

Is Disclosure an Effective Cleansing Mechanism?

The Dynamics of Compensation Peer Benchmarking*

Michael Faulkender[†]

R.H. Smith School of Business, University of Maryland

Jun Yang[‡]

Kelley School of Business, Indiana University

*We would like to thank the following for helpful comments and discussions: Mathew Billett, John Bizjak, Daniel Cheng (RiskMetrics Group), Jennifer Conrad, Josh Coval, Shijie Deng, Paolo Fulghieri, Craig Holden, Steve Kaplan, Paul Kupiec, Richard Mahoney (retired CEO from Monsanto Co.), Kevin Murphy, Mitchell Petersen, Roberta Romano, Lemma Senbet, Haluk Unal, Kam-Ming Wan, and David Yermack, as well as conference participants at the Sixth WU Corporate Finance Conference, the Third Corporate Governance Conference at Drexel University, “Executive Compensation after the Financial Crisis” at Copenhagen Business School, and the 2011 International Conference on Corporate Finance and Financial Markets at City University of Hong Kong, and seminar participants at UT Dallas, FDIC, Georgia Tech, Indiana University, and the University of Maryland. We thank RiskMetrics for providing compensation peer group data (Compensation Analytics) for the last two years. We also thank Cassandra Marshall for her excellent research assistance, John Bradburn, Aswin Chandra, Jerry Chen, Brent Danner, Meyer Jap, Peggy Huang, Meliana Lionardy, Raj Mistry, Keith Paige, Joyce Pang, Kenny Parks, Nicolas Perfetti, and Sida Zhai for their help to collect data, and Hannah Bolte for her editorial help.

[†] Address: 4411 Van Munching Hall, University of Maryland, College Park, MD 20742. Telephone: (301)405-1064. Email: mfaulken@rhsmith.umd.edu

[‡] Corresponding author. Address: 1309 E 10th Street, Bloomington, IN 47405. Telephone: (812)855-3395. Email: jy4@indiana.edu

Is Disclosure an Effective Cleansing Mechanism?

The Dynamics of Compensation Peer Benchmarking

Abstract

Firms regularly justify their CEOs' compensation by referencing companies with highly paid CEOs with whom they claim to compete for managerial talent. This paper examines whether the 2006 regulatory requirement of disclosing compensation peers has mitigated firms' opportunistic peer benchmarking of CEO compensation. Our evidence shows that benchmarking manipulation became more severe after enhanced mandatory disclosure, particularly at firms with substantial shareholder complaints about compensation practices, low institutional and director ownership, busy Boards, and large Boards. The effect is the strongest at firms with new CEOs. These findings call into question whether mere disclosure can remedy potential executive compensation abuses.

Classification Code: G34, J31, J33

Keywords: Disclosure Regulation; Corporate Governance; Executive Compensation; Peer Groups; Benchmarking

1. Introduction

Changes in the level and dispersion of CEO compensation since the early 1990s have triggered an increasingly heated debate over whether current compensation practices reflect the equilibrium outcome of the CEO labor market¹ or merely the power of entrenched CEOs.² In this debate, firms often justify their CEO compensation by comparing their CEO pay packages to a group of companies with highly paid CEOs,³ claiming they compete for managerial talent with those selected peer companies. This paper examines the dynamics of the peer benchmarking process, addressing whether the 2006 regulatory requirement of disclosing compensation peers has cast sunshine on the practice and thus mitigated firms' opportunistic behavior of benchmarking CEO compensation against a group of self-selected, highly-paid peer CEOs (Faulkender and Yang, 2010; Bizjak, Lemmon, and Nguyen, 2011).

Disclosure regulation has often been put into place during economic downturns (such as the Exchange Act and the Securities Act of 1933) or after corporate scandals (such as Sarbanes-Oxley Act of 2002) to mitigate firms' bad behavior. There is an extensive literature on the benefits and costs, and both the intended and unintended consequences of disclosure regulation (Leuz and Wysocki, 2008; Healy and Palepu, 2001). Compared to market solutions (voluntary disclosure), disclosure regulation is designed to create positive externalities, save cost in aggregate, and provide strict sanctions on fraud. However, it inevitably imposes direct compliance costs and sometimes indirect costs, such as informing competitors of the firm's practices or trade secrets. In addition, mandating disclosure may decrease the usefulness of the information even though the quantity of available information increases. For instance, Bailey, Li,

¹ For example, Murphy (2002), Murphy and Zabochnik (2004), Oyer (2004), Gabaix and Landier (2008), Edmans and Gabaix (2009), Edmans, Gabaix, and Landier (2009), Core and Guay (2010), Kaplan and Rauh (2011), Baranchuk, MacDonald, and Yang (2011), and Giannetti (2011) argue that the scarcity of managerial talent and increasing importance of managerial skills largely explain observed changes in level and dispersion of CEO pay.

² For example, Bertrand and Mullainathan (2001), Bebchuk and Fried (2003, 2004), and Morse, Nanda, and Seru (2011) argue that CEO entrenchment and ineffective Board monitoring are the causes of increased CEO pay.

³ See, for example, Bizjak, Lemmon, and Naveen (2008).

Mao, and Zhong (2003) find that after passage of Regulation Fair Disclosure, analyst disagreement increased suggesting that “forecasting earnings beyond the current quarter has become more difficult after the imposition of Reg FD.” Moreover, Hermalin and Weisbach (2011) show that disclosure regulation may actually raise pay levels for senior executives, at least partially, to compensate them for the lost rents due to increased monitoring associated with enhanced disclosure.

Compensation disclosure, in particular, is intended to make transparent the compensation process at firms, press the Board of Directors to better perform its monitoring role, and prevent managers from setting their own pay.⁴ However, disclosed information on compensation of peer CEOs may help justify a CEO’s demand for higher pay. Perry and Zenner (2001) show that the tax legislation in 1992 that caps the corporate income tax deduction of non-performance related compensation at one million dollars (IRS tax code 162(m)) and the compensation disclosure rule enacted in 1993 actually caused dramatic increases in real compensation levels. The externality works in a fashion of ratcheting up executive compensation, in contrast to the stated intentions of Congress.⁵

In this paper, we examine the 2006 Securities and Exchange Commission (SEC) rule that requires firms to disclose compensation peer companies if they are used in determining executive compensation. Researchers have documented that even after controlling for characteristics that would likely capture the competitive forces of the CEO labor market, such as industry

⁴ “They [the 2006 SEC amendments] are also intended to provide investors with a clearer and more complete picture of the compensation earned by a company’s principal executive officer, principal financial officer and highest paid executive officers and members of its board of directors. In addition, they are intended to provide better information about key financial relationships among companies and their executive officers, directors, significant shareholders and their respective immediate family members.” — SEC final rules 33-8732a, August 29, 2006

⁵ In the context of the mutual fund industry, Carlin and Manso (2011) argue that attempts to educate investors may provide incentives for financial institutions to create more complex products and services that enable them to retain an informational advantage. Applying this idea to compensation disclosure, it may similarly be the case that heightened disclosure requirements incentivize firms to increase the complexity of their compensation practices in an attempt to overwhelm unsophisticated investors.

identification and relative size of the firm and its peer group members, the compensation levels at the selected peers had incremental power in explaining the composition of compensation peer groups (Faulkender and Yang, 2010; Bizjak, Lemmon, and Nguyen, 2011).⁶ In other words, firms appeared to be gaming the benchmarking process by including in their peer group companies with highly paid CEOs and omitting comparable firms with lower paid CEOs. This way they could claim that they were paying the median compensation and appear reasonable to their shareholders, yet still overpay the CEO. Has the opportunistic behavior in peer benchmarking been mitigated by the mandatory disclosure of compensation peer companies? Or has enhanced disclosure actually increased peer benchmarking biases, similar to the unintended consequence of IRS tax code 162(m)? This is the focus of our study, and the answer is: the gaming of peer benchmarking continues.

The timing of the change in disclosure requirements and the process of determining peer group composition make this an interesting setting for examining the larger question of the effects of mandated disclosure. In August of 2006, the SEC issued a disclosure requirement that came into effect for fiscal years ending on or after December 15, 2006 according to which firms must state:

Whether the registrant engaged in any benchmarking of total compensation, or any material element of compensation, identifying the benchmark and, if applicable, its components (*including component companies* [emphasis added]). — SEC final rules 33-8732a, Item 402(b)(2)(xiv), August 29, 2006

Firms generally construct their peer groups and determine the compensation structure at the beginning of the fiscal year. Because the fiscal year of firms typically ends in December, most firms formed their compensation peer groups by March of that year; for 2006, this was well

⁶ DiPrete, Eirich, and Pittinsky (2010) show the effects of leapfrogging potentially explain a considerable fraction of the overall upward movement of executive compensation over a recent 15 year period. In contrast, Albuquerque, De Franco, and Verdi (2009) and Cadman and Carter (2009) argue that compensation peer benchmarking is consistent with the equilibrium outcomes of the CEO labor market.

before the announcement of the change in the reporting requirement on August 29. Thus, the first year that we observe should be primarily comprised of peer groups that were formed before firms knew that the names of the compensation peer companies would have to be disclosed.⁷ These observations therefore serve as a baseline for assessing firm behavior prior to the disclosure requirement. In this paper, we follow the peer groups for the subsequent three years, ample time for Boards of Directors and their compensation committees to adjust the set of peer companies selected before the new disclosure rule. Our question is: Did firms continue managing peer benchmarking process, or did they act to generate less biased peer groups once disclosure was mandated? Analyzing the difference in peer groups selected prior to the commencement of enhanced disclosure and those formed under the new disclosure regime arguably provides a natural experiment for assessing the effects of mandated disclosure.

Our evidence suggests that firms have not generated less biased peer groups after enhanced disclosure. Relative to the first year of our sample, during which peer membership was determined before firms knew that the list of peers would have to be disclosed, firms actually showed a stronger tendency to select peer companies with higher CEO pay during the subsequent three years when they could have altered their peer groups in light of the enhanced disclosure requirement. These findings are not merely the result of existing peers increasing pay more than unselected potential peers. We find that firms actively added companies with higher CEO pay to their compensation peer groups and, in the year immediately after the enactment of the new disclosure rule, dropped peer companies with lower CEO pay. These findings call into question the effectiveness of mere disclosure to remedy potential abuses of peer benchmarking in setting executive compensation.

⁷ The rule was proposed on January 27, 2006, followed by a period of six months during which comments were solicited. Historically, many proposed SEC rules were postponed in implementation or abandoned altogether. For example, rules related to proxy access were proposed in 2003, 2007, and 2009. The SEC put a Stay on these rules on October 5, 2010. Given this uncertainty, it is unlikely that firms modified their peer companies in early 2006.

We expand upon these findings by looking at how variation in corporate governance characteristics of our sample firms relates to the evolution of selection biases in the peer benchmarking process. Specifically, if we expect Say-on-Pay to be an effective mechanism at altering egregious firm behavior, we should observe a reduced tendency to choose highly paid peer companies at those firms that received significant support for shareholder proposals to address compensation related issues. Instead, we find that after enhanced disclosure those firms actually increased the manipulation of their compensation peer selection more than firms that did not receive significant complaints about their compensation practices.

