The Effect of the Sarbanes-Oxley Act on CEO Pay for Luck

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Abstract

According to the rent-extraction hypothesis, weak corporate governance allows entrenched CEOs to capture the pay-setting process and get paid for luck, i.e., events beyond CEO control. In this paper, I use the requirement of majority independent directors imposed by the Sarbanes-Oxley Act of 2002 (SOX) to ask whether improved board oversight affects CEO pay structure. Using ExecuComp data, I find that in firms with originally weak corporate boards, i.e., firms affected by SOX stipulations, CEO pay for performance strengthened after SOX while pay for luck diminished. In contrast, the results imply that in firms with strong boards prior to SOX, there is no pay for luck and pay for performance changes little after SOX. These results are consistent with the rent-extraction view and suggest that a regulatory intervention such as SOX helps ameliorate agency problems between CEOs and shareholders. I provide additional support for this interpretation of the results by rejecting a number of alternative hypotheses.

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1 Introduction

The wave of corporate scandals in the U.S. in 2000 has raised concerns about the effectiveness of corporate governance and has weakened investors' confidence in securities markets. Legislative authorities responded quickly to these cases of corporate governance failure with the passage of the Sarbanes-Oxley Act (henceforth SOX) of 2002, new Securities and Exchange Commission regulations, and governance requirements adopted by the NYSE and NASDAQ. The main purpose of the reform was to restore investor confidence and to improve the auditing of U.S. public companies. The reforms were attacked as a costly regulatory overreaction. Questions as to whether the costs of the reforms outweigh the benefits have received significant academic and public attention (Section 2). Recent work has investigated the audit fee costs of SOX, the change in earnings quality and the abnormal returns associated with the passage of SOX. However, relatively little is known about the impact of SOX on CEO pay. The corporate scandals in 2000 were associated not only with low quality of financial reporting and fraud, but also with excessive CEO pay. In this paper, I examine the impact of the latest corporate governance reforms on executive pay structure.

Executive compensation pay is at the center of heated debates from the late 1990s, when it soared to unprecedented levels due to the use of stock options and the bull market at that time. Hall and Liebman (1998) report a 209% increase of the mean salary in the largest U.S. firms for the period 1980 to 1994. Recently, Bebchuk and Grinstein (2005) use data from 1993 to 2003 and find that CEO pay has increased by 146% among S&P 500 firms. Because huge portions of executive packages consist of stock options, when a firm's stock price becomes overvalued potential, conflicts of interest between managers and owners arise (Jensen, 2005).[1] Jensen argues that except by pure luck, managers cannot produce the performance required to justify these high stock prices. Further, the

[1]Traditional agency theory (Holmstrom, 1979; Jensen and Meckling, 1976) suggests that CEO pay is used to reduce a moral hazard problem between the CEO and shareholders by linking pay to firm performance; in practice, executives are offered stock, options, bonuses and long-term incentive plans (LTIPS) to motivate them to maximize shareholder wealth. See Murphy (1999) and Core et al. (2003) for a survey on the components of CEO pay and the incentives they provide.

sizable CEO option holdings cannot be explained even after controlling for the effect of stock overvaluation, but they seem to be consistent with arguments that some managers have power over setting their own pay and they use this power to extract rents. According to this rent-extraction view, recently exemplified by Bertrand and Mullainathan (2001), and Bebchuk et al. (2002), weak corporate governance associated with lax boards find it difficult to oppose powerful CEOs who gain control over the pay-setting process and determine their own pay. The estimation of the link between board monitoring and CEO pay is plagued by potential reverse causality if high-paid powerful CEOs weaken the board monitoring by appointing their friends onto their company's board. This paper utilizes the exogenous increase in board independence, that is a measure of board oversight, imposed by SOX and NYSE regulations to explain changes in CEO pay for luck. Consistent with previous literature, I measure pay for luck by the sensitivity of pay to industry-wide movements assumed to be beyond CEO control (Bertrand and Mullainathan, 2001; Garvey and Milbourn, 2006).

I study two samples of firms facing different exposure to SOX and NYSE regulation of board independence prior to the reform's enactment. The first sample includes firms whose boards were composed a majority of independent directors before 2002 and therefore are expected to remain unaffected by SOX stipulations. The second sample consists of firms that have to change the structure of their boards in order to meet the new governance requirements. Identifying a firm's exposure to the reform treatment removes the impact of events which are contemporaneous to the passage of SOX in 2002 and thus more precisely measures the effect of the regulation. Using the ExecuComp database and the difference-in-difference approach, I compare CEO pay for luck between a treatment group of firms with weak board oversight, i.e. dependent-board firms, and a control group of firms with strong board oversight. I find that pay for luck is present only in the dependent-board firms before SOX and, with improved governance, consistently it disappears after 2002. Designed to make managers act in shareholders' best interests, post SOX, CEO pay for performance exhibits an increase after SOX for the dependent-board firms and no change for the rest.

The results are supportive of the rent-extraction view, i.e., "skimming view," however they might also be consistent with alternative explanations. I next examine the robustness of these results to several competing explanations of the pay-for-luck view. First, positive response of pay to industry return changes might not be pay for luck but pay for taking systematic industry risk. To address this, I test whether the sensitivity between pay and industry returns remains when luck turns out to be bad, i.e, industry return is negative. The results suggest that sensitivity is greater when industry returns are up than when they are negative only in pre-SOX dependent-board firms which increases the confidence in the pay for luck explanation. Second, Gopalan et al. (2007) and Milbourn (2003) find that CEO talent might be efficiently linked to the sensitivity of pay to industry returns and hence not explained by rent extraction. Particularly, "pay for luck is more likely to be observed for a talented CEO possessing more valuable human capital who is more likely to be in an industry which offers strategic flexibility to the CEO, allowing them to change the firm's risk exposure to sector movements." The results of examining CEO talent for independent and dependent-board firms separately do not provide support for the talent view. Third, Aggrawal and Samwick (1999) postulate that strategic interaction might explain pay for industry return. Managers in less competitive industries might not be paid for industry movements in order to discourage them from indulging in excess competition. However, the results found in this paper are not supportive of this argument.

This paper contributes to several strands of research. First, it is related to research on corporate governance and particularly the impact of SOX as a major regulatory reform. It shows that through requiring a majority of independent directors, SOX indirectly affects CEO pay structure. I employ the board identification strategy of Wang (2005) who finds that, after the Act, Chief Financial Officer pay for performance decreases in firms with strong before-the-Act board oversight and high uncontrollable risk (i.e, risk that cannot be eliminated by maximum auditing), while it increases in firms with weaker board oversight and high controllable risk (i.e., risk that can be eliminated by maximum auditing). However, my findings shed light simultaneously on the pay for performance

and pay for luck of a particularly visible group of executives—Chief Executive Officers—both before and after SOX. Bertrand and Mullainathan (2001), and Garvey and Milbourn (2006), also study pay for luck, however out of the context of SOX.

Second, this paper is related to research on CEO pay and board structure. I use the passage of SOX as a source of exogenous variation in board independence to explain changes in CEO pay structure.[2]

Third, there is ongoing debate as to why CEO pay has increased so much. Jensen (2005) suggests that CEO pay has increased as a result of a conflict in interests between managers and owners. Consistent with this view, Bebchuk et al. (2002) suggest that CEO pay cannot solve the agency problem, noting that some managers have considerable power in setting their own pay because the company boards are weak in restraining managerial rent seeking behavior. Gabaix and Landier (2008) take an opposite view by arguing that the recent rise in CEO pay is an efficient equilibrium response to the increase in the market value of firms, rather than resulting from agency problems. Although, my results do not aim to explain why CEO pay has increased over time,[3] they indirectly imply that if pay structures associated with rent extraction are affected by major legal reform, changing the relationship between a firm's stakeholders, then CEO pay has to be subject to agency problems rather than an efficient equilibrium response.

