low pay ratio firms but decreases slightly from 197.57 to 180.62 for high pay ratio firms after the passage of the CEO pay ratio disclosure.

Table 2 presents the descriptive statistics of the variables used in my empirical analyses. These CEOs' mean total compensation is equal to $10,336,887 and the mean cash compensation (salary plus bonus) is equal to $1,221,210, indicating that on average, cash accounts for about 12% of the CEO's total compensation. The mean equity-based compensation is $6,092,958 and the mean non-equity incentive compensation is $2,061,164. These two compensation components make up 79% of the CEO's total compensation. About 26% (74%) of the equity compensation takes the form of stock options (restricted stock) grants.

The mean pay ratio is 125, indicating that on average, CEO earns 125 times more than the median employee in the same firm. My average firm reports a positive *ROA* of 0.053 and annual stock return of 17.8% during my sample period. The CEO's compensation duration has a mean value of 1.787 years, which is slightly longer than the mean duration of 1.218 years in Gopalan et al.'s (2014) sample. My average firm has a debt to total assets ratio of 0.22, suggesting that the majority of the firm's assets are financed through equity. The mean CEO age is 51.9 and the mean *RETIRE_AGE* is 0.072, suggesting that only 7% of my sample CEOs are approaching retirement. *ACCVEST_COMP* has a mean of 0.531, implying that about 53% of the CEO's incentive pay is tied to accounting performance. The average board consists of 10 directors and 13% of the CEOs are considered new CEOs that took office for no more than two years.

5. Empirical Findings

5.1 Changes in the design of the CEO's compensation package

I begin by investigating my first research question whether high pay ratio firms decrease the CEO compensation in response to the adoption of CEO pay ratio disclosure rule. The results from estimating equation (1) are reported in Panel A of Table 3. Column (1) reports the results when the dependent variable is the CEO's total compensation. The coefficient on *HIGHRATIO* is significantly positive, indicating that CEOs at high pay ratio firms receive a higher level of remuneration than their peers at firms with a lower CEO pay ratio in the preadoption period. My main variable of interest, *HIGHRATIO*×*POST* is significantly negative, implying that high ratio firms have a smaller increase in CEO compensation than low ratio firms. The sum of *POST* and *HIGHRATIO*×*POST* is significantly negative, suggesting that high pay ratio firms actually decrease, as opposed to increase CEO compensation after the SEC issues the CEO pay ratio disclosure rule. Exponentiating the sum of *POST* and *HIGHRATIO*×*POST* and subtracting one from this number reveals that the CEOs at high pay ratio firms received an average pay reduction of 11.8% in the post period. In contrast, the coefficient on *POST* is significantly positive, suggesting that low pay ratio firms experience a pay increase of 22.6% in the CEO compensation in the post-adoption period.[11]

[11] Exponentiate the coefficient on *POST* and subtract one, and multiply the resulting number by 100.

Table 2 Descriptive Statistics

	Obs	Mean	SD	Q1	Median	Q3
TOTAL_COMP	974	10,336,887	8,715,015	5,685,300	8,635,794	12,676,399
CASH_COMP	974	1,221,210	1,199,387	892.250	1,042,571	1,284,221
SALARY	974	1,084,103	427,144	850,000	1,018,207	1,250,000
BONUS	974	137,107	1,017,710	0	0	0
EQUITY_COMP	974	6,092,958	6,440,578	2,693,925	5,001,335	8,073,609
OPTION	974	1,578,875	4,522,019	0	388,774	2,249,995
STOCK	974	4,514,083	4,661,791	1,399,819	3,664,851	6,355,142
NONEQ_INCEN	974	2,061,164	2,404,874	788,259	1,517,153	2,604,375
PENSION_CHG	974	560,054	1,356,110	0	0	342,727
OTH_COMP	974	401,503	2,395,123	41,768	138,035	319,874
PAY_RATIO	974	125.318	84.455	67.119	101.686	156.315
SALES	974	8.662	1.257	7.760	8.553	9.481
BM	974	0.326	0.749	0.157	0.288	0.476
ROA	974	0.053	0.087	0.019	0.053	0.097
RET	974	0.178	0.971	−0.175	0.103	0.583
STDROA	974	0.056	0.073	0.013	0.038	0.065
STDRET	974	33.173	22.055	18.416	27.421	47.325
DURATION	974	1.787	0.544	1.549	1.875	2.150
SIZE	974	9.039	1.293	8.220	9.145	10.084
LTASSETS	974	0.424	0.265	0.226	0.435	0.597
RD	974	0.034	0.066	0.000	0.006	0.041
VOLATILITY	974	0.402	0.151	0.311	0.397	0.452
STDCFO	974	0.053	0.041	0.029	0.047	0.062
STDSALES	974	0.153	0.148	0.062	0.117	0.190
DEBT	974	0.2213	0.193	0.181	0.202	0.427
RET−1YR	974	0.187	0.931	−0.163	0.092	0.593
SPREAD (%)	974	0.214	0.319	0.097	0.137	0.431
DIFFICULTY	974	−1.877	7.621	−5.579	−0.629	2.706
ADJRET−1YR	974	0.046	0.397	−0.264	0.042	0.282
AGE	974	51.870	7.914	47.100	51.000	57.641
CEO_POWER	974	0.000	1.000	−0.597	−0.015	0.659
ACCVEST_COMP	974	0.531	0.269	0.289	0.552	0.715
STKVOL/ACCVOL	974	6.974	8.829	2.734	4.184	11.725
SEGMENTS	974	2.298	1.516	1.000	2.000	3.000
BOARD_SIZE	974	9.894	2.765	8.000	10.000	12.000
RETIRE_AGE	974	0.072	0.031	0.000	0.000	0.000
NEW_CEO	974	13.462	6.425	0.000	0.000	0.000
INSTOWN	974	0.598	0.187	0.468	0.611	0.863
CHSHVALUE	974	2,071.260	3,934.730	−27.977	815.908	3,092.340
CH(*TOTAL_COMP*)	974	823.895	4,445.870	−626.327	605.929	2,272.190
LOGTA	974	8.933	1.332	8.032	8.831	0.806

Note: Continuous variables are winsorized at the 1% and 99% levels. All variables are defined in Appendix A.