Similarly, if ownership stakes by institutional investors and members of the Board of Directors improve monitoring (Hartzell and Starks, 2003; Fich and Shivdasani, 2005), we should observe less deterioration in the peer benchmarking practices at firms with greater institutional holdings and firms with greater director ownership. Indeed, we find that those firms do not exhibit an increase in peer selection bias, unlike firms with lower institutional and director ownership. We also find that the deterioration of peer benchmarking is limited to firms whose Boards of Directors are ineffective monitors: firms with “busy” Boards (Fich and Shivdasani, 2006) and firms with “large” Boards (Yermack 1996; Eisenberg, Sundgren, and Wells, 1998).

Interestingly, when we examine subsamples divided by several governance measures related to CEO tenure (Hermalin and Weisbach, 1998; Coles, Daniel, and Naveen, 2008), we observe convergence of peer selection biases. At firms with shorter-tenured CEOs (new CEOs, CEOs with short tenure, or shorter tenure than directors), the pay biases in peer group formation were insignificant or even negative (in cases of new outside CEOs) in the first year of our sample when peer groups were selected prior to the change in disclosure requirements. Three years later, we observe that firms with new CEOs caught up with other firms in using compensation peers biased toward companies with highly paid CEOs. These findings are consistent with the

theory of Acharya and Volpin (2010) that a firm may be pushed by competing firms to adopt bad compensation practices to attract or retain scarce managerial talents. The pressure is amplified when a firm hires a new CEO, and the revelation of the prevalent usage of biased peer groups makes the convergence to a bad equilibrium unavoidable.

Finally, we examine whether the enhanced compensation disclosure benefits shareholders by looking at how changes in the peer selection bias vary with past and contemporaneous performance. Strong past equity performance may justify higher pay (justified via better paid peer CEOs) if such performance continues. Our results indicate that higher returns are associated with higher selection bias in the following year's compensation peer group but the difference in pay bias between firms with strong and weak equity performance moderates over the sample period. More importantly, the pay bias does not forecast strong contemporaneous performance; we do not find evidence that the shareholders of firms with compensation peer groups heavily tilted toward higher paid peers are rewarded with industry adjusted returns above firms with less biased compensation peer groups.

The rest of the paper is organized as follows: Section 2 sets up the empirical framework and Section 3 details the data. Section 4 examines the link over time between membership in compensation peer groups and the level of CEO compensation of a potential peer company in a multivariate probit framework. These findings are re-examined using a propensity score matching approach in Section 5. In Section 6, we employ numerous alternative specifications to verify the robustness of our findings. Section 7 focuses on the changes to peer groups (added and dropped peers) over our four-year sample period. In Section 8, we examine how corporate governance characteristics affect the dynamics of peer selection, and Section 9 concludes.

2. Empirical Framework

Prior work on compensation peer benchmarking (Faulkender and Yang, 2010; Bizjak, Lemmon, and Nguyen, 2011) shows that prior to the mandatory disclosure of compensation peer group members, firms tend to choose compensation peers that pay their CEOs more generously after controlling for managerial labor market factors. We hypothesize that if disclosure regulation serves the regulator's purpose to shape corporate behavior,

H1a: Compensation peer membership will become less sensitive to CEO pay at a potential peer company in the years following the adoption of the new disclosure rule.

Alternatively, Hermalin and Weisbach (2011) show theoretically that enhanced disclosure (and the resulting improved monitoring) can increase executive compensation for two reasons. First, managers share some benefit of improved monitoring if they have any bargaining power. Second, even absent bargaining power, managerial compensation may still rise: given the increased costs placed on CEO from enhanced monitoring, offsetting compensation will be required, leading to increased CEO compensation. Thus, governance reforms that have imposed greater disclosure can actually increase CEO compensation. To justify the higher level of required CEO compensation after the change in the disclosure regime, firms will select peer companies with better paid CEOs even though such required pay may not be realized in a period of great recession and public outrage.

Moreover, the Board of Directors could observe the compensation peer companies opportunistically selected by other firms following enhanced disclosure. It is possible that, contrary to the regulator's intentions to eliminate the bias in selecting compensation peers, firms that did not use potential peer CEO pay as a key factor in compiling their peer groups began to mimic other firms in selecting biased compensation peer groups to signal the quality of the firm (Hayes and Schaefer, 2009) or to justify the level of CEO compensation needed to attract the CEO (Acharya and Volpin, 2010). Such unintended consequences of compensation disclosure

were previously documented by Perry and Zenner (2001) in a similar context: real compensation levels increased dramatically following enhanced compensation disclosure and the enactment of tax code 162 (m) in 1993. Thus, we hypothesize:

H1b: Compensation peer membership will become more sensitive to CEO pay at a potential peer company in the years following the adoption of the new disclosure rule.

Because there are explanations for increases or decreases in the sensitivity of compensation peer membership to potential peer CEO pay in the years following enhanced disclosure, we essentially test for no change in peer pay sensitivity and allow the data to inform us as to which hypothesis dominates.

Disclosure regulation should work differently at firms with different corporate governance regimes because corporate governance has been shown to play a key role in shaping corporate compensation practices.⁸ Extending it to the peer benchmarking practice, we expect to observe that strong corporate governance mitigates opportunistic selections of compensation peer companies. In alternative form, we hypothesize:

H2: The sensitivity of peer membership to CEO pay at a potential peer company will increase more at firms with weak corporate governance than at firms with strong corporate governance in the years following the adoption of the new disclosure rule.

We test the second hypothesis by examining how the changes in peer pay bias after the enhanced disclosure vary with a list of corporate governance measures: ownership structure, Board characteristics, and CEO tenure relative to director tenure. We also examine whether firms at which shareholders expressed concerns regarding their compensation practices reduce their peer selection biases after the disclosure regulation.

Alternatively, firms, even ones with strong governance, may be pushed by competition for scarce managerial talent to adopt poor compensation practices, as predicted by Acharya and

⁸ See for example, Acharya and Volpin (2010); Hartzell and Starks (2003); Core, Holthausen, and Larcker (1999); Fich and Shivdasani (2005, 2006); Yermack (1996); Eisenberg, Sundgren, and Wells (1998); Coles, Daniel, and Naveen (2008).

Volpin (2010). This pressure is intensified when a firm hires a new CEO. After the enhanced disclosure, a firm could observe opportunistic peer benchmarking at competing firms to attract the CEO, it may be pressured into doing just the same. Thus, we hypothesize:

H3: The sensitivity of peer membership to CEO pay at a potential peer company will increase more at firms with new CEOs than at firms with old CEOs in the years following the adoption of the new disclosure rule.

Yet another possibility is that firms may be strategically constructing peer groups to ease justification of high pay levels provided to strong performing CEOs. If this is true, firms with greater peer selection bias should deliver better performance subsequently. Thus, if benchmarking CEO pay at peer companies is used as an effective mechanism to justify an appropriate level for CEO compensation, we expect to observe:

H4: In the years following the adoption of the new disclosure rule, firms with better performance are more likely to increase their sensitivity of peer membership to CEO pay at a potential peer company; firms with greater increases in the sensitivity of peer membership to potential peer CEO pay will perform better subsequently.

We test the fourth hypothesis by examining the link between peer selection biases and the lagged as well as contemporaneous excess stock returns. We further look at how the changes of peer selection bias vary with the level of excessive pay, which reflects accounting and stock performance.

3. Data

Beginning December 15, 2006, the SEC required firms to disclose the companies against which they benchmark executive compensation in their proxy statements. For the first two years of our sample (fiscal year ending December, 2006 to November, 2008), we collected compensation peers disclosed by firms in both the S&P 500 and the S&P Mid-Cap 400 (hereafter called the S&P 900) from the proxy statements firms filed at the EDGAR database with the SEC. For the latter two years of our sample (fiscal year ending December, 2008 to November, 2010),

we rely upon data in Compensation Analytics provided by RiskMetrics. We exclude firms in the financial services industry (SIC code between 6000 and 7000) from our analysis due to the rapidly changing regulatory environment for these financial firms over our sample period.⁹ This results in a sample of 2,066 firm-years, covering a total of 763 firms.¹⁰

To evaluate how disclosure has affected the benchmarking process, one not only has to ascertain the companies chosen to be included in the benchmarking set, but also has to examine the set of potential peers that were not selected. Following Faulkender and Yang (2010), we confine our set of potential peers to the other 899 companies in the S&P 900 in that corresponding year. Our approach is to examine for each year, which of those 899 potential peers were actually selected to be in the firm's compensation peer group and why.

Our primary objective is to determine whether the manipulation of the benchmarking process documented in prior literature continued after the SEC's mandate to list compensation peers in firms' proxy statements. Has sunshine cleansed this process, as intended by the SEC? Answering this question requires supplementing the peer group observations with information on the financial condition, industry classification, and compensation at both the firm and the set of potential peers. Measures of each firm's size, leverage, profitability, and industry are obtained from COMPUSTAT and stock return and volatility from CRSP while information on the compensation levels and structure comes from EXECUCOMP. We lag these measures one year

⁹ Outrage at pay for failure on the Wall Street triggered a cap of \$500, 000 on annual salaries for top executives at companies receiving TARP money On February 4, 2009. Four months later, Kenneth Feinberg was appointed as the Special Master for TARP Executive Compensation ("pay czar") to oversee the compensation of top executives at firms that have received federal bailout assistance. Our conclusion does not change including financial firms even though their peer selection biases did decrease in fiscal years ending during December 2008 to November 2010, the second half of our sample.

¹⁰ For example, in 2007, Applied Materials Inc. used the following 23 peer companies: Advanced Micro Devices Inc., LSI Logic Corp., Agilent Technologies, Inc., Lucent Technologies Inc., Analog Devices Inc., Marvell Technology Group Ltd., Apple Computer Inc., Maxim Integrated Products Inc., Broadcom Corp., Motorola, Inc., Cisco Systems Inc., Nortel Networks Corp., Dell Inc., Novellus Systems Inc., Flextronics International Ltd., Oracle Corp., Freescale Semiconductor Inc., Qualcomm Inc., Intel Corporation, Sun Microsystems Inc., KLA Tencor Corp., Texas Instruments Inc., Lam Research Corp. Percentages used to benchmark salary, bonuses, and equity-based compensation were 50th, 65th, and 75th percentiles, respectively.

when examining the characteristics of potential peers as firms will match based upon information they have at the time they select the peer group, which takes place at the beginning of the fiscal year. This timing convention is used throughout the paper. A sample of 1,901,757 firm-potential peer-year matches with a total of 29,424 selected peers (1.5%) emerges after compiling the data necessary to perform our analysis. Summary statistics for these various metrics for sample firms and selected peers are presented in Panel A of Table 1.

The median CEO in our sample firms earned a salary of \$947 thousand, with a slightly higher mean. Total (direct) compensation has a mean of \$7.887 million and a median of \$6.124 million and. The average number of chosen peer companies is 18.76 and the median is 16. Chosen peer companies are similar to disclosing firms in terms of industry, size, visibility, and CEO responsibility. For example, on average, the fraction of chosen peers that are in the firm's 2-digit industry is 45.48% and that are within 50–200% of the firm's sales is 54.2%. For an S&P 500 constituent firm, 88.81% of its chosen peers are also S&P 500 constituents. When the firm's CEO serves as the Chairman of the Board, 71.43% of chosen peers also have chairman CEOs.