Finally, the findings are relevant to the current debate on the impact of SOX and whether or not it is a costly political overreaction. In particular, the results should be of interests to: (i) company boards, that have been strengthened and presumably have redesigned rent-extracting pay packages to act in investors' best interests, (ii) regulators, who have been criticized for implementing costly regulation, (iii) investors, who want to

[2]Board monitoring and CEO pay were often determined by the same person before the passage of the Sarbanes-Oxley Act in 2002 (Hermalin and Weisbach, 2003). It would hardly be reasonable to expect that executives sitting on the board would monitor themselves and construct efficient pay schemes. A plausible reason for the lack of strong board oversight is that the nomination process in public U.S. firms allows the CEO to affect the composition of the board; further, board members sit on several boards simultaneously and they have little time and few incentives to negotiate CEO compensation (Fich and Shivdasani, 2006).

[3]I do not focus on the impact of SOX on CEO pay levels, but on pay structures because there is no identification strategy that would help to explain pay changes before and after SOX.

make sure that their return is not expropriated by the managers.

The remainder of this paper is organized as follows. Section 2 provides background information on SOX and discusses related research. Section 3 discusses the identification strategy. Section 5 covers the data and pay patterns. Section 6 proceeds with the results of pay for luck estimation. Section 7 presents several robustness tests. Concluding remarks are offered in Section 8.

2 Background and Hypothesis

2.1 The Passage of SOX and Related Research

The unreliability of corporate managers and board members in the U.S. raised arguments for introducing a regulation that would better guarantee confidence in securities markets. Initiated by the federal government in 2002, the Sarbanes-Oxley Act is viewed to be among the most extensive corporate governance reforms affecting U.S. corporate governance since the adoption of the initial federal securities laws of 1933/34. The Act consists of several main mandates: creation of a Public Company Accounting Oversight Board (PCAOB), a quasi-public institution to oversee and regulate auditing; new disclosure rules; regulation of public company auditors and auditor-client relationships, corporate governance measures for listed companies; and criminal penalties.

The public reaction to the passage of the Act was controversial. Its fast passage was viewed as a political product (Hilzenrath et al., 2002) that was negatively accepted by the business community because of the high implementation cost. Executives argue that the Act will divert their attention from doing business to overseeing compliance. A survey by Financial Executive International (2005) finds that the average first-year cost estimate for each firm is almost $3 million for roughly 26,000 hours of internal work and 5,000 hours of external work, plus additional audit fees of $823,200 or 53% more in comparison to the pre-SOX period.

A growing literature tries to evaluate whether the costs of implementing SOX out-

weigh its benefits. Because the implementation of the law was accompanied by other political, economic and financial changes, it is hard to disentangle the impact of SOX from these contemporaneous events. Several studies follow the before/after approach to estimate the costs of the reform. Eldridge and Kealey (2005) document a significant increase of audit fees related to establishing internal control systems between 2003 and 2004. Chhaochharia and Grinstein (2007) assess the impact of SOX on the firm's market value. The authors observe that prior to SOX, portfolios of less compliant firms were outperforming portfolios of more compliant firms. Zhang (2007) employs event analysis and finds negative cumulative abnormal returns around SOX events. All these studies suffer from methodological problems because they do not shed light on whether these are SOX-related changes or changes due to other contemporaneous events. Iliev (2007) manages to overcome some of these deficiencies by using the imposed-by-law cutoff for compliance as a quasi-natural experiment.[4] The study finds that the obligation to comply doubles the average annual fees after SOX from $330,700 to $882,300, reduces discretionary accruals by $8.8 million for each firm and lowers the average stock valuation of these firms by 19%.

SOX is blamed for increased incidence of delisting and cross-listing after 2002 and for the lost competitiveness of the New York Stock Exchange compared to the London Stock Exchange.[5] This line of research, however, still does not isolate the impact of many contemporaneous factors for delisting and/or cross-listing. For example Halling et al. (2006) suggest that the decline in cross-listing is due to the improved liquidity of foreign capital markets rather than to SOX enactment. Comparing cross-listed foreign companies subject to SOX in the U.S. to non-cross-listed foreign companies and to cross-listed companies that are not subject to SOX, Litvak (2007) shows that the market premium after the passage of SOX declined for more profitable, riskier and smaller companies with

[4]The Securities and Exchange Commission implemented Section 404 of SOX, which requires companies to put in place and periodically test procedures that monitor internal controls for financial reporting, based on a public float rule of $75 million.

[5]Engel et al. (2006) investigate firms' decisions to go private around SOX as well as the market responses to these decisions.

a higher level of pre-SOX disclosure cross-listed in the U.S.

Other than greater disclosure, SOX prescribes corporate governance changes.[6] Particularly it requires the audit committee—the committee that oversees the firms's auditors—to be composed of independent directors defined as: "Not receiving, other than for service on the board, any consulting, advisory, or other compensation fee from the issuer, and as not being an affiliated person of the issuer of any of its subsidiaries." The audit committee must have a minimum of three members and consist entirely of independent directors. In addition, each member of the audit committee must be financially literate; one member must be an "audit committee financial expert," or the company must disclose that it does not have such a committee and explain why. Shortly afterwards following the SEC guideleines, the New York Stock Exchange (NYSE) and Nasdaq also adopted new listing requirements.[7]The board of directors of each NYSE- and Nasdaq-listed firm must have a majority of independent directors. Further, the regulations require the independent directors to approve the nomination of directors and CEO compensation.

Previous research tells us that weak boards are associated with higher CEO pay viewed as rent-extraction. Hallock (1997) finds that boards with interlocking directors—directors of two companies who sit simultaneously on each other's companies boards—give a higher wage to the CEO. Similarly, Core et al. (1999) show that the wage of the CEO is positively correlated with the presence of interlocking relations, the CEO in the role of chair, and the percentage of affiliated directors. Grinstein and Hribar (2004) discover that a powerful CEO, who is also a chairman manages to extract higher bonuses. Usually the relation between corporate governance mechanisms and CEO pay is endogenous (Hermalin and Weisbach, 2003, Becht et al., 2002) because CEO pay can

[6]In addition, timely and accurate information for investors is guaranteed by drastically increasing the sanctions for management misconduct. For example, the Act imposes a fourfold increase in the maximum prison term for criminal fraud. In addition, if there is an accounting restatement as a result of misconduct, the Act requires CEOs and CFOs to reimburse any incentive-based compensation or profit from the sale of stock received 12 months after the misreporting (Section 304). Executives are prohibited from selling stock during the pension blackout period and are required to report sales or purchases of company stock within two days, rather than the previous ten days after the transaction (Section 306). According to the NYSE regulations, shareholders have to approve all equity-based compensation programs.

[7]See http://www.nyse.com/pdfs/section303Afaqs.pdf for details.

be simultaneously a consequence of weak board structure and a cause for the emergence of such a structure. Before SOX, CEOs were often appointed as chairmen, so they could influence, to a large degree, the decision making process of the board. One approach to address this type of endogeneity is to use *ex-post* performance metrics to infer causality. Core et al. (1999) investigate the consequences of excessive CEO compensation in firms with weaker governance and find a negative relation to future performance. The other approach is to rely on an exogenous variation in the board governance mechanisms, usually through changes in new legislation, and analyze before/after changes in the CEO compensation. Because SOX imposes board independency, which prevents CEOs from being chairman, I use this source of exogenous board monitoring to identify shifts in executive pay.