I then decompose the CEO's total compensation into major components reported in the proxy statements. Results from columns (2)-(6) reveal that the coefficient on *HIGHRATIO*×*POST* is significantly negative only for equity-based compensation (column (3)). Moreover, *POST*+*HIGHRATIO*×*POST* is significantly negative at conventional levels for the equity-based compensation. In terms of economic magnitude, high ratios firms reduce the use of equity based compensation by 20.7% after the SEC issued the pay ratio disclosure rule. Collectively, these results suggest that firms with a higher CEO pay ratio are more likely to cut equity-based compensation in the post adoption period than are firms with a lower CEO pay ratio (*RQ2a*). In addition, results from column (3) also suggest that the reduction in the CEO's total compensation for high pay ratio firms is attributable to the reduction of the CEO's equity compensation.

I further examine which equity-based compensation component(s) contributes to the decline in the CEO's equity-based compensation. Columns (3) and (4) of Panel B in Table 3 show that while the coefficient on *HIGHRATIO*×*POST* is significantly negative for both stock options and restricted stock, *POST*+*HIGHRATIO*×*POST* is significantly negative only for the stock option model. This finding suggests that there is a more pronounced decrease in the grant date fair value of the CEO's stock option grants for firms with a higher CEO pay ratio when compared to stock grants (*RQ2b*) and the decrease in the CEO's equity-based compensation is driven primarily by the reduction in option-based compensation.

Table 4 reports the change in the CEO's compensation duration around the issuance of the CEO pay ratio disclosure rule. The coefficient on *POST* in Column (1) of Table 4 is negative and significant at the 1% level, suggesting that on average, the vesting schedule of the CEO's compensation package shortens for my sample firms in the post-adoption period. Separating firms into the high and low pay ratio groups in column (2) of Table 4, I find that the coefficient on *POST* is no longer significant, indicating that firms with low CEO pay ratio do not change their CEO's vesting schedule in the post-adoption period. The negative coefficient on *HIGHRATIO*×*POST* reveals that it is the high pay ratio firms that shorten the vesting schedule of CEO's pay package. The sum of *POST* and *HIGHRATIO*×*POST* is −0.1922 and statistically significant. Given that the mean *DURATION* for high pay ratio firms in the pre adoption period is 1.8290 (untabulated), column (2) of Table 4 suggests that high pay ratio firms shorten the compensation duration for their CEOs by about 11% after the SEC issued the pay ratio disclosure rule.

Table 5 examines whether firms with a higher CEO compensation ratio set easier to achieve performance targets to reduce the riskiness of their CEOs' compensation. The coefficient on *POST* in column (1) of Table 5 is significantly negative, implying that on average, my sample firms reduce the difficulty of EPS-based performance targets after the implementation of the CEO's pay ratio disclosure rule. Separating firms into those with high and low CEO pay ratios, the negative coefficient on *POST* and *HIGHRATIO*×*POST* suggests that high pay ratio firms set even easier to achieve EPS-based targets than low pay ratio firms do, probably to reduce the riskiness of the pay package in order to compensate the CEO for the reduced total compensation.

Table 3 Levels of the CEO's Compensation Components

Panel A: Level of major compensation components

	(1) Dependent variable:	(2) Dependent variable:	(3) Dependent variable:	(4) Dependent variable:	(5) Dependent variable:	(6) Dependent variable:
VARIABLES	*ln(TOTAL_COMP)*	*ln(CASH_COMP)*	*ln(EQUITY_COMP)*	*ln(NONEQ_INCENT)*	*ln(PENSION_CHG)*	*ln(OTH_COMP)*
HIGHRATIO	0.7030***	0.1633**	0.5100***	0.3055	0.5639**	0.3411**
	(7.8144)	(2.3264)	(8.1644)	(1.2830)	(2.0121)	(2.3679)
POST	0.2038**	0.0031	0.1299***	0.0875	-0.4825**	0.0668
	(2.2469)	(0.0476)	(2.5843)	(0.4545)	(-2.2670)	(0.5565)
HIGHRATIO×POST	-0.3156***	-0.0178	-0.3181***	0.0645	-0.0648	0.0146
	(-3.0767)	(-0.2477)	(-4.4476)	(0.2478)	(-0.2095)	(0.0922)
SALES	0.2813***	0.1388***	0.1732***	0.1819*	0.4505***	0.1963***
	(10.1935)	(4.9935)	(7.2547)	(1.7466)	(5.4178)	(2.7413)
BM	-0.0115	0.2668**	0.0620*	-0.0626	0.0448	0.0382
	(-0.2764)	(2.0760)	(1.7375)	(-0.4532)	(0.4274)	(0.3443)
ROA	0.7680**	0.3649	0.1849	4.3154***	-0.0374	-0.6261
	(2.5806)	(1.1973)	(0.7172)	(3.3385)	(-0.0497)	(-0.7620)
RET	1.5172**	0.4253**	0.8467***	0.1132**	0.0678*	0.0624*
	(2.3467)	(2.1069)	(3.4607)	(2.3312)	(1.8628)	(1.6726)
STDROA	-38.8512***	-13.1461***	-14.0157***	-6.4382***	-3.2164**	-2.1447**
	(-3.8457)	(7.1002)	(2.9815)	(-2.5516)	(-2.0167)	(-1.9735)
STDRET	-0.9846	-0.6319	-0.7153*	-0.5794	-0.3624	-0.1788
	(-1.5701)	(-1.2197)	(-1.6657)	(-1.0353)	(-0.7813)	(-0.6442)
Constant	6.3074***	5.6410***	-0.3819	5.1067**	0.6726	1.3234
	(18.4323)	(23.5919)	(-1.5577)	(2.4416)	(0.3849)	(1.4154)
P-value for test of H0: POST + HIGHRATIO×POST = 0	0.036	0.8055	0.0007	0.3895	0.0151	0.4386
Industry Effect	Included	Included	Included	Included	Included	Included
Observations	974	974	974	974	974	974
Adj R^2	0.3677	0.2207	0.2113	0.2170	0.2611	0.2382