As we are interested in how peer selection has changed over time, in Panel B of Table 1, we provide summary statistics of firms and their chosen peers for the first year (fiscal year ending December of 2006 to November of 2007, shortened as *2006*) and the most recent year (fiscal year ending December of 2009 to November of 2010, shortened as *2009*). The average size of the compensation peer groups increased from 18.69 to 19.95.¹¹ Chosen peers became more similar to disclosing firms in 2009 than in 2006 in terms of firm size as measured by sales and total assets: more than half of chosen peers are within the range of 50–200% of the disclosing firms. This finding is consistent with the evidence in Bizjak, Lemmon, and Nguyen

¹¹ In the later years of our sample period, more firms start to benchmark executive compensation against a long list (often a few hundred) of peer companies included in the surveys of compensation consulting firms (e.g. Towers Perrin, Mercer). We exclude those groups that did not disclose the names of member companies.

(2011) that chosen peers became more similar to firms in sales in the second year than in the first year of our sample period. Interestingly, firms are more likely to choose peers with lower stock returns than themselves at the end of our sample period. As a preview of results presented below, the univariate statistics also demonstrate that while the median total pay of the S&P 900 companies rose \$339 thousand between 2005 and 2008 (the time period examined for peer compensation) the median total pay of chosen peers increased by \$531 thousand. Peer groups seem to be more biased towards companies with higher CEO compensation in 2009 than in 2006.

4. Multivariate Analysis

Peer selection is determined by a number of economic factors that capture the similarities between the firm and its potential peer along the dimensions relevant for the CEO labor market: industry, size, visibility, and CEO responsibility. Specifically, we use the following discrete-choice regression from Faulkender and Yang (2010), with a few additions:

Chosen as peer_{ij}

$$\begin{aligned}
&= \Phi[\alpha + \beta_1 * Match(Two-digit industry_{ij}) + \beta_2 * Match(Three-digit industry_{ij}) & (1) \\
&\quad + \beta_3 * Dummy(Sales within 50–200\%_{ij}) + \beta_4 * Dummy(Assets within 50–200\%_{ij}) \\
&\quad + \beta_5 * Dummy(Market Cap within 50–200\%_{ij}) + \beta_6 * Match(Dow 30_{ij}) \\
&\quad + \beta_7 * Match(S\&P 500_{ij}) + \beta_8 * Match(S\&P MidCap 400_{ij}) + \beta_9 * Match(CEO is chair_{ij}) \\
&\quad + \beta_{10} * Match(CEO is not chair_{ij}) + \beta_{11} * Dummy(High firm ROA_{ij}) \\
&\quad + \beta_{12} * Dummy(High firm stock return_{ij}) + \beta_{13} * Dummy(Talent flows_{ij}) \\
&\quad + \beta_{14} * (Number of peers) + \varepsilon_{ij}],
\end{aligned}$$

where the dependent variable takes the value one if the potential peer j is chosen to be a member of the compensation peer group of firm i ; it takes the value zero otherwise.

Independent variables include whether the potential peer has the same two- and three-digit SIC code, respectively, as the firm; whether the potential peer is within 50% and 200% of

the firm along the three size measures of sales, book assets, and market capitalization; whether both the potential peer and the firm are Dow (DJIA) 30 members, S&P 500 index components, and S&P MidCap 400 index components; whether CEOs of both the potential peer and the firm are or are not chairman of the Board of Directors; and whether any of the top five executives moved between the firm and its potential peer during the time period of 1992 to 2005.

We add two variables to incorporate performance differences between the firm and its potential peer, should performance benchmarking coincide with compensation benchmarking. Specifically, we include a dummy variable indicating whether the firm had a higher ROA in the previous year than the potential peer and a second dummy variable similarly measuring relative equity market performance. In estimating the standard errors, we follow Petersen (2009) and cluster them at both the firm and peer level because errors in estimating peer group inclusion are likely to be correlated for a particular firm as well as for a particular peer. The results of this baseline estimate for all four years can be found in the first column of Table 2.

As previously documented, industry overlap and size similarity are important factors in explaining which firms are chosen to be members of the compensation peer group. Both measures of industry overlap and all three measures of size similarity are statistically and economically significant. In addition, firms with chairman CEOs tend to benchmark against companies with chairman CEOs. Dow 30 firms have a preference for including other Dow 30 companies in their peer group, and likewise S&P 500 firms for choosing other S&P 500 companies, even after controlling for size similarity. Moreover, past exchanges of top five executives with the firm increases a company's chance of being the firm's compensation peer. Interestingly, while differential stock performance has an insignificant effect on likelihood of peer selection, the results indicate that firms are less likely to select potential peers with weaker accounting performance (ROA).

Ultimately, our question is whether firms continued managing the pay-setting process by including in the compensation peer groups companies with high CEO compensation, after controlling for similarities between firms and potential peers in other dimensions. We add total CEO compensation at the potential peer in the prior year (to ensure that the firm had that information at the time of forming its peer group) to our multivariate specification. The result contained in the second column of Table 2 shows that firms continued including companies with higher CEO compensation, all else equal, in their compensation peer groups over the four-year sample period. Economically, an increase of one standard deviation in CEO total compensation increases the likelihood of peer group membership for a company that is similar to the firm in size but not in the firm's 2-digit industry from 4.0% to 5.4% – a 35% increase!¹²

To track how this gaming practice has changed over time, we alter the specification above to allow the sensitivity to peer pay to differ each year. If the intent of the SEC's new disclosure rule were achieved, we would expect to see a significant decline in the sensitivity of peer selection to CEO compensation at the potential peer company over the four-year period of our sample. Fully achieving that objective means that the sensitivity of selection to potential peer pay would not be significantly different from zero by the final year of the sample. The results of this specification are presented in the third column of Table 2.

The results indicate that the gaming of compensation peer groups has actually intensified. The estimated coefficient of peer CEO compensation is higher in the second, third, and fourth years than in the first year. The difference between 2006 and 2009 is statistically significant at the one percent level and economically significant. Recall that the first year should reflect the peer benchmarking activity of firms prior to knowing that sunshine would be cast on the

¹² Other assumptions are both the firm and potential peer are S&P 500 constituents, both CEOs are chairman of the Board, there was no exchanges of top executives between the firm and its potential peer, and the firm had both a higher ROA and higher equity return than the potential peer.

benchmarking practice. Peer companies were selected early in the fiscal year, generally in the first quarter. The change in SEC disclosure requirements was made in August of 2006 and was implemented for fiscal year ending after December 15, 2006. Therefore the peer groups that we observe in the first year were most likely constructed before the SEC imposed the change in disclosure requirement. Every year thereafter, firms were fully aware of the new disclosure requirement and had the opportunity to modify their peer groups should they be concerned about disclosing the identities of their peer companies. However, rather than disappearing, if anything, the manipulation has become more severe.

This finding does potentially suffer from a misspecification problem if disclosure altered the sensitivities of peer membership to other characteristics. Because we forced the coefficients for all other characteristics to be the same over the entire four-year period, it could be the case that firms became better at matching on size and industry after the change in disclosure but, since we force the sensitivities to be the same, the change spuriously loaded on compensation. To address this potential concern, in Table 3 we provide the results of separately estimating the choice equation found in the second column of Table 2 for each year. Contrary to the regulatory objective, we again find that the sensitivity of peer membership to CEO compensation at a potential peer has increased since the SEC mandated disclosure of compensation peers, even after allowing the coefficients on all other control variables to vary each year.

One may argue that perhaps in more recent years firms do not follow peer benchmarking as closely as in 2006, so higher CEO compensation at peer companies does not necessarily lead to higher CEO compensation at the disclosing firm. Following Faulkender and Yang (2010), we regress CEO pay at a disclosing firm on the median CEO compensation of its compensation peer group and factors previously documented to affect the level of CEO compensation, including the median CEO pay of the firm's industry-size peers (Daniel, Lemmon and Naveen, 2008). Results

presented in Table 4 show that, after controlling for other determinants of CEO compensation, the sensitivity of CEO pay at disclosing firms to the median CEO pay at compensation peers does not decrease over time.

5. Propensity Score Matching

An alternative empirical approach to the multivariate probit conducted above is to use a propensity score matching (PSM) algorithm that matches each selected peer company to the closest unselected potential peer, and then compare the compensation level of the CEO at the selected peer with that of the matched unselected company. The procedure works as follows. Similar to Faulkender and Yang (2010), for each disclosing firm, we calculate the probability of being one of its peer group members (*propensity score*) for all potential peers using equation (1), which includes a list of firm and peer characteristics that capture the competition for managerial talent. Equation (1) is estimated year-by-year, thus allowing the sensitivity of firm and peer characteristics to change over time. The propensity score is calculated using the estimated coefficients and the realizations of the corresponding independent variables for each potential peer. Each selected peer is then matched to an unselected potential peer (a company that is not included in the firm's compensation peer group) that has the closest propensity score, without replacement. This generates a sample of 28,854 chosen peers and the same number of best-matched unselected companies.

To validate the results of the multivariate probit approach, we calculate the difference in CEO total compensation (in both dollar and percentage terms¹³) between the chosen peer and its propensity score matched unselected company. We are interested in whether the pay difference is significantly different from zero and in how that pay difference has changed over time, as the

¹³ We normalize the pay difference by the average compensation between the chosen peer and the matched company. This approach limits the range of this statistic to be between -200% and +200%, thereby limiting the effect of outliers that exists when normalizing by one of the two compensation levels.

multivariate results suggest that the pay difference has actually grown since the change in the disclosure requirement. The results of this analysis are available in Table 5.

First, one can observe from columns (1) – (4) that, in all four years, both the average and median CEO pay of the chosen peer are significantly higher than that of the matched unselected companies. All of these differences are statistically different from zero, in both dollar terms and percentage terms. Consistent with the multivariate probit analysis, the difference in total pay between chosen and their best matched unselected companies has not been eliminated; it has actually increased. The average pay difference rose from \$714 thousand in 2006, when peers were chosen before the change in disclosure requirements went into effect, to \$1.169 million in 2009. At the median, the pay difference rose from \$444 thousand to \$855 thousand. In percentage terms, the economic magnitudes range from 10.61% to 15.12% for the average pay difference and 8.30% to 13.94% for the median pay difference over four years. The increases of the pay difference are statistically and economically significant in all four specifications. These findings confirm that the manipulation of the peer selection process has not been curtailed by the increased disclosure requirement.

The propensity score matching results discussed above are based on all selected peers and their best-matched unselected companies. However, some firms have larger peer groups than others. The current comparison may place excessive weight on firms with large peer groups. We therefore repeat our analysis, focusing only on the median pair in each peer group (as ranked by the difference in total compensation between the chosen and best-matched non-chosen peers). The results reported in columns (5) – (8) of Table 5 show that in each of the four years, evaluated at either the mean or median of the sample, the median chosen peer for each disclosing firm had total compensation significantly above its best-matched non-chosen company in both dollar terms and percentage terms. Moreover, the median dollar and median percentage of the pay gap

have increased significantly between the first and fourth year. Focusing on these pivotal peers, we again find that, rather than declining after the enactment of the heightened SEC disclosure mandate, the manipulation of peer selection appears to have been intensified. Overall, empirical findings presented in Sections 4 and 5 confirm Hypothesis H1a, invalidating H1b.