Several studies shed light on the effect of SOX on CEO pay.[8] Soon after the reform enactment, Holmstrom and Kaplan (2003) reason that it might increase the risk for CEOs and CFOs for selling a large amount of stock options because of the possibility of being accused of "misconduct." This will make the executives more reluctant to cash in their equity holdings and henceforth their portfolios will be less liquid, which will shift managerial attention from short- to long-term stock prices.

Cohen et al. (2004) study the change in the structure of executive compensation after the passage of the Sarbanes-Oxley Act in 2002. The hypothesis is that firms will respond to the increased liabilities by lowering the incentive component of managerial pay and by increasing the fixed one so that managers are insured against risks beyond the CEO's control. The results based on the ExecuComp data confirm an increase in fixed salary and a decrease in incentive-based compensation of CEOs after the Act. The

[8]Before the passage of the Sarbanes-Oxley Act, few studies focus on the impact of various law regulations on executive pay. Hubbard and Palia (1995) find that CEOs in the banking industry earn more after banking deregulation in the U.S. in the 1980s and exhibit a stronger pay-for-performance link. Bertrand and Mullainthan (1998) consider state anti-takeover legislation. They suppose that a reduction in takeover threats should raise pay because the entrenched CEOs can "skim" more easily whatever pay they can. In other words, the lack of takeover threat allows entrenched CEOs to increase their rents at the expense of the shareholders. The authors find that large shareholders, who are associated with strong governance, help in limiting the rise in mean CEO pay after the passage of the law and also increase their pay-for-performance sensitivity.

shift from more risky to less-risky pay is interpreted as a form of insurance against the imposed liability after SOX. Another finding of the paper is that CEOs participate less in risky activities after SOX, which might affect negatively shareholder's return because of forgone profitable projects. This paper suffers from relying on time series identification, which fails to isolate the effect of other contemporaneous events related to the reform's passage.

Wang (2005) contrasts the effect of the Act on CFO pay in firms with strong and weak board oversight before the Act and with controllable and uncontrollable risk of material misstatement of an unaudited financial report in the absence of internal control procedures. According to Wang (2005) two factors are expected to affect CFO pay, the first is increased risk,[9] and the second is increased monitoring. Wang argues that firms with a strong board board of directors will be affected mainly by the rise in risk. Thus, these firms will respond to the increased risk with reduced incentive pay according to standard agency theory. The firms with weak boards, however, will be affected by both a rise in risk and improved monitoring. The direction of the change in pay is unclear since it depends on the proportion of uncontrollable risk, managerial risk aversion and the cost of effort.

The findings of Wang (2005) are that CFO's incentive pay is reduced after SOX in firms with strong boards prior to the Act and with a high proportion of uncontrollable risk; further, firms with weak boards before the Act and low uncontrollable risk seem to increase CFO incentive compensation after the reform.

I borrow the methodology of Wang to identify groups of firms with a different level of pre-SOX exposure. Unlike Wang (2005), I focus on CEOs. She claims that CFOs are a more targeted group by the Act because they are in charge of firms' financial reporting. However, I consider it equally important to focus on CEO pay, because CEOs responsibilities are changed by the Act. When examining pay in the context of agency theory, which relies on a direct link between agents' pay and their actions, it would be

[9]Risk is defined as the risk of material misstatement of unaudited financial reports in the absence of internal control procedures.

reasonable to assume that CEOs' actions influence firm performance to a greater extent than CFOs' actions. Next, while Wang (2005) examines pay for performance in an agency setting, I focus on both pay received for actions beyond CEO control, known as *pay for luck*, and on pay for performance (See Section 4).

2.2 Hypotheses: The Sarbanes-Oxley and CEO Pay for Luck

Bebchuk and Fried (2004) argue that because option contracts lack explicit relative performance valuation, executives receive windfall gains as market value increases. Inspired by this view, I explore the impact of luck on CEO pay, where luck is an event that has little to do with CEO activities. In general, an optimal CEO contract should not depend on luck, because it does not provide incentives for enhancing shareholder value. Bertrand and Mullainathan (2001) show that in the presence of large shareholders, which is associated with strong governance, CEO pay responds less to luck. The authors use oil price shocks, industry performance and exchange rate shocks to instrument for firm performance. The response of pay to events beyond CEO control is interpreted as pay for luck. A study by Garvey and Milbourn (2006) raises an important point that positive sensitivity of pay to industry return might be compensation for bearing systematic risk but not necessarily pay for luck. This argument assumes that managerial pay is linked both to good and bad industry fortune. However, if executives have managed to capture the pay-setting process, their pay would be expected to be sensitive to industry performance when the industry return (benchmark) is up but not when it is down (See Section 6).

The passage of the Sarbanes-Oxley Act aims to strengthen corporate governance, which potentially might restrict pay for luck. Weakly governed firms, having dependent boards, are subject to stronger exposure to the reform than well-governed firms (See Section 3). Supposing that CEOs are skimming excess revenues to the detriment of shareholders by capturing the pay-setting process managed by weak boards and setting their own excess pay, we expect that after the reform CEO pay for luck will decrease

because improved governance will allow for efficient realignment of interests between shareholders and managers. Conversely, well-governed firms are not expected to change their pay structure after SOX because pay for luck has not been part of their compensation package before the reform was implemented.

Agency theory implies that managers have to be provided with incentives by linking their pay to firm performance. Whether pay for performance will increase or decrease for the poorly governed firms is unclear because improved monitoring and pay for performance might be both substitutes and complements under different conditions. However, we expect that well-governed firms will not be affected by the reform and that they will preserve their pre-SOX pay policies.

3 Identification

I use the fall of Enron in 2001 as a motivating event for the corporate governance reforms in 2002.[10] The pre-reform period of analysis is from 1998 to 2001 and the post-reform from 2003 to 2005. Year 2002 is dropped as it is the year where the reform was enacted.

Relying solely on time series identification of the impact of the reform on CEO pay-performance sensitivities will not assess the impact of the reform accurately since this strategy might fail to isolate the effects of other economic events contemporaneous to the passage of the Act. In order to circumvent this deficiency, one has to define a group of firms that are less affected by the Act, i.e., a "control group," and a group of firms that is subject to the reform's requirements, i.e., a "treatment group." The difference in pay-performance sensitivities for these two groups of firms is a more accurate measure of the SOX impact.

Although SOX is a complex regulation, I only look at the impact of improved board oversight through the requirement for majority independent directors. Board indepen-

[10]The implementation of the Act started soon after its passage. The final rule was agreed upon on July 24 (VandeHei et al., 2002), passed in Congress on July 25, and signed into law on July 30. August 14, 2002 was the first deadline for CEOs and CFOs of the 947 largest firms to certify the truthfulness of their financial reports.

dence induce treatment intensity across firms before SOX, which allows separate analysis of firms with strong board oversight and firms with weak board oversight prior to the reform. I consider firms with weak board oversight to be the "treatment" group as opposed to the "control group," that consists of firms with strong board oversight.

Previous studies using cross-sectional data to examine board monitoring and executive pay rely on a potentially endogenous source of variation (Lehn et al., 2003). Because CEOs could control company boards, equally plausible pay incentives affect board composition or vise versa. Relying on panel data before SOX is questionable due to low yearly variation of board independence. Thus, using the Act as a "surprising" event that causes a forceful change in the board structure might be a better identification of the relationship, though to some degree, the extent of board change depends on the composition of the board before the reform. I examine the pre-SOX year-to-year change of the percent of independent directors to infer whether firms have expected the upcoming regulation and thus adjust their board policy before the passage of SOX. Considering independent- and dependent-board firms separately, the results show that there is no systematic difference in the way board structure changes across firms over time.