Note: *,**,*** denote $p < 0.1$, $p < 0.05$, and $p < 0.01$ (two tailed). T-statistics in parentheses are based on Huber-White robust standard errors.[12] All variables are defined in Appendix A.

Table 3 Levels of the CEO's Compensation Components (Continue)

Panel B: Level of major compensation components

VARIABLES	(1) Dependent variable： *ln*(*SALARY*)	(2) Dependent variable： *ln*(*BONUS*)	(3) Dependent variable： *ln*(*OPTION*)	(4) Dependent variable： *ln*(*STOCK*)
HIGHRATIO	0.1868***	−0.2672	0.6117*	1.1461***
	(2.8372)	(−1.6161)	(1.8818)	(3.6169)
POST	0.0482	−0.1999	0.1606	0.6142**
	(0.7625)	(−1.4067)	(0.6186)	(2.3807)
HIGHRATIO×*POST*	−0.0617	0.2138	−0.8142**	−0.9953***
	(−0.9025)	(1.1300)	(−2.1651)	(−2.7966)
SALES BM	0.1430***	−0.0648	0.4145***	0.2118**
	(5.3257)	(−1.1693)	(3.6027)	(2.0181)
BM	0.2454*	0.2588**	−0.1496	0.2796*
	(1.8603)	(2.5771)	(−0.7831)	(1.9005)
ROA	0.4397	−1.0105	1.6204	−1.5820
	(1.4828)	(−1.5543)	(1.2945)	(−1.3174)
RET	0.6627	0.3028**	0.3851***	0.4935***
	(1.3276)	(2.3017)	(2.7426)	(3.2884)
STDROA	−4.1201***	−8.3201***	−5.3424**	9.2179***
	(−3.7122)	(−8.4763)	(−2.2791)	(5.3463)
STDRET	−0.2571	−0.4023	−0.2418*	−0.4572*
	(−0.6147)	(−0.5739)	(−1.6705)	(−1.7461)
Constant	5.5891***	0.6917	−3.5697***	3.3704
	(24.3208)	(1.3575)	(−3.6658)	(1.3213)
Industry Effect	Included	Included	Included	Included
P-value for test of H0: *POST* + *HIGHRATIO* ×*POST* = 0	0.6325	0.8119	0.0163	0.1086
Observations	974	974	974	974
Adj R^2	0.2162	0.0900	0.1553	0.0582

Note: *,**,*** denote $p < 0.1$, $p < 0.05$, and $p < 0.01$ (two tailed). T-statistics in parentheses are based on Huber-White robust standard errors. All variables are defined in Appendix A.

[12] Because I have only two years of data (one year before and one year after the adoption of the CEO pay ratio disclosure) and I include the *POST* dummy to identify observations from 2016, I am unable to cluster t-statistics at both the firm and year levels for Tables 3-7.

Table 4 Duration of the CEO Compensation

VARIABLES	(1) Dependent variable： *DURATION*	(2) Dependent variable： *DURATION*
HIGHRATIO		0.1288**
		(2.0598)
POST	−0.1320***	−0.0586
	(−3.4518)	(−0.9949)
HIGHRATIO×POST		−0.1336*
		(−1.7324)
SIZE	0.1066***	0.0932***
	(6.2299)	(4.5993)
BM	0.0495	0.0510
	(1.1934)	(1.2276)
LTASSETS	0.2247**	0.2331**
	(2.0842)	(1.9814)
RD	0.5017**	0.4986**
	(2.3419)	(2.3018)
DEBT	−0.0472	−0.0623
	(0.2176)	(0.4945)
VOLATILITY	−0.3014**	−0.2972**
	(−2.3104)	(−2.2671)
STDCFO	−0.4320*	−0.4157*
	(−1.7154)	(−1.7381)
STDSALES	−0.2217*	−0.2376*
	(−1.8435)	(−1.9001)
RET−1YR	0.1602***	0.1574***
	(3.2464)	(3.1351)
SPREAD	−0.2417***	−0.2376***
	(3.0247)	(2.9302)
Constant	−0.1320***	1.1183***
	(−3.4518)	(4.5878)
Year Effect	Included	Included
Industry Effect	Included	Included
P-value for test of H0:	YES	YES
POST + *HIGHRATIO×POST* = 0		0.0008
Observations	974	974
Adj R^2	0.1223	0.1274

Note: *,**,*** denote $p < 0.1$, $p < 0.05$, and $p < 0.01$ (two tailed). T-statistics in parentheses are based on Huber-White robust standard errors. All variables are defined in Appendix A.