6. Robustness Checks

Our results are robust to numerous alternative specifications. The finding that peer selection biases have increased over our sample period is stronger using the specification in Faulkender and Yang (2010), which does not include the difference in accounting and stock performance when calculating the propensity score for a potential peer company. Furthermore, we address the concern that pay level and pay structure are jointly determined by adding the similarity of pay structure between the firm and its potential peers, using either the fraction of equity-based pay or incentive-based pay (bonus plus equity over total pay), into the calculation of the propensity score in the matching process. We still do not find any evidence of improved peer selection over our sample period.

Corporate governance characteristics may also affect the compensation philosophy and peer benchmarking process. For example, Conyon, Core and Guay (2010) and Fernandes, Ferreira, Matos, and Murphy (2010) show that firms with higher institutional ownership tend to grant more equity-based pay and higher total pay, which explains most of the pay difference between CEOs in the United States and in other countries. In an alternative specification, we add the similarity in institutional ownership between the firm and its potential peers into the calculation of the propensity score. Our results retain. To address the concern that the change in peer selection biases might be driven by the change of our sample firms, we restrict our sample to firms that disclosed the names of their compensation peers in all four years. The conclusion

that peer selection process does not improve still holds. The same conclusion retains for firms in the S&P 500 and firms in the S&P MidCap 400 groups.

7. Changes of Peer Group Members

We show that firms have selected peer companies with more upward biases in CEO compensation over the four-year period of our sample. How is the sensitivity of peer membership to CEO compensation increasing over time? Are firms actively changing their peer groups, or is it merely the case that highly paid CEOs who were already included in peer groups at the beginning of the period have received greater pay raises? To answer this question, we focus on the companies that were added to or dropped from the compensation peer groups of disclosing firms over time.

The process that we follow for this examination is similar to the propensity score matching approach described in Section 4. For each added peer company (a company that is a peer group member in a particular year but not the previous year), we match it to another company that has not been in the peer group either year and has the closest selection likelihood to the added company. Similarly, for each company dropped from the compensation peer group (a company was a peer group member the previous year but not this year), we match it to another company that has been a peer both years and has the closest propensity score to the dropped peer company. We then compare compensation at the 4,208 added and 2,103 dropped peer companies with their best matches. The results are provided in Table 6.

The increase in the sensitivity of peer group membership to CEO compensation results at least partially from the active changes that firms and their compensation committees made to their compensation peer groups. Added peers on average make \$636 thousand more in total compensation than the best-matched unselected peer. This difference does not seem to be driven by outliers, as the median difference in total compensation between added peers and their

matched unselected peers is estimated at \$666 thousand. On a percentage basis, these added companies make an average of 9.9% (10.8% at the median) more than the closest unselected potential peers. Despite the aggregate number of additions in each of the three years being rather similar, the additions in the second and fourth years of our sample appear to have an upward bias whereas the additions appear unbiased in the third year of our sample.

And who was dropped from the peer group? To avoid biases due to peer companies' bankruptcy, being acquired, or going private, we only include dropped companies that remained in the S&P 900 index that year in our sample. Looking at the dropped companies relative to the closest-matched retained peers, we observe similar but weaker results in the opposite direction. Interesting patterns appear in the second year, immediately after the enactment of the new disclosure rule. Dropped companies have an average of \$441 thousand (median of \$701 thousand) less in total compensation. On a percentage basis, dropped companies make 9.85% less (10.26% at the median) on average in total compensation than comparable retained peers.

Overall, the evidence suggests that at least some firms engaged in a process of actively dropping the low paid members of their peer group and adding peers that are paid higher than otherwise similar companies. All of these additions and deletions took place after firms were required to disclose the members of their compensation peer groups; we continue to find peer CEO compensation playing a significant role in peer selection. This indicates that the enhanced disclosure rule did not effectively deter firms from managing the peer benchmarking process.

8. Corporate Governance and Peer Group Benchmarking

The effect of disclosing peer group information on firm behavior will likely depend on corporate governance characteristics of the firm. How increases in peer selection bias vary with corporate governance measures also informs us as to what extent our results are consistent with labor market versus agency explanations. In this section, we separately analyze how the

dynamics of peer benchmarking following the change in disclosure vary with whether (a) a firm has recently received significant shareholder support for a compensation-related proposal, (b) institutional shareholders comprise a significant ownership position in the firm, (c) directors hold significant amount of firm equity, (d) the Board of Directors is not “busy,” (e) the Board of Directors is “small,” (f) the fraction of directors who joined the Board after the CEO assumed office is low, (g) the CEO is new, and (h) among new CEOs, the CEO is hired from outside.

A. Shareholder Proposals on Compensation-Related Issues

One recent change in corporate governance is the enactment of Say-On-Pay, requiring firms to provide shareholders an opportunity to cast an advisory vote on the compensation packages Boards offer senior executives. Whether these votes will have a significant effect on compensation practices is an open question because the votes are merely advisory.

The empirical evidence on the effect of Say-on-Pay on executive compensation is mixed. Using a large sample of UK firms, Ferri and Maber (2011) find no evidence of a change in the level and growth rate of CEO pay before and after the introduction of Say-on-Pay, after controlling for various firm characteristics. In contrast, Cai and Walkling (2011) show that when the House passed the Say-on-Pay Bill, the market reaction was significantly positive for firms with high abnormal CEO compensation and low pay-for-performance sensitivity, and for those responsive to shareholder pressure. Examining the effect of shareholder proposals on CEO compensation, Martin and Thomas (1999) and Ertimur, Ferri, and Muslu (2011) find significant reduction or smaller increases in CEO pay at firms targeted by shareholder proposals that receive higher levels of voting support, call for a greater link between pay and performance, or are sponsored by institutional proponents.¹⁴

¹⁴ Research on the effect of shareholder proposals on firm performance is also far from being conclusive. For example, see Buchanan, Netter, and Yang (2010), and Ertimur, Ferri and Stubben (2010) for evidence on positive

When shareholders object in sufficient numbers to the pay practices of firms, will those firms modify their pay packages or will they instead try to better justify the existing packages by altering their compensation peer groups? During our sample period, Say-on-Pay was not implemented, but shareholders still voted on compensation-related proposals, which may provide us with some insights into how firms will respond to shareholder disapproval of their pay practices. Using data provided by RiskMetrics, we separate firms into those that received 20% support for a compensation-related proposal at least once and those that did not. We then repeat the analysis conducted in Section 5 using the propensity score matching approach for each of these two sub-groups. The results of this analysis are located at the top left quadrant of Panel A of Table 7.

Firms at which shareholders raised significant concerns regarding compensation practices are those with more egregious pay practices in 2006. Looking at the difference in total compensation between chosen peers and their best-matched non-chosen companies in 2006, we find that the average chosen peer made \$1.32 million more than its matched company at firms where a compensation-related shareholder proposal received at least 20% support. This is compared to only a \$586 thousand pay gap at firms without such shareholder support.

These resolutions did not lead to less biased compensation peer groups three years later. Indeed, the pay differential grew significantly larger at firms receiving significant shareholder support for compensation-related proposals. By 2009, the average pay difference between chosen peers and the closest non-chosen potential peers rose to \$2.30 million at firms with such support relative to a much smaller difference of \$908 thousand at those without. The results suggest that compensation peer benchmarking has been used “effectively” by firms with

effects of shareholder proposals on firm performance, which contradicts earlier findings of zero or negative effects (Karpoff, Malatesta, and Walkling, 1996; Gillan and Stark, 2000).

shareholder concerns regarding CEO compensation to justify their CEO compensation. Arguably, firms targeted by shareholders for their compensation practices are those that could potentially benefit the most from the Say-on-Pay regulation, yet we do not observe any improvement on their peer benchmarking. These results call into question whether Say-on-Pay will actually address potential abuses in pay setting or just incentivize firms to further manipulate the peer benchmarking process.

B. Ownership Structure

Ownership structures affect monitoring effectiveness. Hartzell and Starks (2003) show the importance of the monitoring role of institutional shareholders, especially in disciplining compensation practices. Institutional shareholders are likely to have the expertise necessary to evaluate compensation peer groups and raise credible concerns about the firm's benchmarking process. Similarly, directors, who have informational advantages and a fiduciary duty to monitor, have stronger incentives to do so when their personal wealth is tied to shareholder returns (Fich and Shivdasani, 2005). Thus, we expect that firms with significant institutional and director ownership differentially respond to the change in the enhanced disclosure rule.

We define firms as having high institutional holdings (using data from 13-F filings) and high director ownership when their values exceed the corresponding sample median levels. As shown in Panel A of Table 7, for both ownership measures, we do not find a significant difference across high and low ownership groups in the pay gap between selected peers and their best-matched unselected peers in 2006. Between 2006 and 2009, the pay gap for firms with high institutional holdings did not change, regardless of whether we examine the mean or the median. The increase in pay gap that we documented earlier is confined to the set of firms with low institutional holdings: the average pay gap more than doubled from \$682 thousand to \$1.53

million.¹⁵ Similarly, the results on director ownership show that the increased selection biases were mainly at firms with low director ownership. While better ownership structures do not eliminate the peer selection biases that existed in the compensation benchmarking process, they do appear to restrain firms from exacerbating those biases.¹⁶

C. Busy Boards and Small Boards

Various Board characteristics have been shown to affect monitoring effectiveness and thus firm value. Fich and Shivdasani (2006) show that when directors are busy serving multiple Boards, they are less effective monitors and are associated with lower accounting and stock performance, and lower sensitivity of CEO turnover to firm performance. Yermack (1996) and Eisenberg, Sundgren, and Wells (1998) show that small Boards of Directors are effective monitors and are associated with higher firm value.¹⁷ We thus expect busy Boards and large Boards to be less effective at monitoring pay practices such as compensation peer benchmarking. To test these predictions, we divide our sample into two subsamples for each of the two Board measures using sample median levels as the cutoff points: a Board with the average director serving on more than the sample median number of Boards is labeled as a *busy* Board, while a Board with more directors than the sample median number is labeled as a *large* Board.

The results presented in Panels A and B of Table 7 are strikingly similar to those reported for ownership structures. There is little difference in 2006 in pay biases of those firms with busy Boards versus those with non-busy Boards, and no difference for firms with large Boards versus those with small Boards. However, from 2006 to 2009, increases in pay bias were entirely limited to firms at which Board monitoring was considered weaker. The average pay difference

¹⁵ We observe similar results using the concentration of institutional holdings (Hartzell and Starks, 2003).

¹⁶ Examining peer benchmarking changes over time according to CEO ownership generates results similar to those using institutional and director ownership.

¹⁷ Coles, Daniel, and Naveen (2008) argue that firm value increases (decreases) in Board size for complex (simple) firms.

between selected and best-matched unselected peers increased from \$727 thousand to \$1.5 million for firms with busy Boards, and from \$674 thousand to \$1.35 million for firms with large Boards; while firms with non-busy Boards and firms with small Boards had no increase in pay biases. For both Board measures, increases in the pay gap after the enhanced disclosure were significantly higher at firms with weak Boards, both economically and statistically.