The share of independent directors is increasing over the whole period from 1998 to 2005. In order to distinguish the trend effect from the potential effect of SOX, I estimate a regression where board independence is a left-hand side variable and a linear trend, and a dummy for the passage of the Act are right-hand side variables. The results show that the percent of independent directors increases after 2002 even after accounting for the trend. Although, the trend toward more independence had started much before regulation, the regulation itself contributes more significantly.

Table 1 reports how board structure is altered after SOX and confirms the actual reform's treatment. Each cell of the table reports the percentage change of the share of independent directors before and after SOX across board committees and pre-SOX defined board independence. Regardless of the way an independent board is defined, we observe that the reforms seem to affect firms with dependent boards to a greater extent than firms with independent boards. Two alternative measures of board independence

are used. First, I construct ten portfolios according to firms' sales for the period 1998-2001 and define the median percent of independent directors in each portfolio.[11] Then, for each portfolio I classify a firm as belonging to the independent-board subsample if its percent of independent directors is higher than the median percent of independent directors in the relevant portfolio. Similarly, the sample of dependent-board firms prior to the reform consists of those with a lower percent of independent directors than the portfolio median. Second, I consider an alternative proxy that does not depend on firm size, but only on the firm's majority of independent directors (more than 50% of all board members). The table shows that the share of independent audit committee members increases by 13% for the median-portfolio-based approach and by 6% for the majority-rule-based one. Overall, the percentage increase of the share of different types of independent directors is significantly higher (at the 1% level) in firms with dependent boards than in firms with independent boards as of before SOX, which supports the use of board independence as a proxy for the changed monitoring.

The reform's identification strategy suggests that little change in CEO pay-performance sensitivity for the "control" group is expected because these firms have already met the requirements of SOX for board independence. The "treatment" group, however, is expected to experience a change in pay for performance and pay for luck because of a stronger shift in board independence.

Agency theory sheds light on the role of corporate boards. Boards have to offer such a pay package to managers that they would have incentives to act in shareholders' best interest.[12] Apart from offering a contract, boards also monitor if managers act in owner's interests. Board monitoring, however comes at a cost. The role of monitoring is to redistribute risk from the managers to the owners and in such a way to reduce

[11] I employ the IRRC definition of an independent director. This is a director not affiliated with the company.

[12] In this optimal contracting world there could be other mechanisms than the board and its efficient CEO contracts that might realign the interests between managers and owners. Bertrand and Mullainathan (1998) see the threat of a takeover to be another incentive device that motivates CEOs to perform better.

the degree of information asymmetry, which will enable owners to tailor the managers' rewards more closely to their actions rather than to profits. Hence, the expected result of increased monitoring should be a reduction in pay for performance relative to the situation without monitoring. However, monitoring will happen only if the cost of doing so is offset by the additional payoff of economizing incentives. Monitoring will not be undertaken if marginal costs are too high or if firm risk is too low. The passage of SOX demands stronger monitoring through the rule for majority independent directors, which according to the principal-agent theory will lead to a lower level of pay for performance at the margin because the strong board can now instruct the manager to take actions leading to the maximum shareholder value. However, if monitoring is not conducted due to high costs, then boards can also employ pay for performance to motivate managers. Stated differently, the increased board oversight after SOX, might increase or decrease pay for performance depending on monitoring costs and other features of the CEO pay such as pay for luck.

Another aspect of monitoring is that boards might be weak and dominated by entrenched CEOs who appoint their friends, capture the pay-setting process and extract rents. Thus according to this view, CEO compensation level would be excessive, reflecting the CEOs ability to extract private benefits in excess of the optimal compensation. Bebchuk and Fried, who advanced this view, further claim that "desire to camouflage rent extraction might lead to the use of inefficient pay arrangements that provide suboptimal incentives and thereby hurt shareholder value." After the series of corporate scandals in 2000, associated with excessive CEO pay and a huge discrepancy between US CEO pay and international CEO pay, the rent extracting view gained momentum. The authors convey the idea that policy changes can dramatically improve executive compensation systems and consequently overall corporate performance. In this study, I rely on the passage of SOX as an intervention event that might curb CEO rent-seeking behavior by reducing CEO excessive pay. I examine the possibility that CEOs have captured the pay setting process and are paid for "luck" before SOX, however not after it when their corporate governance was presumably improved.

4 Empirical Specification

I use a two-stage approach that allows the simultaneous examination of the impact of SOX on pay for luck and pay for performance. In the first stage, firm performance is decomposed into two parts: a systematic-risk component and a firm-specific component. The systematic-risk component reflects common industry shocks that affect all firms in an industry. To be consistent with prior literature (Bertrand and Mullainathan, 2001; Garvey and Milbourn, 2006), I measure pay for luck by the response of pay to changes in industry-wide returns, and pay for skill (i.e., pay for performance) by the response of pay to changes in firm-specific performance. At the first stage, I decompose the time-series of each firm's performance:

$$Return_{it} = \beta_1 IndustryReturn_{jit} + \zeta_1 t + \eta_{1i} + \varepsilon_{1it} \quad (1)$$

where $IndustryReturn$ is value-weighted (or equal-weighted) industry return on assets in year t based on the 2-digit SIC industry j and firm i itself is excluded from the mean calculation, t is time fixed effects, η_{1i} is firm fixed effects and ε_{1it} is the residual. The firm-specific component is constructed by the estimated residual ε_{1it} for each sample firm i and for each year t. The systematic component, $\widehat{Return}_{jit}$, is a product of the estimated coefficient and the industry performance, $\widehat{\beta_1} IndustryReturn_{jit}$. At the second stage, I estimate the following regression:

$$\begin{aligned} Log(Pay_{it}) &= [\beta_2 \widehat{Return}_{jit} + \delta_{2X} X_{it} + \gamma \varepsilon_{1it}] SOX + \\ &\quad + \rho SOX + \zeta_2 t + \eta_{2i} + \varepsilon_{2it} \end{aligned} \quad (2)$$

where SOX is taking the value one for the period 2002-2005 and zero for the period 1998-2001; $Log(Pay_{it})$ includes salary, bonus, benefits, total value of restricted stock granted, total value of stock options granted, long-term incentive payouts and all other pay; $\widehat{Return}_{jit}$ is the systematic component common for the industry group and not attributable to CEO actions or CEO quality, ε_{1it} is the firm-specific estimated residual from

the first equation, β_2 is the response of pay to industry performance that is associated with luck and X_{it} is a set of firm specific variables such as firm size, stock volatility and book-to-market ratio. I include an indicator variable for the passage of the Act, SOX, taking on value one for the period 2002-2005, and a full set of SOX interaction terms. The above specification is estimated separately for firms with dependent and independent boards as defined prior to SOX. Following previous literature on CEO pay, I account for time invariant firm heterogeneity by including firm fixed effects.[13] Errors are clustered at the firm level, allowing for correlation between different observations within firms across different years. The effect of the reform is the difference in the post-SOX change of pay for industry-induced and pay for firm-specific return between dependent-board firms (treatment group) and the independent-board firms (control group).

It is well-known that the difference-in-differences estimator is based on strong identification assumptions. In particular, in the absence of treatment, the average outcomes for the treatment and control groups would have followed parallel paths over time. Comparing the annual total pay between the independent and dependent-board firms, the value of options granted is the component that induces significant variation between the pay policies of both groups of firms. To reduce the existing disparity, I focus on pay without options in the main specification (Section 6), and explore total pay as a robustness check (Section 7).[14]

Bertrand and Mullainathan (2001) refer to the phenomenon of pay for luck as managerial "skimming," according to which managers skim off only the gains from good luck, i.e. when an industry is flourishing. They find that when large shareholders associated with better monitoring are not present, pay is sensitive to exogenous forces such as industry fortune. Garvey and Milbourn (2006) argue that the link between pay and industry performance might reflect compensation for taking industry risk and not necessarily be

[13]Murphy (1995) shows that controlling for firm fixed effects is important in the managerial pay literature.