Table 5 Target Difficulty of CEO EPS-Vesting Grants

VARIABLES	(1) Dependent variable： *DIFFICULTY*	(2) Dependent variable： *DIFFICULTY*
HIGHRATIO		0.2056
		(0.61)
POST	−6.1498	−3.9614***
	(−27.82)	(−8.46)
HIGHRATIO×POST		−2.8719***
		(−5.38)
SIZE	−2.7902***	−2.3771***
	(−7.8842)	(−9.3611)
ADJRET-1YR	−0.1580	−0.1424
	(−0.6904)	(−0.6725)
DEBT	0.0186	0.0273
	(0.7549)	(0.6283)
AGE	−0.0324	−0.0319
	(−1.3157)	(−1.4102)
CEO_POWER	−0.7338**	−0.7299**
	(−2.0845)	(−1.9728)
Constant	8.6405***	9.5190***
	(17.4127)	(16.2381)
Industry Effect	Included	Included
P-value for test of H0: *POST* + *HIGHRATIO×POST* = 0		<0.0001
Observations	974	974
Adj R^2	0.5073	0.5681

Note: *,**,*** denote $p < 0.1$, $p < 0.05$, and $p < 0.01$ (two tailed). T-statistics in parentheses are based on Huber-White robust standard error. All variables are defined in Appendix A.

Table 6 investigates whether high pay ratio firms increase the use of accounting-based measures in their long-term incentive compensation after the SEC issues the pay ratio disclosure rule. The coefficient on *POST* in column (1) is not significantly different from zero, indicating that overall, my sample firms do not change the weight place on accounting-based performance measures in response to the new disclosure rule. In contrast, the coefficient on *POST* in column (2) is significantly negative, implying that low pay ratio firms decrease the proportion of incentive compensation tied to accounting-based performance measures. The coefficient on *HIGHRATIO×POST* is significantly positive, implying that high pay ratio firms increase the use of accounting-based vesting provisions in the CEO's compensation more so than low pay ratio firms.

Table 6 The Use of Accounting-Vested Performance Grants

VARIABLES	(1) Dependent variable： *ACCVEST_COMP*	(2) Dependent variable： *ACCVEST_COMP*
HIGHRATIO		−0.0377
		(−1.3601)
POST	0.0186	−0.0483*
	(1.2625)	(−1.8617)
HIGHRATIO×POST		0.0751**
		(2.1831)
STKVOL/ACCVOL	0.0591***	−0.6024***
	(−2.7672)	(−2.6917)
SEGMENTS	0.0168**	0.0116**
	(2.0231)	(1.9908)
CEO_POWER	0.0641*	0.6114
	(1.6503)	(1.6491)
RETIRE_AGE	−0.0048	−0.0047
	(0.0974)	(0.1123)
NEW_CEO	−0.0213*	−0.1975*
	(−1.7429)	(−1.6683)
INSTOWN	−0.2651*	−0.2527*
	(−1.8647)	(−1.7366)
BOARD_SIZE	0.0103	0.0097
	(1.0365)	(0.0877)
SIZE	0.0126*	0.0001
	(1.9034)	(0.0062)
Constant	0.2842**	0.5641***
	(2.0880)	(7.1628)
Industry Effect	Included	Included
P-value for test of H0: *POST* + *HIGHRATIO×POST* = 0		0.0961
Observations	974	974
Adj R^2	0.0891	0.0928

Note: *,**,*** denote $p < 0.1$, $p < 0.05$, and $p < 0.01$ (two tailed). T-statistics in parentheses are based on Huber-White robust standard errors. All variables are defined in Appendix A.

The sum of *POST* and *HIGHRATIO×POST* is 0.0268 and significant at the 10% level, suggesting that high pay ratio firms increase the proportion of performance compensation tied to accounting-based measures by 2.68% after the implementation of the CEO pay ratio disclosure rule.

5.2 Sensitivity Analyses

I perform three sensitivity analyses to ensure that my results are not driven by my research design choices. First, the construction of the indicator variable, *HIGHRATIO*, might lose valuable information contains in the original pay ratio variable. I replace the *HIGHRATIO* indicator variable with (a) raw pay ratio; (b) industry-adjusted pay ratio, calculated as raw pay ratio minus the median pay ratio of all firms from the same two-digit SIC industry; and (c) the percentile ranking of the raw pay ratio and industry-adjusted pay ratio in equations (1), (3), (4), and (5). The results are qualitatively similar to those reported in Tables 3-6.

Second, my primary analyses decompose firms into high and low pay ratio firms based on firm pay ratios relative to industry median pay ratios. Rouen (2020) models the components of a CEO to employee pay ratio and reports a negative relation between unexplained pay disparity is negatively associated with future firm stock and accounting performance. I repeat all of my analyses by redefining high and low pay ratios based on a unexplained pay ratio modified based on Rouen's (2020) model.[13] I find inferentially similar results to those reported in Tables 3-6.

Third, I use an alternative measure to measure the vesting schedule of the CEO's incentive compensation. My primary vesting period measure is Gopalan et al. (2014)'s pay duration, which is calculated as the weighted average of the vesting periods of the different components of executive pay, with the weight for each component being the value of that component as a percentage of the executive's total compensation. As a robustness check, I also measure the vesting period of the grants based on the length of time it takes for the entire grant to vest following Cadman et al. (2012). I obtain inferentially similar results as those reported in Table 4.

5.3 Additional Analysis

Empirical analyses thus far provide consistent evidence that firms cut down CEO pay and at the same time reduce the riskiness of their CEOs' compensation package in order to make up for the decreased total pay after firms are required to disclose the CEO pay ratio. A natural question to ask is whether the changes in the CEO compensation design lead to more effective CEO compensation. The pay-performance link has long been used by practitioners and researchers to gauge the effectiveness of CEO compensation (e.g., Jensen and Murphy 1990; Smith and Watts 1992; Institutional Shareholder Services 2018). In this section, I examine whether the pay-performance relation of the CEO compensation strengthens in the post disclosure period. Following Ke et al. (2012), I estimate the pay-performance regression as follows:

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[13] I use the firm level economic variables in equation (1) of Rouen (2020) to explain the firm level median employee pay generated from SalaryList.com. The resulting explained firm level median employee pay together with the explained CEO pay based on equation (2) of Rouen (2020) is used to determine the explained pay ratio. The unexplained ratio is calculated as the difference between the actual ratio and the explained ratio following Rouen (2020).