D. Co-opted Boards, New CEOs, and Inside vs. Outside CEOs

The selection of Board members (at least implicitly) by the CEO or the appointment of a new CEO by the Board of Directors influence the bargaining power of the Board vis-a-vis the CEO (Hermalin and Weisbach, 1998). Coles, Daniel, and Naveen (2008) consider directors who joined the Board after the CEO assumed office *co-opted* and less effective at scrutinizing and monitoring managerial decisions: as their fraction increases, CEO turnover-performance sensitivity diminishes and CEO compensation level increases. We define a Board as *co-opted* if the fraction of directors joining the Board after the CEO's appointment is greater than the sample median. As shown in Panel B of Table 7, we find that prior to the enhanced disclosure firms with co-opted Boards had significantly higher pay biases in peer selections than firms without co-opted Boards. However, the latter more than doubled the selection bias (from \$457 thousand in 2006 to \$1.15 million in 2009), catching up with the former in 2009.

When a new CEO is hired, theoretically, the Board and the CEO conduct arm's length bargaining, with the CEO's bargaining power depending on his/her abilities. Thus, we expect to find lower pay biases at firms with new CEOs, especially new CEOs hired from outside, because these outsiders are unlikely to "capture" the Board. As shown in Panel B of Table 7, we find this is indeed the case prior to the enhanced disclosure. Actually, firms that hired outside new CEOs had deeply negative pay biases; in other words, those firms selected peer companies that paid their CEOs approximately \$2 million less than their matched potential peers.

Public disclosure of compensation peer lists shocked the CEO labor market. Given that firms compete with others for scarce managerial talent, a firm will be pushed to do the same if its competing firms use biased peer lists to attract the CEO. In those cases, the mitigating effect of strong corporate governance such as high institutional ownership and director ownership will be overpowered by the urge to attract and retain the CEO over its competing firms. Such effects become particularly acute when a firm searches for a new CEO. This finding is consistent with Acharya and Volpin (2010) in that the externality pushes firms, even those with strong governance, to adopt bad compensation practices. Enhanced disclosure merely served as a catalyst in this process. We find that in 2009, the negative pay gap at firms with new outside CEOs disappeared. While showing no peer selection biases prior to enhanced disclosure, firms with internally promoted CEOs picked up pay biases of \$1.9 million in 2009. Pay biases increased at firms with old CEOs as well, but not to the same extent.

E. Firm Performance and Excessive Pay

Ultimately, to judge whether disclosure regulation is effective, we need to examine whether shareholders benefit from changes in the disclosure regime (Holmstrom and Kaplan, 2003; Core, Guay, and Thomas, 2005). If peer benchmarking has been increasingly used to justify proper levels of CEO pay after enhanced disclosure, we should observe that better performing firms increased the pay gap between selected and matched unselected peer companies from 2006 to 2009 more than worse performing firms did. In addition, the pay gap increase at firms with pay in excess of the level predicted by performance, firm characteristics, and CEO characteristics should be less than that at firms without excessive pay, given that those CEOs were already overpaid. Moreover, firms that adjusted their peer companies toward better paid CEOs should deliver better performance (Core, Holthausen, and Larcker, 1999).

As shown in Panel A of Table 8, better performing firms (relative to the average stock return of the 3-digit SIC industry in the year prior to peer selection) had higher pay gaps than poor performing firms in 2006. However, better performing firms did not have significant increases in the pay gap, while worse performing firms dramatically increased the pay gap from 2006 to 2009. Not surprisingly, but contrary to the proposed hypothesis, firms with positive excessive pay had higher pay gaps than firms with negative excessive pay in both 2006 and 2009.¹⁸ After the enhanced disclosure, firms with positive excessive pay increased their selection biases to the same extent as firms with negative excessive pay.

Regarding subsequent performance, we examine whether the median pay gap at the firm explains future performance. If CEOs are benchmarked against hand-picked peer companies to justify higher pay because the Board expects them to generate superior performance, we should observe positive abnormal returns amongst those firms with more biased peer groups. We test this hypothesis by regressing industry adjusted equity returns over the fiscal year on the median pay gap of the compensation peer group formed at the beginning of the fiscal year. The results of this examination are in Panel B of Table 8. We find no meaningful relationship between firm abnormal stock performance and the median pay bias of its compensation peer group, indicating that an upwardly biased peer group does not improve shareholder wealth.

The cross-sectional results illustrate that firms with weak corporate governance increased peer selection biases dramatically after enhanced disclosure, whereas we also observe convergence in opportunistic peer benchmarking at firms in which the Board has been classically characterized as having bargaining power over the CEO, especially at firms with new CEOs. While past performance does appear to be associated with increased pay bias in peer group

¹⁸ Factors included in the prediction of CEO pay are CEO/Chairman of the Board duality, CEO tenure, ROA, stock return, lagged measures of ROA, stock return, sales, volatility of stock returns, leverage, and market-to-book; see Faulkender and Yang (2010) and Core, Holthausen, and Larcker (1999).

formation, such increased pay bias does not lead to improved returns for shareholders. Moreover, our evidence suggests that the recently mandated Say-on-Pay may actually exacerbate the biases in compensation peer benchmarking. Overall, empirical findings in this section confirm Hypotheses H2 and H3, invalidating H4.

9. Discussion of Results and Conclusion

Four years after the enactment of the SEC rule requiring disclosure of compensation peers, firms continued to select peer companies that pay their CEOs generously, even after controlling for various economic determinants of peer group membership. Our findings suggest that new regulations mandating disclosure of compensation peer companies did not mitigate opportunistic behavior in peer benchmarking. Actually, peer selection biases got worse at firms with weak corporate governance. These findings are consistent with claims in Weisbach (2007) that the set of circumstances under which governance regulation can improve welfare is very limited.

Several economic and enforcement-related factors may help explain why enhanced disclosure of peer benchmarking did not mitigate the gaming of that process. First, enhanced disclosure can worsen peer benchmarking for economic reasons. As discussed in Hermalin and Weisbach (2011), CEO pay may increase to compensate for the inconvenience or lost rents caused by improved monitoring associated with enhanced disclosure. Even though dramatic increases in CEO pay did not occur as a result of adverse economic conditions, such required high levels of compensation should still be accompanied by selecting compensation peers biased toward companies with highly paid CEOs. Moreover, given that investors now observe the list of companies that disclosing firms used to benchmark their CEO compensation, at least for some firms it may be rational to benchmark against “aspirational” peer companies in order to affect

market perceptions of firm value; see Hayes and Schaefer (2009) for a model of the “Lake Wobegon effect.”¹⁹

Observing opportunistic peer benchmarking at other firms, those firms that did not engage in such practices may have begun to do so, especially when they hire new CEOs. There were no effective enforcement mechanisms to impose penalty on opportunistic peer benchmarking during our sample period. First, the SEC required firms to disclose the identities of their peer companies and only later emphasized peer selection rationales. To meet the SEC’s requirement, firms typically state in the Compensation Discussion and Analysis section of their proxy statements that they compete for managerial talents with those compensation peer companies. The SEC had not identified firms with improper peer benchmarking practices.

Second, Boards of Directors are less concerned about legal liabilities after disclosing the identities of compensation peer companies because of the reduction in informational asymmetry between insiders and outsiders.

Third, firm proxy statements have become overwhelming since the disclosure regulation, which makes it difficult to extract key information, especially given that investors have limited attention and processing power (Hirshleifer and Teoh, 2003).²⁰ It is beyond the capability of the average shareholder to determine whether compensation peers were selected opportunistically. To reach our conclusion, one would have to find the list of companies against which the firm benchmarks its executive compensation and, more importantly, to identify a set of companies

¹⁹ Former DuPont CEO Edward S. Woolard, Jr. spoke at a Harvard Business School roundtable on CEO pay: “The main reason (CEO) compensation increases every year is that most boards want their CEO to be in the top half of the CEO peer group, because they think it makes the company look strong. So when Tom, Dick, and Harry receive compensation increases, I get one too, even if I had a bad year.... (This leads to an) upward spiral.”

²⁰ We examine a randomly selected set of 50 proxy statements out of the S&P 500 component firms and find that the average length of the proxy statement was 41 pages in 2006. It increased to 61 pages in 2009. The section that contains peer benchmarking information, Compensation Discussion and Analysis (CD&A), went from six pages to 15 pages, an increase of 150%. CD&A also contains many other pieces of newly disclosed information such as performance metrics used in the annual incentive plan and long-term incentive plan, formulas for executive pension plans, and details of perks.

that were not selected as peers but are comparable in firm financial and CEO characteristics to those selected. For the average shareholder, this would require accessing the financial report and proxy statement for each of those selected peer and unselected potential peer companies. One may still find the peer group reasonable unless one engages in the same detailed analysis the firm's compensation consultants did when constructing the peer group. It is even more challenging to detect whether peer benchmarking has become more biased over time. These obstacles explain, at least partially, why media and investors had not paid much attention to the peer benchmarking issue until very recently.²¹

Fourth, the complex analysis required for detecting peer selection biases explains the increasing importance of shareholder advisory firms. As the fraction of equity held by institutions increases, institutional investors have stronger incentives to seek guidance on how to vote on proxy issues and what role to play in influencing corporate governance and executive compensation. Institutional shareholder advisory services with numerous institutional clients, such as RiskMetrics, have the incentives, abilities, and resources to address issues such as compensation peer benchmarking. However, they did not provide explicit guidelines on peer benchmarking during our sample period because of higher priorities on other corporate governance issues such as Say-on-Pay and proxy access. Actually, the observed improvement in peer matching based on industry and size, as recently advocated by RiskMetrics and adopted by many compensation consulting firms, indicates a small step in the right direction. However, industry and size matching is insufficient to improve peer benchmarking if, among companies of similar size in their industry, firms still select ones with highly paid CEOs.

²¹ Coverage of peer benchmarking in the media includes interviews on the *PBS NewsHour* on October 4, 2011; articles at *Washington Post* on October 3, 2011, *New York Times* on July 26, 2010, the *Wall Street Journal* on August 18, 2009.

References:

- Acharya, V., Volpin, P., 2010. Corporate Governance Externalities. *Review of Finance* 14, 1–33.
- Albuquerque, A., De Franco, G., and Verdi, R., 2009. Peer choice and CEO compensation. Working paper, Boston University.
- Bailey, W., Li, H., Mao, C., Zhong, R., 2003. Regulation Fair Disclosure and Earnings Information: Market, Analyst, and Corporate Responses. *Journal of Finance* 58, 2487–2514.
- Baranchuk, N., MacDonald, G., Yang, J., 2011. The economics of super managers. *Review of Financial Studies* 24, 3321–3368.
- Bebchuk, L., Fried, J., 2004. Pay without performance: The unfulfilled promise of executive compensation. Harvard University Press, Cambridge, MA.
- Bebchuk, L., Fried, J., 2003. Executive compensation as an agency problem. *Journal of Economic Perspectives* 17, 71–92.
- Bertrand, M., Mullainathan, S., 2001. Are CEOs rewarded for luck? The ones without principals are. *Quarterly Journal of Economics* 116, 901–932.
- Bizjak, J., Lemmon, M., Naveen, L., 2008. Does the use of peer groups contribute to higher pay and less efficient compensation? *Journal of Financial Economics* 90, 152–168.
- Bizjak, J., Lemmon, M., Nguyen, T., 2011. Are all CEOs above average? An empirical analysis of compensation peer groups and pay design. *Journal of Financial Economics* 100, 538–555.
- Buchanan, B., Netter, J., Yang, T., 2010. Are shareholder proposals an important corporate governance device? Evidence from US and UK shareholder proposals. Working Paper, Seattle University.
- Cadman, B., Carter, M., 2009. Compensation peer groups and their relation with CEO pay. Working paper, University of Utah and Boston College.
- Cai, J., Walkling, R., 2011. Shareholders' say on pay: Does it create value? *Journal of Financial and Quantitative Analysis* 46, 299–339.
- Carlin, B., Manso, G., 2011. Obfuscation, learning, and the evolution of investor sophistication. *Review of Financial Studies*, forthcoming.
- Coles, J., Daniel, N., Naveen, L., 2008. Co-opted boards. Working paper, Arizona State University.
- Coles, J., Daniel, N., Naveen, L., 2008. Boards: Does one size fit all? *Journal of Financial Economics* 87, 329–356.
- Canyon, M., Core, J., Guay, J., 2011. Are US CEOs paid more than UK CEOs? Inferences from risk-adjusted pay. *Review of Financial Studies* 24, 402–438.
- Core, J., Guay, W., 2010. Is CEO pay too high and are incentives too low: A wealth based contracting framework. *Academy of Management Perspectives* 24, 5–19.