[14]See Heckman and Hotz (1989) for an explanation of difference-in-differences, and Bertrand and Mullainathan (1998) for an application of this methodology to analyze the effect of anti-takeover legislation in the US in the 1980s on CEO pay.

reflecting pay for luck. To incorporate their argument in the current analysis, I estimate a model where I allow for the sensitivity of pay for luck and skill to vary with positive and negative values of luck and skill. I estimate Equation (2) adding the following terms:

$$[\xi \widehat{Return}_{jit} \times Down1(\widehat{Return}_{jit} < 0) + \chi \varepsilon_{1it} \times Down2(\varepsilon_{1it} < 0)]SOX(t > 2002) \tag{3}$$

where $Down1(\widehat{Return}_{jit} < 0)$ is an indicator variable taking the value of one if luck is negative, and zero otherwise, and $Down2(\varepsilon_{1it} < 0)$ is an indicator variable taking the value of one if skill is negative. The skimming hypothesis predicts that SOX plays a role in decreasing pay for luck through the intervention of strong boards, and also punishes the lack of skill. I empirically address these questions in Section 6. The next section proceeds with data and sample description.

5 Sample and Descriptive Statistics

5.1 Sample

The Standard and Poor's ExecuComp database provides information about the five highest-paid executives available in proxy statements. Disclosure rules for U.S. executives require details on salary, annual bonuses, option holdings, equity and option grants, age and tenure. The database covers firms from the S&P 500, the S&P Mid-Cap 400, the S&P Small-Cap 600 and other supplemental S&P indices.[15] The IRRC data is of annual frequency and covers the directors of the S&P 500, S&P 400 mid-cap and S&P 600 small-cap firms for the period 1996 to 2005. The data provides details on the structure and practices of the boards of directors, historical information for each director, such as the committees they belong to, board affiliation, shares held and total voting power.

The ExecuComp sample contains 2,350 firms or 14,592 firm-years for the period 1998-

[15]Since the sample contains both large- and small-cap firms, *ex-post* survivorship bias is less likely.

2005 (See Table 2). Officers named as Chief Executive Officers (CEOs) are defined by the CEOANN field for each year.[16] In 1998, around 10% of the firms in the ExecuComp data did not report on their CEOs, while in 2005—only 1% did not report. Before excluding these firms from the analysis, I make a sample selectivity analysis on the relation between the incidence of not reporting CEOs records and firm observable characteristics. The results from a logit regression show that none of the estimated set of parameters is statistically significant, which insures against biases caused by systematic non-reporting.

The IRRC data covers 2,906 firms or 12,959 firm-years for the period 1998 to 2005. The sample obtained after matching both data sets over the period 1998-2005, consists of 1,722 executives named as CEOs and 10,812 firm-years. I rely on a successful match between the IRRC and ExecuComp data only if a firm is present for at least two years for the period 1998-2002 in the IRRC data, which is necessary to calculate the yearly average of board independence. Under this condition there are 217 firms present in the ExecuComp data but missing in the IRRC data. A sample selectivity analysis explores whether the non-matched firms, which are the firms available in the ExecuComp sample but missing in the IRRC data for the period 1998-2002, are randomly distributed across firms with different characteristics. The results show that small-cap firms are more likely to be missing in comparison to the large-cap and mid-cap firms. I investigate whether the non-matched group is similar to the independent or dependent-board firms in terms of pay and firm performance. For the whole period the non-matched firms seem to be significantly smaller than both the dependent and independent groups, however they are closer in size to the latter group than to the former. In addition, the non-matched firms are less profitable than both the independent and dependent groups. Looking at CEO pay, the non-matched group seems to be similar to the independent-board firms. Hence, the non-matched group of firms may be characterized as a separate set of firms that are smaller, less profitable but exhibit similar pay levels as the independent-board firms. I

[16]Chief Operating Officer (COO) and Chief Financial Officer (CFO) are retrieved from the field TITLEANN. The group of COOs is considerably smaller in comparison to CEOs and CFOs. It is possible that COOs are not ranked among the top highest-paid executives and they are reported in the data.

further examine the robustness of these results by including this group of firms to the previously defined independent-board firms (See Section 6).

Firm-level data are taken from thew COMPUSTAT industrial annual database. The industry affiliation is based on the SIC-code classification.[17] The three largest industry groups in the sample are comprised of Commercial Banks (SIC 6020, 4.5% of the sample), Prepackaged Software (SIC 7372, 4.19% of the sample) and Crude Petroleum and Gas (SIC 1311, 2% of the sample). Further, after eliminating firms with missing data on either total pay or return and windsorizing them at the 1% level, the analysis-ready sample consists of around 1,650 firms and 10,000 CEO-firm-years.

Table 3 reports descriptive summary statistics. The upper panel of the table describes the full sample of all matched firms, the middle one details the non-matched sample, and the bottom panel shows the mean differences between independent and dependent firms. Total pay reaches a maximum of around $7 million in 2000 when the majority of corporate scandals occured. The value of granted options in the total pay package reaches maximum in the same year. Firms seem to divert the most from granting options to their CEOs in 2003 and 2004. This measure, however, is calculated as the number of options times the Black-Scholes option value[18], and it captures the effect of both large option grants and any equity overevaluation.

The middle panel covers firms that are not present in IRRC data but are present in the ExecuComp data. Except for 1998, the unmatched firms seem to pay less than the matched firms; these firms also report lower net sales, return on assets and larger volatilities compared to the volatilities of the matched sample. Looking at the bottom panel, the dependent-board firms compensate their managers better than the independent-board firms. The difference of $2.03 million in annual pay in 2001 is the highest over the sample

[17]See http://listsareus.com/business-sic-codes-q.htm for details.

[18]The most widely used method for valuing options is the Black-Scholes formula adjusted for continually paid dividends. The value of European call option paying dividends is: $OptionValue = Pe^{-ln(1+d)T}N(z) - Xe^{-ln(1+r)}N(z-\sigma\sqrt{T})$, where P is the grant-date stock price, X is the exercise price, T is the time remaining until expiration, d is the annualized dividend yield, σ is the stock-price volatility, r is the risk-free discount rate, N(.) is the cumulative distribution function, and $z = (ln(P/X) + [ln(1+r) - ln(1+d) + \sigma^2/2]T)/(\sigma\sqrt{T})$.

period. The main reason is the particularly high option grants that the dependent-board firms bestow on their CEOs. Inspecting the value of one option granted separately shows that dependent-board firms' grants are more overvalued than the independent-board firms' grants only before SOX, however afterwards this differential disappears. As for the number of shares as a fraction of a firm's outstanding shares, the dependent-board firms do not give larger grants than the independent-board firms except for in 2004 and 2005.

Another important tendency is that the dependent-board firms exhibit larger levels of sales than the independent-board firms, although for 1999-2001 the difference is not statistically significant. The mean ROA indicates that only in 1998 and 2002, and the dependent-board firms perform better than the independent-board firms. Comparing the volatilities shows that, except for the most turbulent period for the financial markets in 2001 and 2002, the independent-board firms are less volatile than the dependent-board firms.

Overall, these descriptive findings are hard to interpret. There could be factors other than SOX after 2002 that influence the change. The rest of this study asks to what extent the observed mean pay patterns can be explained by differences in firm and individual characteristics before and after SOX.