$$CH(TOTAL\_COMP)_{it} = \omega_0 + \omega_1 CH(ROA)_{it} + \omega_2 POST_{it} + \omega_3 CH(ROA)_{it} \times POST_{it} + \omega_4 CH(ASSETS)_{it} + \omega_5 CH(BM)_{it} + Industry\ fixed\ effects + Year\ fixed\ effects + \varepsilon_{it} \quad (6)$$

CH(*TOTAL_COMP*) is the change in the logarithm of CEO's total compensation reported in the summary compensation table of the proxy statement. *CH*(*ROA*) is the change in return on assets (*ROA*). *ROA* is calculated as income before extraordinary items scaled by beginning total assets. I control for the change in total assets *CH*(*ASSETS*) and change in book-to- market ratio *CH*(*BM*) in equation (6) because business operation complexity and growth opportunities could potentially impact the pay-performance relation (Ke et al. 2012). *ASSETS* is the logarithm of total assets. *BM* is book value of equity scaled by market value of equity.

I estimate equation (6) for the full sample and for high and low pay ratio firms separately. If equation (6) yields results consistent with past research on pay-to-performance sensitivity, I expect ω_1 to be positive, suggesting that there is a positive sensitivity of pay to performance. The coefficient on *CH*(*ROA*)×*POST* (ω_3) captures the change in the pay-performance link from the pre- to the post adoption period. A positive (negative) ω_3 suggests that a one-unit increase in firm performance is associated with a greater (smaller) increase in the CEO's compensation in the post adoption period, suggesting a stronger link between firm performance and the CEO's compensation.

Table 7 presents the results from estimating equation (6). Model (1) of Table 7 reports the full sample results. The coefficient on *CH*(*ROA*) is significantly positive, indicating a positive relation between CEO compensation and firm performance. The coefficient on *CH*(*ROA*) *POST* is not significant, implying that the pay-performance relation does not change significantly from the pre- to the post-adoption period for my full sample.

Models (2) and (3) report the results for firms with high and low CEO pay ratio, respectively. Consistent with prior literature, the coefficient on *CH*(*ROA*) is positive and significant in both models (2) and (3), indicating a positive pay-performance link. However, the coefficient on *CH*(*ROA*) is much smaller in column (2) than in column (3) ($p < 0.01$), implying that the pay-performance link for low pay ratio firms is not as strong as that for high pay ratio firms in the pre-adoption period. The coefficient on *POST* indicates the change in the CEO's total compensation for firms with zero change in *ROA* from the pre- to the post- adoption period. Because there is no firm with a zero change in *ROA* in my sample, I do not interpret the coefficient on *POST* in Table 7.

The coefficient on *CH*(*ROA*)×*POST* is not significant for both the low pay ratio and high pay ratio samples at the two-tailed level. However, this interaction is significantly negative for the high pay ratio firms at the one-tailed 10% level. This latter finding suggests that the pay-performance sensitivity weakens for the high ratio firms in the post period, if anything. Taken together,

Table 7 Change in the Pay-Performance Relation from the Pre-to the Post-Disclosure Period

VARIABLES	(1) Dependent variable： *CH*(*TOTAL_COMP*)	(2) Dependent variable： *CH*(*TOTAL_COMP*)	(3) Dependent variable： *CHSHVALUE*
	Full sample	*HIGHRATIO* = 0	*HIGHRATIO* = 1
CH(*ROA*)	1.1705***	0.6606*	1.7230***
	(2.8111)	(1.7149)	(2.6228)
POST	−0.0760*	−0.0849	−0.0787*
	(−1.6822)	(−0.9508)	(−1.7112)
CH(*ROA*)*3POST*	−0.3617	0.0373	−1.1649#
	(−0.5291)	(0.0406)	(−1.5353)
Ln(*TA*)	0.0140	−0.0209	−0.0941***
	(0.8162)	(−0.6669)	(−3.8381)
BM	0.0089	−0.0248	−0.0265
	(0.1114)	(−0.2233)	(−0.2030)
Constant	−0.1808	0.2336	1.2266***
	(−1.1066)	(0.6352)	(4.6920)
Industry Effect	Included	Included	Included
Year Effect	Included	Included	Included
Observations	971	486	485
Adj R^2	0.0491	0.0688	0.1829

Note: *,**,*** denote $p < 0.1$, $p < 0.05$, and $p < 0.01$ (two tailed). # $p < 0.1$ (one tailed) denote T-statistics in parentheses are based on Huber-White robust standard errors. All variables are defined in Appendix A.

these results provide some weak evidence that the implementation of the CEO pay ratio disclosures weakens the incentive effect of CEO compensation for high pay ratio firms but not the low pay ratio firms, implying that the changes made to the CEO compensation design by high pay ratio firms do not improve, and in fact hurt the efficacy of CEO compensation if anything.

6. Concluding Remarks

There is an intense public concern over the increasing disparity between the pay of the CEOs and that of rank-and-file employees. To address this concern, the SEC approved the pay ratio disclosure rule on August 5, 2015 mandating disclosure of the ratio of the CEO's compensation to median employee pay. However, there is considerable debate over whether the pay ratio disclosure could effectively rein in growing CEO compensation. Supporters of the new disclosure rule believe that by disclosing the ratio, companies would be pressured to limit compensation of their CEOs and/or to increase the salaries of average workers. That

is, the pay ratio disclosure rule attempts to create public sentiment to shame companies into reducing executive compensation. However, critics argue that companies can avoid cutting CEO compensation by outsourcing their lower paid staff to a third party, which increases the median employee pay, thereby achieving a better pay ratio.