- Core, J., Guay, W., Thomas, R., 2005. Is U.S. CEO compensation inefficient pay without performance? A review of 'Pay without Performance: The Unfulfilled Promise of Executive Compensation. *Michigan Law Review* 103, 1142–1185.
- Core, J., Holthausen, R., Larcker, D., 1999. Corporate governance, chief executive officer compensation, and firm performance. *Journal of Financial Economics* 51, 371–406.
- DiPrete, T., Eirich, G., Pittinsky, M., 2010. Compensation benchmarking, leapfrogs, and the surge in executive pay. *American Journal of Sociology* 115, 1671–1712.
- Edmans, A., Gabaix, X., Landier, A., 2009. A multiplicative model of optimal CEO incentives in market equilibrium. *Review of Financial Studies* 22, 4881–4917.
- Edmans, A., Gabaix, X., 2009. Is CEO pay really inefficient? A survey of new optimal contracting theories. *European Financial Management* 15(3), 486–496.
- Eisenberg, T., Sundgren, S., Wells, M., 1998. Larger board size and decreasing firm value in small firms. *Journal of Financial Economics* 48, 35–54.
- Ertimur, Y., Ferri, F., Muslu, V., 2011. Shareholder activism and CEO pay. *Review of Financial Studies*, forthcoming.
- Ertimur, Y., Ferri, F., Stubben, S., 2010. Board of directors' responsiveness to shareholders: Evidence from shareholder proposals. *Journal of Corporate Finance* 16, 53–72.
- Faulkender, M., Yang, J., 2010. Inside the black box: The role and composition of compensation peer groups. *Journal of Financial Economics* 96, 257–270.
- Fernandes, Nuno G., Miguel A. Ferreira, Pedro P. Matos and Kevin J. Murphy, 2010. The pay divide: (Why) are U.S. top executives paid more? Working Paper, University of Southern California.
- Ferri, F., Maber, D., 2011. Say on pay votes and CEO compensation: Evidence from the UK. Working Paper, New York University.
- Fich, E., Shivdasani, A., 2005. The impact of stock-option compensation for outside directors on firm value. *Journal of Business* 61, 2229–2254.
- Fich, E., Shivdasani, A., 2006. Are busy boards effective monitors? *Journal of Finance* 61, 689–724.
- Gabaix, X., Landier, A., 2008. Why has CEO pay increased so much? *Quarterly Journal of Economics* 123, 49–100.
- Giannetti, M., 2011. Serial CEO incentives and the structure of managerial contracts. *Journal of Financial Intermediation* 20, 633–662.
- Gillan, S., Stark, L., 2000. Corporate governance proposals and shareholder activism: The role of institutional investors. *Journal of Financial Economics* 57, 275–305.
- Hartzell, J.C., Starks, L., 2003. Institutional investors and executive compensation. *Journal of Finance* 58, 2351–2374.

- Hayes, R., Schaefer, S., 2009. CEO pay and the Lake Wobegon effect. *Journal of Financial Economics* 94, 280–290.
- Healy, P., Palepu, K., 2001. Information asymmetry, corporate disclosure, and the capital markets: A review of the empirical disclosure literature. *Journal of Accounting Economics* 31, 405–440.
- Hermalin, B., Weisbach, M., 1998. Endogenously chosen boards of directors and their monitoring of management. *American Economic Review* 88, 3–43.
- Hermalin, B., Weisbach, M., 2011. Information disclosure and corporate governance. *Journal of Finance*, forthcoming.
- Hirschleifer, D., Teoh, S., 2003. Limited attention, information disclosure, and financial reporting. *Journal of Accounting and Economics* 36, 337–385.
- Holmstrom, B., Kaplan, S., 2003. The state of U.S. Corporate Governance: What's right and what's wrong? *Journal of Applied Corporate Finance* 15, 8–20.
- Kaplan, S., Rauh, J., 2011. Wall Street and Main Street: What contributes to the rise in the highest incomes? *Review of Financial Studies* 23, 1004–1050.
- Karpoff, J., Malatesta, P., Walkling, R., 1996. Corporate governance and shareholder initiatives: Empirical evidence. *Journal of Financial Economics* 42: 365–395.
- Leuz, C., Wysocki, P., 2008. Economic consequences of financial reporting and disclosure regulation: A review and suggestions for future research. Working paper, University of Chicago.
- Martin, K., Thomas, R., 1999. The effect of shareholder proposals on executive compensation. *University of Cincinnati Law Review* 67, 1021–1081.
- Morse, A., Nanda, V., Seru, A., 2011. Are incentive contracts rigged by powerful CEOs? *Journal of Finance* 66, 1779–1821.
- Murphy, K., 2002. Explaining executive compensation: Managerial power versus the perceived cost of stock options. *University of Chicago Law Review* 69: 847–869.
- Murphy, K., Zabojnik, J., 2004. CEO pay and appointments: A market-based explanation for recent trends. *American Economic Review Papers and Proceedings* 94, 192–196.
- Oyer, P., 2004. Why do firms use incentives that have no incentive effects? *Journal of Finance* 59, 1619–1649.
- Perry, T., Zenner, M., 2001. Pay for performance? Government regulation and the structure of compensation contracts. *Journal of Financial Economics* 62, 453–488.
- Weisbach, M.S., 2007. Optimal executive compensation versus managerial power: A review of Lucian Bebchuk and Jesse Fried's Pay without Performance: The Unfulfilled Promise of Executive Compensation. *Journal of Economic Literature* 45: 419–428.
- Yermack, D., 1996. Higher market valuation of companies with a small board of directors. *Journal of Financial Economics* 40, 185–211.

Table 1: Descriptive Statistics of the Matched Pairs of Disclosing Firms and Chosen Peers

In Panel A, summary statistics are provided for each firm-year in the sample. In Panel B, the means for each variable are provided for the first and fourth years for the subsample of 431 firms that are in the sample in both years. *Total compensation* is *TDC1* in the ExecuComp database. *Median potential Peer* compensation values are the statistics for the median of the other 899 companies in the S&P 900 for that corresponding compensation variable. *Median chosen peer* compensation values are the statistics for the median among the selected peers for that corresponding pay variable. *Number of peers* is the number of chosen compensation peers. The remaining variables are tabulated as the percentage of the selected peers of each firm-year that meet the following criteria: *Match (Two-digit industry)* and *Match (Three-digit industry)* are one if a chosen peer in the same two-digit and three-digit industry of the firm and zero otherwise, respectively. *Dummy (Size within 50–200%)* is one if the sizes (*Sales*, *Assets*, and *Market Cap*) of the firm and peer are within 50–200% of each other and zero otherwise. *Dummy (Higher firm ROA)* is one if ROA of the firm is higher than that of the chosen peer and zero otherwise. *Dummy (Higher firm stock return)* is similarly defined for stock return. *Dummy (Talent flows)* is one if at least one of the top five executives moved between the firm and any company in the same 4-digit SIC code as the selected peer during 1992-2005. All dollar values are in millions of US Dollars. In Panel B, ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Entire Sample

	Median	Mean	Standard Deviation
Firm salary (millions of dollars)	0.947	0.965	0.349
Firm total pay (millions of dollars)	6.124	7.887	6.481
Number of peers	16	18.76	17.75
Match (Two-digit industry)	41.67%	45.48%	31.71%
Match (Three-digit industry)	20.00%	30.26%	29.37%
Dummy (Sales within 50–200%)	54.55%	54.20%	21.87%
Dummy (Assets within 50–200%)	45.45%	43.20%	23.70%
Dummy (Market Cap within 50–200%)	38.10%	36.70%	21.99%
Peer is Dow 30 if firm is Dow 30	45.45%	44.38%	22.69%
Peer is Dow 30 if firm is not Dow 30	0.00%	4.34%	10.06%
Peer is S&P 500 if firm is S&P 500	100.00%	88.81%	31.54%
Peer is S&P MidCap 400 if firm is S&P MidCap 400	0.00%	33.98%	47.39%
Peer CEO is chair and firm CEO is chair	100.00%	71.43%	45.19%
Peer CEO is not chair and firm CEO is not chair	0.00%	33.06%	47.07%
Dummy (Higher firm ROA)	0.00%	5.63%	23.08%
Dummy (Higher firm stock return)	0.00%	38.23%	48.64%
Dummy (Talent flows)	0.00%	10.54%	21.61%

Table 1: Descriptive Statistics of the Matched Pairs of Disclosing Firms and Chosen Peers (Cont.)**Panel B: First Year and Fourth Year for Firms in Both Years of the Sample**

	Year 1	Year 4	Difference
Median potential peer salary (millions of dollars)	0.833	0.908	0.075***
Median chosen peer salary (millions of dollars)	0.975	1.026	0.051***
Median potential peer total pay (millions of dollars)	4.933	5.272	0.339
Median chosen peer total pay (millions of dollars)	6.771	7.302	0.531***
Number of peers	18.69	19.95	1.25*
Match (Two-digit industry)	42.68%	44.36%	1.68%
Match (Three-digit industry)	28.99%	28.69%	-0.30%
Dummy (Sales within 50–200%)	49.76%	54.40%	4.64%***
Dummy (Assets within 50–200%)	45.19%	50.36%	5.18%***
Dummy (Market cap within 50–200%)	39.42%	39.26%	-0.16%
Peer is Dow 30 if firm is Dow 30	48.83%	43.82%	-5.02%
Peer is Dow 30 if firm is not Dow 30	4.84%	3.95%	-0.88%
Peer is S&P 500 if firm is S&P 500	86.28%	86.15%	-0.13%
Peer is S&P MidCap 400 if firm is S&P MidCap 400	29.39%	29.29%	-0.09%
Peer CEO is chair and firm CEO is chair	73.42%	77.52%	4.10%
Peer CEO is not chair and firm CEO is not chair	27.75%	25.13%	-2.62%
Dummy (Higher firm ROA)	6.83%	5.63%	-1.20%
Dummy (Higher firm stock return)	25.54%	38.23%	12.69%***
Dummy (Talent flows)	10.03%	9.28%	-0.74%