6 Are CEOs Paid for Luck?

I begin the empirical analysis by examining whether the average CEO is paid for changes in firm-specific and industry-induced returns. I follow Bertrand and Mullainathan (2001) and Garvey and Milbourn (2006) to decompose systematic and idiosyncratic components of firm performance, however, add before/after SOX differences in pay sensitivities separately for both dependent and independent-board firms. The estimates of total pay (options excluded) regressions are reported in Table 4. The pay measure ignores changes in the value of the CEO's existing shares and options. Whether the consequence of this exclusion is an underestimation of the managerial incentives depends on the managers'

activities regarding their personal portfolios.[19] Given the difficulty of controlling for managers' activities, using current compensation has the advantage of measuring only compensation components over which the board of directors has direct control. Moreover, the focus of my analysis is on the potential influence of SOX on executive pay, rather than on the optimal managerial pay dynamics. Since the major channel through which SOX affects CEO pay is board decisions which affect only current pay, I use the current compensation measures instead of changes in past pay. In addition, I study the impact of SOX on pay for luck, which does not vary with fluctuations in previously granted pay. It is assumed that the Act has limited control through board oversight over the amount of pay that CEOs choose to retain in their portfolios. The use of current compensation is further justified by Core and Guay (1999) who conclude that firms use flow of equity incentives to reward past performance and re-optimize incentives for future performance.

Table 4 presents the results from the second stage pay regressions which include the estimated industry-specific performance and firm-specific performance from equation (1). Columns 1 to 3 of the table separately consider the full sample, independent, and dependent-board firms. In column 1, the industry-induced estimate is not significant, which suggests that industry performance is not an important component of a CEO's pay package. Firm-specific performance is positively linked to pay, which confirms that the more skillful a manager is, the higher her pay.[20] Columns 2 and 3 provide a better understanding of the impact of SOX on pay structure because the specification not only accounts for the passage of SOX but also accounts for treatment and control groups of firms. Column 2 includes only the firms with independent boards prior to SOX and strongly confirms that these firms, associated with strong governance, do not pay their CEOs for changes in industry performance, ether before or after the passage of SOX. On the contrary, the dependent-board firms reward managers for industry performance

[19]Ofek and Yermack (2000) report evidence that managers alter their portfolios in response to the composition of their pay packages. Similarly, managers counteract the effects of existing holdings through hedging transactions.

[20]An additional specification I added to the full sample the unmatched firms as described in Section 5. The results remained unchanged: there is a significant positive link between pay and industry return.

before SOX. However, after the passage of the Act they seem to abandon this practice by decreasing the sensitivity of pay to industry performance by 70%. Based on the coefficient estimate, one standard deviation increase in industry-induced return (0.045 units) corresponds to a 0.30% decrease in pay after SOX.

Looking at the result for the firm specific performance for the full sample (column 1) shows that a percentage point increase in firm-specific returns leads to a 1.1% increase in pay. Next, the results show that there is no difference in the sensitivity of pay to firm-specific return between dependent and independent-board firms before SOX. However, the post-SOX period is associated with a notable 60% increase of firm-specific performance estimate in the dependent-board firms, while the sensitivity remains unchanged for the independent board.[21] [22] My results are consistent with those of Wang (2005) who studies the impact of SOX on chief financial officers' pay. Particularly, the author finds that CFO's incentive pay is reduced after SOX in firms with strong boards prior to the reform, while firms with weak boards increase their CFOs incentive compensation after the reform.

The overall impact of SOX on CEO pay for industry-induced performance is the difference between the coefficients on $SOX * Industry - InducedROA$ for dependent and independent-board firms. The estimate of -6.59, significant at 13% shows that the reform reduces the impact of industry return on pay. The other notable effect of SOX is an increase in pay for skill by 1.37%. As a whole, the reform seem to better link CEO pay to company performance and to reduce pay for industry-induced return, which is expected to ameliorate agency problems between managers and shareholders.

Bertrand and Mullainathan (2001) find that in the presence of large shareholders,

[21] An alternative way to estimate the sensitivity of pay to firm specific return is to estimate one-stage pay regression where only a firm's performance is controlled. The results strongly confirm a substantial increase in pay for performance in the dependent-board firms after the passage of the Act while there is no change evident for the independent-board firms.

[22] The sample of unmatched firms exhibits similar pay levels to the independent-board firms, however both groups differ substantially in terms of firm performance and size. For robustness test, I combine both samples and I re-estimate the specification in column 2. The results do not show any material change from the estimates reported in column 2. Thus, the lack of a complete match does not seem to affect the conclusions of the main results.

considered to be active monitors, CEO pay responds less to industry performance than in firms where large shareholders are not present. The authors interpret the response of pay to industry profits as pay for luck, because managers are paid for actions and outcomes beyond their control. Gavrey and Milbourn (2006) argue that the positive sensitivity of pay to industry return might be a compensation for bearing systematic risk but not necessarily pay for luck. Similar questions arise in my specification: whether the strong link between pay and industry return before SOX is only in dependent-board firms and its subsequent decrease after SOX is pay for luck. To further clarify the interpretation of this evidence, I follow Garvey and Milbourn (2006) and include positive and negative industry changes in the pay regressions. Under the pay for luck interpretation, CEO pay is expected to respond less to industry performance during industry recessions than during times of boom. The results of this exercise are presented in columns 4 to 6 in Table 4, and Table 5 summarizes the total effects.

The specification in equation (3) allows for a complete interaction of industry-induced return with its positive and negative values: *Industry-induced ROA*Down1* where *Down1* is an indicator variable taking the value of one if *Industry-induced ROA* is negative and zero otherwise; *Firm-specific ROA*Down2* where *Down2* is taking value of 1 if firm-specific ROA is negative and zero otherwise; *SOX*Industry-induced ROA*Down1* and *SOX*Firm-specific ROA*Down2*, accounting for the SOX-related changes in sensitivities. Table 5 summarizes the total sensitivities from this specification before and after SOX for dependent and independent boards. For the full-sample specification, displayed in the upper panel of the table, the sensitivity of total pay to industry-induced ROA before SOX is higher in booms, than it is in recessions (*Industry-induced ROA + Industry-induced ROA*Down1)*, however the link between industry-induced return and pay disappears after SOX.[23] Analyzing the group of the independent-board firms when industry return is positive shows that pay is not linked to industry performance, however the negative

[23]Descriptive statistics of the performance benchmark show that based on the firm's two-digit SIC code, industry-induced return is positive in 78% of all cases, which is similar to the statistics reported in Garvey and Milbourn(2006).

sign in times of recession implies filtering out of the systematic risk. The results for the dependent-board firms depict a different picture. In times of fortune, a standard deviation increase in industry fortune leads to a 0.54% increase of pay before SOX and only a 0.18% (not significant) after it. When industries suffer loss, CEO pay decreases by 9% before SOX and by 5% after it. Examining the firm-specific pay indicates no change for independent-board firms, while dependent-board firms increase CEO pay after SOX, conditional upon CEO outperforming peers, and conversely decrease pay if a CEO is underperforming his/her peers.

Overall, the results of the sensitivity of pay to industry-induced and firm-specific return suggest that companies with different governance pursue different pay policies. The results are supportive of the skimming view because CEOs of weakly governed firms are rewarded for industry performance when the industry is up, however they are punished to a lesser degree when the industry is down. In addition, after the passage of SOX in 2002, there is no evidence for such benchmarking. In the next subsections, I analyze the robustness of this result to several alternative explanations.

6.1 The Impact of Managerial Talent

In a recent paper, Gopalan et al. (2007) provide an explanation as to why it might be optimal to compensate managers for luck. Their model assumes that CEOs affect industry performance by implementing the firm's strategy for exposure to industry factors. Since part of the exposure is under the control of the CEO, incentives are all-important to ensure optimal choice of the exposure level. Further, the authors conclude that the optimal contract rewards a risk-averse manager more for good luck than punishing her for bad luck. The model also previews the pay outcomes if investors can observe and verify the CEO's talent. The talented CEOs have to be paid more for luck than the untalented ones in order to efficiently choose the firm's exposure to industry fluctuations. Table 6 presents the results for pay for luck for talented and less talented CEOs, however incorporating the SOX framework. Similarly to Gopalan et al. (2007), I use positive (negative)

idiosyncratic return as an indicator for talent (no talent). The lower part of the panel uses tenure as an alternative yet somewhat cruder proxy for talent. The presumption is that the longer a CEO manages to stay with a company, the more talented she is and hence in a position to make better strategic choices.