Moreover, because it could be costly for firms to determine the median employee pay, especially for companies that have multinational operations, large diverse workforces, and complicated payroll systems, the SEC has added substantial flexibility in calculating the median employee pay to help reduce the compliance burden. Critics argue that the Rule's flexibility would substantially diminish any potential usefulness of the disclosure.

Using the adoption of the CEO pay ratio disclosure rule in 2015 as a natural experiment, I empirically examine whether firms with a high disparity in pay between the CEOs and their median employees prior to the rule adoption change their CEO compensation practices to avoid the public outrage over their CEOs' high pay ratios. I rely on SalaryList.com to identify the median employee pay and split firms into high and low pay ratio firms based on the median pay ratio one year before the SEC passed the pay ratio disclosure rule. I find that high pay ratio firms decrease their CEOs' total compensation in the post-adoption period. I do not observe a similar decrease for low pay ratio firms. The reduction in the CEO pay for high ratio firms is attributable to the decrease in equity-based compensation, and option awards in particular. These results are consistent with the notion that high pay ratio firms cut their CEOs' total compensation to avoid potential negative publicity about the high pay ratio.

To compensate the CEO for the reduced compensation, the firm reduces the riskiness of the CEO pay so that the CEO is not harmed by the payment reduction. Specifically, I find that high pay ratio firms shorten the vesting schedule of the CEOs' incentive pay, set easier to achieve performance targets for the CEOs' performance-vested awards, and increase the use of accounting-based performance provisions in the post-adoption period. Low pay ratio firms do not make similar changes to their CEOs' compensation packages during the same period.

Finally, I examine if the pay-performance relation changes after firms change their CEO's pay package in response to the SEC's pay ratio disclosure rule. I find some weak evidence that the pay-performance link is weaker for high pay ratio firms in the post-adoption period, suggesting that the pay design changes made by high pay ratio firms do not improve the efficacy of the CEO compensation. Although this paper uses a difference-in-differences design to control for the changes in the macro-environment, there is no clear-cut control sample in this study. Classifying sample firms into high and low pay ratio firms based on the median (or mean) industry pay ratio is somewhat arbitrary. As a results, results reported in this paper should be interpreted with caution.

This study makes several contributions. First, it extends the literature on firm-level pay disparity. The existing literature on the CEO-employee pay disparity focuses primarily on the rela-

tion between the CEO pay ratio and firm performance (Cheng et al. 2017; Rouen 2020). I extend this literature by investigating how the CEO pay ratio disclosure rule affects the design of the CEO compensation and provides insights into the debate over whether the new disclosure rule could influence the compensation practices. Firms are required to report a CEO pay ratio based on the pay of the median employee starting the 2018 proxy season. A key concern about this requirement is that the substantial managerial discretion that goes into the calculation of the median employee pay, making the pay ratio impossible for investor to determine what a "good" or "bad" ratio is (e.g., Harsen, Ward, and Buyniski 2010). Commentators thus suspect that this pay ratio disclosure rule will not affect the CEO compensation. My evidence informs this controversy by showing that firms are concerned about the public outrage triggered by an eye-catching high ratio and redesign their CEO's compensation package in response to the passage of the pay disclosure rule.

Second, this paper adds to the literature on the design of executive compensation. Prior studies generally examine how the agency problem and corporate governance structure (including CEO power) affect the amount of total and equity-based compensation (Bebchuk et al. 2002). In recent years, researchers start to look at the determinants of the CEO compensation design, such as the CEO compensation duration (Gopalan et al. 2014), and accelerated- or contingent (performance)-vesting provisions (Choudhary et al. 2009; Carter et al. 2009; Bettis et al. 2010; Bettis et al. 2018). I contribute to this literature by showing that firms reduce the riskiness of the CEO compensation in response to potential negative publicity provoked by high CEO pay ratio by reducing equity-based pay, shortening the CEO compensation duration, decreasing the use of performance-vested provisions, setting easier to achieve performance targets, and increasing the use of easier to manipulate accounting-based vesting provisions.

Appendix A Definition of variables

ACCVEST_COMP	dollar value of CEO incentive compensation that is tied to at least one EPS metric scaled by the dollar value of total incentive compensation granted to the CEO during the year.
ADJRET-1YR	the annual buy-and-hold stock return for the year prior to the grant, minus the median annual buy-and-hold stock return for all firms in the same two-digit SIC industry classification.
AGE	CEO's age taken from ExecuComp.
BM	book value of equity divided by the market value of equity.
BOARD_SIZE	total number of directors on the board.
BONUS	dollar value of a bonus earned by the named executive officer during the fiscal year.
CASH_COMP	sum of *SALARY* and *BONUS*.
CEO_POWER	common factor obtained from principal component analysis (PCA) on the following six items: (1) the number of board committees on which the CEO sits, (2) CEO tenure, (3) board size, (4) proportion of independent directors on the board, (5) the fraction of shares owned by the largest outside owner of the firm, and (6) institutional ownership.
CH(*ASSETS*)	change in logarithm of total assets at the end of the year.
CH(*BM*)	Change in book-to market ratio (*BM*).
CH(*ROA*)	change in return on assets (*ROA*). *ROA* is defined as income before extraordinary items scaled by total assets.
CH(*TOTAL_COMP*)	Change in the logarithm of CEO's total compensation reported in the summary compensation table of the proxy statement.
DEBT	ratio of the sum of long-term and short-term to the book value of total assets.
EQUITY_COMP	sum of *STOCK* and *OPTION*.
HIGHRATIO	indicator variable set equal to one if the firm's CEO pay ratio in the pre-adoption period, which is 2014 in my sample, is greater than or equal to the median CEO pay ratio of all firms from the same two-digit SIC industry, and zero otherwise. The CEO pay ratio is calculated as the CEO compensation scaled by the median employee compensation. CEO compensation is taken from the total compensation column in the Summary Compensation Table of the firm's proxy statement. The median employee compensation is the median employee salary by calculating the median salary of positions within each firm by each year listed on SalaryList.com.
LEADQ	One-year ahead Tobin's Q.
LEAROA	One-year ahead *ROA*.
ln(*BONUS*)	Logarithm of (1 + *BONUS*).
ln(*CASH_COMP*)	Logarithm of (1 + *CASH_COMP*).
ln(*EQUITY_COMP*)	Logarithm of (1 + *EQUITY_COMP*).
ln(*NONEQ_INCENT*)	Logarithm of (1 + *NONEQ_INCENT*).
ln(*OPTION*)	Logarithm of (1 + *OPTION*).
ln(*OTH_COMP*)	Logarithm of (1 + *OTH_COMP*).
ln(*PENSION_CHG*)	Logarithm of (1 + *PENSION_CHG*).
ln(*STOCK*)	Logarithm of (1 + *STOCK*).
ln(*TOTAL_COMP*)	Logarithm of (1 + *TOTAL_COMP*).
LTASSETS	ratio of book value of property, plant, and equity plus goodwill over noncash total assets.