Table 2: Multivariate Probit Regressions of Peer Group Selection

The dependent variable is one if a potential peer [Standard & Poor's (S&P) 500 and S&P Mid Cap 400] is chosen as a compensation peer by a disclosing firm and zero otherwise. *Peer total pay* (TDC1) is from the matching year and is measured in millions of dollars. We winsorize peer pay at the 1st and 99th percentiles and use $\ln(\text{Peer total pay})$ in the regression. *Match (Two-digit industry)* and *Match (Three-digit industry)* are one if a potential peer is in the firm's two-digit and three-digit industry, respectively, and zero otherwise. *Dummy (Size within 50–200%)* is one if the sizes (*Sales, Assets, and Market Cap*) of the firm and the potential peer are within 50–200% of each other and zero otherwise. *Match (Dow 30 membership)*, *Match (S&P 500 membership)*, and *Match (S&P 400 MidCap membership)* are one when both the firm and its potential peer are Dow 30 members, S&P 500 index components, and S&P MidCap 400 index components, respectively, and zero otherwise. *Match (CEO is chair)* is one when CEOs of both the firm and its potential peer are chairmen of the Boards of Directors; and *Match (CEO is not chair)* is one when both CEOs are not chairmen. *Dummy (Higher firm ROA)* is one if ROA of the disclosing firm is higher than that of the potential peer and zero otherwise. *Dummy (Higher firm stock return)* is similarly defined for stock return. *Dummy (Talent flows)* is one if at least one of the top five executives moved between the firm and any company in the same 4-digit SIC code as the selected peer during 1992-2005. *Number of peers* is the number of compensation peers chosen by the firm. The specification in the third column contains year dummies but the estimated coefficients are omitted for brevity. We winsorize compensation variables at the 1st and the 99th percentiles. Standard errors reported in parentheses are clustered at both disclosing firm and potential peer level. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Model	(1)	(2)	(3)
Ln(Peer total pay)		0.163*** (0.013)	
Ln(Peer total pay) Year 1			0.131*** (0.015)
Ln(Peer total pay) Year 2			0.173*** (0.016)
Ln(Peer total pay) Year 3			0.187*** (0.016)
Ln(Peer total pay) Year 4			0.177*** (0.018)
Match (Two-digit industry)	1.127*** (0.032)	1.143*** (0.032)	1.142*** (0.032)
Match (Three-digit industry)	0.613*** (0.037)	0.617*** (0.036)	0.618*** (0.037)
Dummy (Sales within 50–200%)	0.456*** (0.011)	0.462*** (0.011)	0.460*** (0.011)
Dummy (Assets within 50–200%)	0.243*** (0.010)	0.252*** (0.010)	0.258*** (0.010)
Dummy (Market Cap within 50–200%)	0.081*** (0.010)	0.093*** (0.010)	0.099*** (0.010)
Match (Dow 30 membership)	1.731*** (0.079)	1.630*** (0.080)	1.625*** (0.080)
Match (S&P 500 membership)	0.467*** (0.022)	0.400*** (0.021)	0.398*** (0.021)
Match (S&P MidCap 400 membership)	0.040** (0.019)	0.091*** (0.019)	0.091*** (0.019)
Match (CEO is chair)	0.094*** (0.013)	0.081*** (0.012)	0.084*** (0.013)
Match (CEO is not chair)	-0.026 (0.014)	-0.014 (0.009)	-0.017 (0.014)
Dummy (Higher firm ROA)	-0.104*** (0.015)	-0.097*** (0.014)	-0.098*** (0.015)
Dummy (Higher firm stock return)	0.001 (0.009)	0.014 (0.009)	0.014 (0.009)
Dummy (Talent flows)	0.628*** (0.030)	0.643*** (0.029)	0.645*** (0.029)
Number of peers	0.007*** (0.000)	0.007*** (0.000)	0.007*** (0.000)
Intercept	-3.060*** (0.020)	-3.355*** (0.033)	-3.366*** (0.041)
Number of observations	1,901,757	1,901,757	1,901,757
Pseudo R ²	0.272	0.279	0.280

Table 3: Multivariate Probit Regressions of Peer Group Selection Year-By-Year

The dependent variable is one if a potential peer [Standard & Poor's (S&P) 500 and S&P Mid Cap 400] is chosen as a compensation peer by a disclosing firm and zero otherwise. *Peer total pay* (TDC1) is from the matching year and is measured in millions of dollars. We winsorize peer pay at the 1st and 99th percentiles and use $\ln(\text{Peer total pay})$ in the regression. *Match (Two-digit industry)* and *Match (Three-digit industry)* are one if a potential peer is in the firm's two-digit and three-digit industry, respectively, and zero otherwise. *Dummy (Size within 50–200%)* is one if the sizes (*Sales, Assets, and Market Cap*) of the firm and the potential peer are within 50–200% of each other and zero otherwise. *Match (Dow 30 membership)*, *Match (S&P 500 membership)*, and *Match (S&P 400 MidCap membership)* are one when both the firm and its potential peer are Dow 30 members, S&P 500 index components, and S&P MidCap 400 index components, respectively, and zero otherwise. *Match (CEO is chair)* is one when CEOs of both the firm and its potential peer are chairmen of the Boards of Directors; and *Match (CEO is not chair)* is one when both CEOs are not chairmen. *Dummy (Higher firm ROA)* is one if ROA of the disclosing firm is higher than that of the potential peer and zero otherwise. *Dummy (Higher firm stock return)* is similarly defined for stock return. *Dummy (Talent flows)* is one if at least one of the top five executives moved between the firm and any company in the same 4-digit SIC code as the selected peer during 1992-2005. *Number of peers* is the number of compensation peers chosen by the firm. We winsorize compensation variables at the 1st and the 99th percentiles. Standard errors reported in parentheses are clustered at both disclosing firm and potential peer level. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Table 3: Multivariate Probit Regressions of Peer Group Selection Year-By-Year (Cont.)

Model	Year 1	Year 2	Year 3	Year 4
Ln(Peer total pay)	0.137*** (0.016)	0.157*** (0.016)	0.202*** (0.018)	0.190*** (0.021)
Match (Two-digit industry)	1.105*** (0.033)	1.099*** (0.034)	1.197*** (0.037)	1.199*** (0.036)
Match (Three-digit industry)	0.705*** (0.041)	0.615*** (0.039)	0.587*** (0.044)	0.621*** (0.043)
Dummy (Sales within 50–200%)	0.431*** (0.013)	0.425*** (0.013)	0.546*** (0.015)	0.478*** (0.016)
Dummy (Assets within 50–200%)	0.261*** (0.014)	0.267*** (0.013)	0.183*** (0.017)	0.303*** (0.015)
Dummy (Market Cap within 50–200%)	0.115*** (0.015)	0.130*** (0.013)	0.045*** (0.017)	0.100*** (0.014)
Match (Dow 30 membership)	1.718*** (0.085)	1.623*** (0.076)	1.427*** (0.090)	1.580*** (0.105)
Match (S&P 500 membership)	0.380*** (0.024)	0.429*** (0.023)	0.357*** (0.024)	0.354*** (0.028)
Match (S&P MidCap 400 membership)	0.086*** (0.025)	0.089*** (0.024)	0.135*** (0.027)	0.096*** (0.024)
Match (CEO is chair)	0.045*** (0.018)	0.125*** (0.018)	0.039*** (0.019)	0.104*** (0.019)
Match (CEO is not chair)	0.041 (0.027)	-0.064*** (0.020)	0.010 (0.019)	-0.033 (0.023)
Dummy (Higher firm ROA)	-0.118*** (0.019)	-0.120*** (0.017)	-0.099*** (0.019)	-0.070*** (0.020)
Dummy (Higher firm stock return)	0.025 (0.017)	0.020 (0.016)	-0.011 (0.017)	0.000 (0.019)
Dummy (Talent flows)	0.625*** (0.035)	0.612*** (0.033)	0.650*** (0.037)	0.676*** (0.041)
Number of peers	0.011*** (0.000)	0.006*** (0.000)	0.025*** (0.001)	0.018*** (0.000)
Intercept	-3.356*** (0.040)	-3.384*** (0.041)	-3.657*** (0.044)	-3.672*** (0.050)
Number of observations	492,472	514,623	620,649	437,685
Pseudo R ²	0.278	0.284	0.292	0.295

Table 4: Peer Group Compensation as an Explanation for Executive Compensation

The dependent variable is *CEO total pay* (TDC1) at the disclosing firm. *Median peer total pay* is the median CEO total pay of the chosen compensation peer companies. *Median total pay of industry-size peers* is the median CEO total pay of companies in the firm's 2-digit industry and of sales within 50-200% of the firm's. Firm *Sales*, *ROA*, *Stock return*, and *Volatility* (BS volatility) are from ExecuComp. *Leverage* is $\text{total debt} / (\text{total debt} + \text{market capitalization})$. *Market-to-book value* is the ratio of market value to book value of assets. *Dummy (CEO is chair)* is one when the CEO of the firm serves as the chairman of the Board, and *CEO tenure* is number of years the CEO has been in the post. We winsorize compensation variables at the 1st and the 99th percentiles and apply log transformation to compensation variables and sales to overcome the skewness in the data. Panel A includes descriptive statistics of disclosing firms. In Panel B, we report the probit regression results for the full sample and for each of the four years separately. We winsorize compensation variables at the 1st and the 99th percentiles. Standard errors are in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Descriptive Statistics

	Median	Mean	Standard Deviation
Firm total pay (millions of dollars)	6.124	7.887	6.481
Median peer total pay (millions of dollars)	6.445	7.522	4.166
Median total pay of industry-size peers (millions of dollars)	4.721	6.178	5.354
Lagged sales (millions of dollars)	3,900.43	12,230.18	30,610.38
ROA	0.077	0.081	0.089
Lagged ROA	0.085	0.090	0.083
Stock return	0.045	0.059	0.457
Lagged stock return	0.008	0.002	0.361
Lagged market-to-book value	1.680	2.011	1.123
Lagged leverage	0.127	0.152	0.125
Volatility of stock returns	0.288	0.336	0.188
Dummy (CEO is chair)	1.000	0.586	0.496
CEO tenure	5.000	6.591	6.526

Table 4: Peer Group Compensation as an Explanation for Executive Compensation (Continued)**Panel B: Multivariate Probit Regression**