Starting with the upper panel, the results do not support the view that talented CEOs are paid more for luck when compared to their less talented peers. In the independent-board firms before SOX, it is exactly the less talented CEOs who seem to be rewarded most for industry induced return interpreted as pay for luck. The interpretation of the large positive pay for luck for talented CEOs in dependent boards firms is interesting. A talented CEO in a firm with weak board oversight is expected to dominate the pay-setting process more than a less talented CEO in similar firms. There is around a 60% decrease of pay for luck after the passage of the reform only in dependent-board firms, which suggests that the reform manages to reduce pay for luck. Looking at the lower panel, the results reaffirm that the talent hypothesis cannot explain pay for luck changes after SOX. The results are rather supportive of the view that for the period 1998-2005 higher pay for luck for talented CEOs in dependent-board firms is better explained by the rent-extraction hypothesis than by the optimal incentives view.

Himmelberg and Hubbard (2000) consider that demand-supply dynamics in the managerial labor market might explain higher pay in times of industry fortune when there is higher demand for skilled CEOs. The authors argue that the supply of highly skilled CEOs is relatively inelastic, therefore positive shocks to aggregate demand increase both the value of the firm as well as the marginal value of the CEO pay. In other words, the link of pay to positive industry-wide return might be used to motivate a manager to stay with the company when facing the opportunity to accept a better outside offer. If we believe that the link between CEO pay and industry return fluctuations is driven by demand-supply changes on the managerial labor market due to shocks, and particularly during positive industry change when talented CEOs are rewarded more for staying with the company, then we would expect positive shocks to affect this link consistently over time. On the contrary, we see that the average CEO is rewarded more for positive

shocks than for negative ones only before 2002, however after the passage of SOX positive industry fortunes does not seem to be positively linked to CEO pay (Table 5). This inconsistency allows us to rule out the demand-supply argument when examining the before/after change of pay for industry performance among firms with different governance structures.

6.2 Market Concentration

Aggarwal and Samwick (1999) suggest that for managers in less competitive industries a lower sensitivity of pay to industry return might be used to discourage them from competing too aggressively, because this might negatively impact other firms' profits. The authors find that weaker links between CEO pay and industry return softens product market competition. Thus, in highly concentrated industries, where oligopolistic structures are present, lower pay is expected for industry performance in order to weaken competition. To empirically address this explanation, I study whether pay for luck varies with the Herfindahl-Hirschman index, which is the sum of the industry's (three-digit SIC) squared market shares in percentages. By construction, an increase in the index indicates greater market concentration. Likewise, a small Herfindahl-Hirschman index indicates a competitive market. The source of data for the index is Standard and Poor's Compustat North America.[24]

I follow the specification of Aggarwal and Samwick (1999) where industry-induced return is interacted with the c.d.f of the Herfindahl-Hirschman index. The results are presented in Table 7. Examining independent/dependent-board firms separately, the first three columns present a specification where industry-induced ROA is interacted

[24]To compare my classification with the one in Aggarwal and Samwick (1999) who rely on the Census of Manufactures, I investigate the companies appearing in the high/low concentrated groups. In the highly concentrated group the top three most concentrated industries are scheduled air transport, motor vehicles and car bodies, and department stores. The companies with the largest shares in this group are Southwest Airlines, General Motors, Federal Signal Corp, Kohl's Corp and J.C. Penney. The low-concentrated group includes semiconductors, related services, pharmaceutical preparations, and electric services. This classification is comparable to the broader firm size classification of Aggarwal and Samwick (1999).

with the industry concentration measure, however without allowing for before/after SOX change. Focusing on the coefficients on *Industry-induced ROA*Her.Percentile*, there is an insignificant increase in pay for industry-induced return with a percentile movement along the index distribution of all firms. Although the estimates are insignificant, this pattern exhibits an opposite tendency to the Aggarwal and Samwick (1999) view. After including a SOX dummy that captures the year of enactment in Columns 4 to 6, the results indicate that pay to industry return decreases for highly concentrated industries after SOX across all groups of firms. Hence, apart from being insignificant, the effect of industry concentration on pay for industry-induced performance exhibits an inconsistent pattern before and after SOX.

7 Robustness

The results thus far strongly support the conclusion that CEOs managing companies with dependent-board firms before SOX were paid for luck, while CEOs in independent-board firms did not manage to capture the pay setting process and set their own pay. This section tackles several possible concerns with the base line results.

i) Table 8 shows estimates from a specification in which the dependent variable is total pay instead of total pay without options. Option value constitutes a larger part of pay in dependent-board firms than in independent-board firms only before SOX. When adding the value of granted options to the rest of CEO pay, the results differ slightly from the estimates in Table 4. Particularly, industry risk is filtered out before SOX in better governed firms. This evidence is consistent with the agency theory prediction that the industry component of a firm's returns is removed from the compensation package since a CEO cannot affect the market and it is costly for executives to bear the related risks. After SOX, however, there is a notable increase in the link between CEO pay and industry return. As for the dependent-board firms, the results confirm strong sensitivity between CEO pay and industry return before SOX and a sharp decline after it. Table 9 reports the estimates of pay for luck when industry returns are positive and when they

are negative. The independent-board firms are filtering out the effect of negative industry return before SOX. The dependent-board firms follow a different policy: during industry fortunes CEOs are rewarded, but during slowdowns CEOs are punished, however to a smaller extent.

ii) Firm performance is measured by stock return instead of return on assets. Return on assets is closely related to short-term accounting profit and it directly reflects managerial decisions and a firm's interaction with the product market. As a frequently used measure of performance, stock return incorporates a firm's expected profitability which might be independent of the evaluation of current performance and the current manager's efforts. As an accounting measure, ROA is more easily manipulated than capital markets measures. Due to the substantially higher number of restatements as a result of improved internal control systems after 2002, it is possible that ROA is subject to substantial accounting corrections (Coates, 2007). Because stock return has remained unaffected by accounting procedures, I employ it as an alternative measure of performance. Similar to previous evidence (Kaplan, 1994), the results from Table 8 show that a percentage change in compensation is more strongly related to changes in return on assets than to changes in stock returns. The conclusion from the main specification in Table 4, however, is preserved—firms with dependent boards link their CEO pay to market-wide movements in performance that are beyond the control of the executives before SOX, however, they abandon this practice afterwards. The impact of industry-induced stock return on total pay confirms a decrease in the sensitivity of pay to industry-wide movements in performance after SOX only in the dependent-board firms.