NEW_CEO	indicator variable that equals one if CEO tenure is no more than two years and zero otherwise.
NONOEQ_INCEN	value of amounts earned (the performance criteria was satisfied) during the year pursuant to non-equity incentive plans.
OPTION	grant date fair value of all options awarded during the year.
OTH_COMP	amount listed under "All Other Compensation" in the Summary Compensation Table, including perquisites and other personal benefits, termination or change-in-control payments, contributions to defined contribution plans (e.g. 401K plans), life insurance premiums, gross-ups and other tax reimbursements, discounted share purchases etc.
PAY_RATIO	the CEO pay ratio, calculated as the CEO compensation scaled by the median employee compensation. CEO compensation is taken from the total compensation column in the Summary Compensation Table of the firm's proxy statement. The median employee compensation is the median employee salary by calculating the median salary of positions within each firm by each year listed on SalaryList.com.
PENSION_CHG	sum of (a) above-market or preferential earnings from deferred compensation plans, and (b) aggregate increase in actual value of defined benefit and actual pension plans during the year.
POST	indicator variable set equal to one if the observation comes from the post adoption period.
Q	Tobin's Q, calculated as (total assets + market value of common equity−common equity −deferred taxes /total assets.
RD	ratio of research and development expenditure over book value of total assets.
RET	buy-and-hold stock return for the current year.
RET-1YR	one-year buy-and-hold return for the firm's stock over the previous fiscal year.
RETIRE_AGE	indicator variable that equals one if CEO age ≥ 65 and zero otherwise.
ROA	return on assets measured by income before extraordinary items divided by total assets at the beginning of the year.
SALES	logarithm of sales for the current year.
SALESGROW	sales in year t minus sales in $t-1$, and scaled by sales in $t-1$.
SALARY	dollar value of the base salary earned by the named executive officer during the fiscal year.
SEGMENTS	number of business segments.
SIZE	logarithm of the firm's market capitalization.
SPREAD	average ratio of the daily bid-ask spread to the closing price during the previous year.
STDCFO	standard deviation of the ratio of operating cash flows over lagged total assets over the previous five years.
STDRET	standard deviation of *RET* over the past five years.
STDROA	standard deviation of return on assets (*ROA*) over the past five years, where *ROA* is defined as income before extraordinary items scaled by beginning total assets.
STDSALES	standard deviation of the firm's annual sales growth during the prior five years.
STKVOL/ACCVOL	the firm's ratio of stock volatility (*STDRET*) to accounting performance volatility (*STDROA*).
STOCK	grant date fair value of all stock awards during the year.
TOTAL_COMP	total compensation as reported in summary compensation table of the proxy statement.
VOLATILITY	stock return volatility calculated as the annualized volatility of daily stock returns during the previous year.

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中華會計學刊
第 18 卷 第 1 期，1 - 40 頁 (2022)
DOI:10.6538/TAR.202207_18(1).0001

中文粹要

CEO 薪酬比率揭露規定對 CEO 薪酬的影響

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投稿日期：2021 年 2 月 5 日；1 審後接受，接受日期：2021 年 5 月 23 日

摘　要

美國證券管理委員會在 2015 年要求公司揭露該公司 CEO 薪酬相對於公司中位數員工薪酬的比率 (CEO 薪酬比率)。本文使用 CEO 薪酬資訊細節足夠的 487 家公司，實證結果發現在 CEO 薪酬比率揭露規定公布前有比較高 CEO 薪酬比率的公司，在揭露規定公布後減少該公司 CEO 總薪酬的金額。CEO 總薪酬金額的減少主要是由於員工認股權金額的減少。另外，本文發現在 CEO 薪酬比率揭露規定公布前有比較高 CEO 薪酬比率的公司，在揭露規定公布後縮短 CEO 激勵報酬的既得期間、設定比較容易達成的績效既得報酬的績效標準、並增加使用會計績效條件在激勵報酬的使用，而這些 CEO 薪酬條件的改變並未出現在 CEO 薪酬比率比較低的公司。這些發現顯示高 CEO 薪酬比率的公司減少 CEO 薪酬對 CEO 的風險以補償總薪酬金額的減少。

關鍵詞：CEO 薪酬、CEO 薪酬比率、薪酬設計、績效既得

本文榮獲「2020 年會計理論與實務研討會」最佳論文獎。本論文感謝兩位匿名評審的修正意見，作者感謝科技部經費補助 (MOST 110-2410-H-002 -057 -MY3)。文中言論由作者自行負責。
數據可用性：本文使用的數據可從公開資料來源取得。