Independent variables	Ln(CEO total pay)				
	Full Sample	Year 1	Year 2	Year 3	Year 4
Ln(Median peer total pay)	0.594*** (0.042)	0.543*** (0.085)	0.637*** (0.086)	0.665*** (0.089)	0.650*** (0.095)
Ln(Median total pay of industry-size peers)	0.067* (0.036)	0.050 (0.076)	0.046 (0.071)	0.056 (0.072)	0.107 (0.075)
Ln(Lagged sales)	0.125*** (0.018)	0.154*** (0.037)	0.101*** (0.037)	0.139*** (0.035)	0.078** (0.035)
ROA	0.262 (0.245)	0.186 (0.621)	-0.125 (0.421)	-0.856 (0.534)	1.493** (0.581)
Lagged ROA	-0.667** (0.270)	-1.065 (0.687)	0.591 (0.601)	-0.590 (0.557)	-1.519** (0.501)
Stock return	0.084** (0.033)	0.180 (0.119)	0.253*** (0.093)	0.139 (0.109)	-0.023 (0.050)
Lagged stock return	0.251*** (0.046)	0.225** (0.110)	0.391*** (0.127)	0.319*** (0.084)	0.357** (0.147)
Lagged market-to-book value	0.047*** (0.018)	0.064* (0.034)	-0.006 (0.036)	0.080** (0.037)	0.088* (0.046)
Lagged leverage	-0.078 (0.139)	-0.329 (0.310)	-0.220 (0.313)	0.149 (0.271)	0.121 (0.246)
Volatility of stock returns	0.035 (0.285)	-1.455 (1.021)	0.795 (1.225)	0.319 (0.606)	0.203 (0.521)
Dummy (CEO is chair)	0.149*** (0.030)	0.121* (0.063)	0.216*** (0.064)	0.108* (0.059)	0.155** (0.061)
CEO tenure	-0.001 (0.002)	-0.001 (0.005)	0.003 (0.005)	-0.006 (0.005)	-0.001 (0.005)
Intercept	-0.645*** (0.129)	-0.627** (0.286)	-0.597** (0.283)	-0.852*** (0.269)	-0.457* (0.258)
Number of observations	1,801	464	439	464	434
Adjusted R ²	0.391	0.384	0.426	0.387	0.377

Table 5: Summary Statistics for Chosen Peers versus Matched Unselected Companies

This table contains mean and median differences between the selected peers and their propensity score matched unselected companies in *Total compensation* (TDC1). In Columns (1), (2), (5), and (6), pay differences are expressed in thousands of dollars. In Columns (3), (4), (7), and (8), pay differences are expressed as percentages of the average CEO compensation at the chosen peer and the best-matched unselected company. We first calculate the difference for each selected propensity score matched pair (pay at the selected peer minus pay at the propensity score matched unselected company). Summary statistics of these differences over all matched pairs are reported in Columns (1) – (4). We then calculate the median pay difference of all matched pairs for each firm in each year. For results reported in Columns (5) – (8), each disclosing firm has only one observation for each year, the pair with the median pay difference. We report results for each year separately and calculate the changes of these pay differences from Year 1 to Year 4. Due to the significant skewness of compensation data, we winsorize the pay differences at the 5th and 95th percentiles. Standard errors are clustered at the disclosing firm level. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Pay difference between selected peers and best-matched unselected companies	Using all chosen peers for each disclosing firm				Using the median peer for each disclosing firm			
	Mean of dollar pay difference (thousands of dollars) (1)	Median of dollar pay difference (thousands of dollars) (2)	Mean of percentage pay difference (3)	Median of percentage pay difference (4)	Mean of dollar pay difference (thousands of dollars) (5)	Median of dollar pay difference (thousands of dollars) (6)	Mean of percentage pay difference (7)	Median of percentage pay difference (8)
Year 1	714.137***	443.550***	10.610%***	8.304%***	920.960***	359.988***	11.150%***	6.437%***
Year 2	678.005***	628.707***	11.290%***	10.620%***	590.724***	552.591***	7.909%***	9.165%***
Year 3	1,091.723***	909.428***	14.380%***	13.940%***	1,081.632***	731.938***	12.920%***	13.880%***
Year 4	1,168.931***	854.928***	15.122%***	13.340%***	1,135.167***	726.929***	13.650%***	12.090%***
Difference (Year 4 minus Year 1)	454.794***	411.378***	4.510%***	5.030%***	214.207	366.940**	2.500%	5.654%**

Table 6: Companies Added to and Dropped From the Compensation Peer Group

This table contains mean and median differences between added peers and the propensity score matched unselected companies in *Total compensation* (TDC1). It also contains mean and median differences between dropped peers and the propensity score matched retained peer companies in *Total compensation* (TDC1). In Columns (1), (2), (5), and (6), the differences are expressed in thousands of dollars. In Columns (3), (4), (7), and (8), pay differences are expressed as percentages of the average CEO compensation at the peer and the best-matched unselected company. For each propensity score matched pair, the pay difference is calculated by pay at the added peer minus pay at the propensity score matched unselected company or pay at the dropped peer minus pay at the propensity score matched retained peer. We winsorize the pay difference at the 1st and the 99th percentiles. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	Added peers				Dropped peers			
	Mean of dollar pay difference (thousands of dollars)	Median of dollar pay difference (thousands of dollars)	Mean of percentage pay difference	Median of percentage pay difference	Mean of dollar pay difference (thousands of dollars)	Median of dollar pay difference (thousands of dollars)	Mean of percentage pay difference	Median of percentage pay difference
Pay difference between added/dropped peers & best-matched companies	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Years 2,3, and 4	635.555***	665.861***	9.90%***	10.76%***	76.743	-213.985	-2.83%	-3.06%*
Year 2	908.557***	949.058***	11.45%***	14.40%***	-441.084	-701.145**	-9.85%***	-10.26%**
Year 3	2.899	82.463	3.86%*	1.41%	320.311	0.000	1.61%	0.00%
Year 4	882.824***	901.385***	13.40%***	15.81%***	299.471	-200.220	-3.27%	-2.51%
Year 4 minus Year 2	-25.733	-47.674	1.95%	1.41%	222.728	13.765	6.58%	7.74%

Table 7: Peer Choices and Corporate Governance

This table contains differences between the selected peers and their propensity score matched unselected companies in Total compensation (*pay gap*). Compensation level is expressed in thousands of dollars. We separately report the mean and median pay gap in the first and fourth years of our sample period. We also report the changes in pay gaps from the first to the fourth year. In Panel A, pay gaps are reported separately for firms that did not receive at least 20% support for compensation-related shareholder proposals over the 2005 to 2009 period and for those that did, for firms with institutional ownership above the sample median and those below, for firms with director ownership above the sample median and those below, and for firms for which the average number of Boards on which the firm's directors serve above the sample median (directors are "busy") and those below. In Panel B, we divide firms into two groups based on whether the number of directors is above the sample median ("large" Board) or below ("small" Board); whether the fraction of directors joined the Board after the CEO assumed office is above or below the sample median; whether the CEO is incumbent or new (with tenure shorter than 2 years); and, among new CEOs, whether the CEO is internally promoted or hired from outside the firm. For each year in each column, the first number is the mean across the corresponding firms and the second number is the median. The final column lists the difference between two groups of firms. The bottom two rows provide the mean and median changes in pay gaps from the first to the fourth year, respectively. Due to the significant skewness of compensation data, we winsorize the pay differences at the 5th and 95th percentiles. Standard errors are clustered at the disclosing firm level. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Table 7A: Peer Choices and Corporate Governance (Cont.)

	Did Not Have Shareholder Resolution		Had Shareholder Resolution		Difference		Low Institutional Holdings		High Institutional Holdings		Difference	
Year 1												
Mean	585.83	***	1,315.44	***	729.61	**	682.15	***	756.04	***	73.89	
Median	313.92	***	1,539.43	***	1,225.51	***	394.46	***	498.41	***	103.95	
Year 4												
Mean	907.55	***	2,295.24	***	1,387.69	***	1,527.26	***	737.17	***	-790.09	***
Median	667.54	***	2,290.76	***	1,623.22	***	1,119.07	***	586.70	***	-533.55	***
Difference (Year 4 – Year 1)												
Mean	321.72	*	979.80	**	658.08		845.11	***	-18.87		-863.98	**
Median	353.62	***	751.33	*	397.71		724.61	***	88.29		-637.50	***
Year 1												
Mean	688.05	***	613.62	***	-74.42		726.72	***	638.51	***	-88.21	
Median	528.16	***	322.79	***	-205.68		604.08	***	291.11	**	-312.97	*
Year 4												
Mean	1,549.92	***	735.08	***	-814.84	***	1,498.77	***	403.30	***	-1,095.47	***
Median	1,161.88	***	628.52	***	-533.36	***	1,165.20	***	379.09	***	-786.11	***
Difference (Year 4 – Year 1)												
Mean	861.86	***	121.46		-740.42	**	772.05	***	-235.21		-1,007.26	***
Median	633.72	***	305.73	**	-327.68		561.12	***	87.98		-473.14	*

Table 8: Firm Performance and Excessive Pay

The table in Panel A contains differences between the selected peers and their propensity score matched unselected companies in Total compensation (*pay gap*). Compensation level is expressed in thousands of dollars. We separately report the mean and median pay gap in the first year (fiscal year ending December, 2006 to November, 2007) and fourth year (fiscal year ending December, 2009 to November, 2010) of our sample period. We also report the changes in pay gaps from the first to the fourth year. In the left side of the panel, pay gaps are reported separately for firms with equity returns below their 3-digit industry average in the prior year and for firms with equity returns above their industry average. In the right side of the panel, pay gaps are reported separately for firms with total compensation above what is explained by firm characteristics and for those with total compensation below what is explained by firm characteristics. Factors included in the prediction of CEO pay are ROA, stock return, CEO/chairman duality, CEO tenure, and lagged measures of ROA, stock return, sales, volatility of stock returns, leverage, and market-to-book. For each year in each column, the first number is the mean across the corresponding firms and the second number is the median. The bottom two rows provide the mean and median changes in pay gaps from the first to the fourth year, respectively. The final column lists the difference between two groups of firms. The table in Panel B provides the results of regressing industry adjusted equity returns on the median pay difference between chosen peers and best matched unselected peers. The equity return is measured as the realized equity return during the fiscal year in excess of the average equity return of companies in the same 3-digit SIC. The independent variable is measured as the median pay difference in the previous fiscal year between chosen peers and best matched unselected peers. Therefore, we have one observation for each firm-year. In the first column, we report the coefficients from this regression for all four years in our sample. In columns two through five, we report the coefficients for each individual year of our sample period. Due to the significant skewness of compensation data, we winsorize the pay differences at the 5th and 95th percentiles. Standard errors are clustered at the disclosing firm level. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Table 8: Firm Performance and Excessive Pay (Cont.)

Panel A. Lagged performance and excessive pay

	Low Lagged Excess Return			High Lagged Excess Return			High Excessive Pay			Low Excessive Pay		
				Difference							Difference	
Year 1												
Mean	396.06	***	1,014.64	618.58	***	947.25	***	395.3	***	-551.95	**	
Median	177.14	***	732.76	555.62	***	753.35	***	115.73		-637.62	***	
Year 4												
Mean	838.9	***	1,336.00	497.09	**	1,393.80	***	792.01	***	-601.8	**	
Median	741.6	***	882.84	141.25		1,083.44	***	536.35	***	-547.1	***	
Difference (Year 4 – Year 1)												
Mean	442.84	*	321.35	-121.49		446.55	**	396.71		-49.84		
Median	564.46	***	150.09	-414.37	**	330.09	**	420.61	***	90.52		

Panel B. Contemporaneous performance

	All 4 Years	Year 1	Year 2	Year 3	Year 4
Median Pay Gap	-0.001 (0.006)	0.002 (0.008)	0.012 (0.011)	-0.017 (0.011)	-0.003 (0.018)
Constant	0.062 *** (0.006)	0.024 ** (0.010)	0.089 *** (0.013)	0.117 *** (0.011)	0.020 (0.019)