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1. 研究議題

本研究檢視美國證券管理委員會的 CEO 薪酬比率揭露規定是否影響 CEO 薪酬的設計。美國證券管理委員會在 2015 年發布新揭露規定，要求公司揭露該公司 CEO 薪酬相對於公司中位數員工薪酬的比率 (CEO 薪酬比率)。SEC 提到這項揭露規定的目地是希望提供投資人有用的資訊來判斷 CEO 薪酬是否合理，但反對這項揭露規定的人士宣稱公司如果想要避免一個過高的 CEO 薪酬比率，他們可以將低薪工作外包以提高中位數員工薪資，而不需減少 CEO 薪酬。此外，公司有很大的彈性來決定中位數員工是誰，因此實務上對於 CEO 薪酬比率揭露的規定是否會影響 CEO 薪酬存在著相當大的爭議，本研究因此探討 CEO 薪酬比率揭露的規定 CEO 是否影響薪酬結構的設計。

2. 研究假說 / 問題

Crawford et al. (2019) 發現若公司的 CEO 薪酬比率較高，則股東在 Say-on-pay 投票中投下反對票的比例亦較高。因此公司有可能降低 CEO 的總薪酬以減低 CEO 薪酬比率帶給社會大眾的不良觀感。但 Fisch et al. (2018) 發現除非公司的績效不佳，投資人不太會對 CEO 薪酬計畫投下反對票。因此本研究的第一個研究問題為：

RQ1：*在 CEO 薪酬比率揭露規定公布前有比較高 CEO 薪酬比率的公司，會在揭露規定公布後增加較少或減少較多的 CEO 總薪酬。*

Abernethy et al. (2015) 發現公司有動機去對薪酬改革做出回應，CEO 薪酬比率較高的公司有較強的動機去減少 CEO 薪資以避免負面的輿論，但由於人力資源市場的競爭，公司必需要想辦法補償 CEO 被減少的薪酬，使得 CEO 總薪酬表面上雖然下降，但對 CEO 的價值卻沒有太大影響。眾所周知當經理人收到比較危險的薪酬時，他們會要求額外的風險貼水，如果公司要減少總薪酬而又不想影響薪酬對經理人的價值，公司可以減少經理人薪酬的有風險的部分，因此本文接下來檢視幾個可以降低經理人薪酬的薪酬設計相關的研究問題。

RQ2a：*在 CEO 薪酬比率揭露規定公布前有比較高 CEO 薪酬比率的公司，相對於 CEO 薪酬比率較低的公司，會在揭露規定公布後減少較多的權益基礎薪酬在 CEO 薪酬的使用。*

RQ2b：*在 CEO 薪酬比率揭露規定公布前有比較高 CEO 薪酬比率的公司，相對於 CEO 薪酬比率較低的公司，會在揭露規定公布後減少較多的員工認股權在 CEO 薪酬的使用。*

RQ3：*在 CEO 薪酬比率揭露規定公布前有比較高 CEO 薪酬比率的公司，相對於 CEO 薪酬比率較低的公司，比較會縮短 CEO 薪酬的既得期間。*

RQ4：*在 CEO 薪酬比率揭露規定公布前有比較高 CEO 薪酬比率的公司，相對於 CEO 薪酬比率較低的公司，比較會設定較容易達成的績效標準。*

RQ5：*在 CEO 薪酬比率揭露規定公布前有比較高 CEO 薪酬比率的公司，相對於 CEO 薪酬比率較低的公司，比較採用會計績效標準做為激勵薪酬的給付標準。*

3. 研究方法

本研究使用 2014-2016 年間美國公開公司樣本，從 Incentive Lab 資料庫取得 CEO 薪酬資訊，從 Compustat 取得財務報表資料，CRSP 取得股價資料，並使用 Thomson Reuters Institutional (13f) 及 Institutional Shareholder Services (ISS) Directors database 建構所需的控制變數。CEO 薪酬比率揭露規定公布前的 CEO 薪酬比率則由 SalaryList.com 取得。為了減少樣本自我選擇等內生性問題，本文採用 Difference-in-Differences (DID) 的研究設計來檢視 CEO 薪酬比率揭露規定對 CEO 薪酬設計的影響。

4. 研究結果

實證結果發現在 CEO 薪酬比率揭露規定公布前有比較高 CEO 薪酬比率的公司，在揭露規定公布後減少該公司 CEO 總薪酬的金額。CEO 總薪酬金額的減少主要是由於員工認股權金額的減少。另外，本研究亦發現在 CEO 薪酬比率揭露規定公布前有比較高 CEO 薪酬比率的公司，在揭露規定公布後縮短 CEO 激勵報酬的既得期間、設定比較容易達成的績效既得報酬的績效標準、並增加使用會計績效條件在激勵報酬的使用，而這些 CEO 薪酬條件的改變並未出現在 CEO 薪酬比率比較低的公司。這些發現顯示高 CEO 薪酬比率的公司減少 CEO 薪酬對 CEO 的風險以補償總薪酬金額的減少。總體而言，本研究的發現支持公司為了要補償 CEO 名目薪資的下降而調整的薪酬的組成以減低風險性薪酬的使用。此外，這些薪酬設計的改變似乎並未改變薪酬績效敏感度。

5. 研究貢獻

本研究主要的研究貢獻有兩方面：首先，本文延伸了公司內部薪資差距的文獻，現有文獻主要著重於 CEO 和員工薪資差距對公司績效的影響，本研究則聚焦在 CEO 和員工薪資差距一旦被強制揭露會如何影響 CEO 薪酬的設計與組成。其次，本研究亦補充 CEO 薪酬設計的文獻。本文發現一旦公司被要求揭露 CEO 和員工的薪資差距，他們會減低風險性報酬 CEO 在薪酬的使用，而這些薪酬設計的改變似乎並未為公司股東帶來實質的好處。