The independent-board firms, viewed as better governed firms, do not pay their managers for changes in industry-related stock performance. Looking at the pay for firm-specific return, dependent-board firms reward managers for firm-specific return, i.e. skill, only after SOX, while the independent-board firms do not change their pre-SOX policy of skill rewarding. When accounting for asymmetric response of pay to market performance, the results are very similar to those in Table 5.

iii) I test whether pay for luck varies with firm size. Table 10 reports results separately

for small and big firms. Small firms are defined as those with lower than the median sales level. The results remain unchanged when looking separately at big and small firms. Earlier work shows that talented CEOs manage large firms because this maximizes their impact and economic efficiency (Gabaix and Landier, 2008). In addition to the measures of talent exploited in Section 6, I look at firm size as a proxy for talent. The results clearly indicate that there is no difference in pay for luck for big and small firms across board type, thus excluding the impact of talent as a factor explaining the before/after changes of pay for luck between dependent and independent-board firms.

iv) Aggarwal and Samwick (1999a) show that ignoring the impact of stock volatility on CEO pay might significantly understate the strength of the pay-performance relationship. Including the cumulative distribution function of stock volatility, measured as the standard deviation of stock returns using the five years of monthly data preceding the data year, captures both size effects and risk effects. Similar to the result in Garvey and Milbourn (2006), Table 11 shows that on average the sensitivity of pay to industry-wide return is decreasing as the risk increases with a percentage point for the period 1998-2005. However, the main result of pay for luck across various board structures before and after SOX, remains unchanged.

v) I assess the sensitivity of the results to the measure of board independence. In Table 13 board independence is defined as a majority rule, where companies with less than 50% independent directors are classified as dependent. The total number of this type of company is 358. The results do not show any material difference from the estimates in Table 4. The estimates in Table 14 suggest that same pattern of pay for luck changes when industry returns are positive and negative as shown in the results in Table 5.

vi) The specification in equation (2) follows Bertrand and Mullainathan (2001) where only contemporaneous industry-induced and firm-specific returns are assumed to explain variations in CEO pay. This specification is appealing for the present before/after comparison of the impact of SOX using firm fixed effects in which deviations from sample means are estimated. However, pay might respond to lagged industry-induced and lagged firm-specific return because some components of pay such as salary, are set at the be-

ginning of the year, while others such as bonuses are determined at the end of the year. Table 15 shows that the industry-induced return decreases by 60% after SOX, compared to the pre-SOX period in dependent-board firms.

8 Conclusion

This paper examines the change of executive pay before and after the passage of the Sarbanes-Oxley Act of 2002. Introduced soon after a series of corporate scandals, the reforms mandated independent audit, nomination and compensation committees together with higher sanctions for management misconduct. Unlike Wang (2005), who focuses on pay for performances of highly specific executive groups—CFOs and COOs—this study covers CEO pay for performance and pay for luck, thereby adding the analysis into the contemporary literature on CEO pay.

Employing difference-in-differences methodology, I explore the effect of SOX on pay for performance and pay for luck. I compare before/after differences in two types of firms: those with stronger board monitoring before the reform, and those with weaker board monitoring. I find that the pay-for-performance link increases after 2002 in firms with weaker board oversight, that is, in firms more affected by SOX stipulations. In contrast, the pay-for-performance relationship changes little in firms with independent boards.

Following Bertrand and Mullainathan (2001), I examine CEO pay for luck before and after SOX. Consistent with this study, I document that after the reform, when corporate governance is improved, pay for luck measured by industry-wide movements in firm performance disappears on average. Further, to uncover the effect of governance on pay for luck, I explore the before/after effect when positive and negative industry shocks are taken into account. Consistent with the "skimming" hypothesis, CEOs are rewarded only for positive industry shocks before SOX, but they are not punished for negative ones. These results confirm the earlier finding of Bertrand and Mullainathan (2001) that stronger corporate governance decreases pay for luck which is considered to undermine shareholders's value. The contribution of my analysis is that I employ a clean

identification approach to answer how the recent governance reform affects pay for luck. Combining the pay for performance and pay for luck explorations, I find that in the dependent-board firms the first component increases and the second one decreases after SOX, which supposedly is an indicator of improved corporate governance. The policy implication is that stricter corporate governance rules, insured by the Sarbanes-Oxley Act of 2002, might be beneficial for shareholders because they manage to curb CEOs' rent-seeking behavior. To evaluate the total effect of the corporate governance reforms of 2002, however, it is necessary to account for the costs of SOX—e.g., increased audit fees—which is left for future research.

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Table 1: **The Effect of SOX on Company Board Structure**

Summary statistics of percentage change of board independence from the average during the 2002-2005 period compared to the average from 1998-2001 across board committees. *Median-Portfolio-Based* and *Majority-Based* present two different ways to calculate board independence. *Median-Portfolio-Based* defines an independent (dependent) board to be a board with a percentage of independent directors higher (lower) than the median percentage of independent directors in ten size decile portfolios. *Majority-Based* defines independent (dependent) board to be a board with more (less) than 50% independent directors. Each cell reports the percentage change of independence across *Audit, Nomination, Compensation committees*. Δ shows the percentage differences between dependent and independent boards. All other statistics are significant at 1%.

	Median-Portfolio-Based			Majority-Based		
	Independent	Dependent	Δ	Independent	Dependent	Δ
Audit Committee (% independence)	0.048	0.17	0.124	0.05	0.11	0.06
Nomination Committee (% independence)	0.14	0.33	0.20	0.16	0.24	0.09
Compensation Committee (% independence)	0.03	0.12	0.097	0.02	0.048	0.029
Total (% independence)	0.06	0.25	0.186	0.03	0.21	0.12

Table 2: **Samples Overview**

Number of firms and executives over time, 1998-2005. *CEO* is defined by the CEOANN field for each year. The TITLE field is used to define *COO* and *CFO*. *Other executives* reports other managers than CEO, COO and CFOs in the ExecuComp database. *Directors* covers the number of all directors (except executives) for each year in the IRRC data. *Analysis-Ready Sample* is a matched sample of ExecuComp with IRRC data. *Independent (Dependent)-Board Firms* includes all firms with higher (lower) than the median percentage of independent directors in size decile portfolios.

	1998	1999	2000	2001	2002	2003	2004	2005	Total
ExecuComp									
Number of Firms	1,941	1,952	1,844	1,795	1,825	1,801	1,784	1,650	14,592
Chief Executive Officers (CEO)	1,731	1,810	1,792	1,671	1,671	1,688	1,690	1,649	13,702
Chief Operating Officer(COO)	784	805	878	822	849	827	804	778	6,547
Chief Financial Officer (CFO)	1,161	1,271	1,358	1,327	1,376	1,398	1,416	1,451	10,758
Other Executives	9,005	8,349	7,738	7,373	7,390	7,100	6,356	4,827	58,138
IRRC									
Number of Firms	1,770	1,804	1,755	1,797	1,439	1,472	1,477	1,455	12,959
Directors	17,046	17,419	16,675	16,669	13,498	13,792	13,733	13,416	122,248
Analysis-Ready Sample									
Number of Firms	1,586	1,588	1,483	1,408	1,376	1,340	1,281	1,197	11,259
Independent-Board Firms	821	820	782	740	723	710	679	529	5,804
Dependent-Board Firms	681	714	689	637	627	618	595	446	5,007
Chief Executive Officers (CEO)	1,502	1,534	1,471	1,377	1,350	1,328	1,274	975	10,811
Non-Matched Sample	226	271	316	288	315	356	406	319	2,321

Table 3: **Descriptive Statistics**

Descriptive statistics of Chief Executive Officers and firms over the period 1998-2005. *Total pay* is CEO's salary, bonus, other annual pay, total value of restricted stock granted, total value of stock options, long-term incentives and all other pay (thousands USD). *Total Pay1* is *Total Pay* with option grants excluded. *Sales* is net annual sales. *ROA* is the annual percent net income before extraordinary items and discounted operation divided by total assets. *Option Value* represents option grants Black-Scholes value of the options granted to the CEO. *Stock Volatility* is the standard deviation of stock returns computed using the five year monthly data preceding the data year. *Analysis-Ready Sample* is the matched sample of the ExecuCompa and IRRC data. *Non-Matched Sample* is the sample of firms present in the ExecuComp but not present in IRRC. *Independent-Dependent* shows the yearly average mean differences between independent- and dependent-board firms. In this panel, *Stock Volatility* shows the variance-comparison ratio between independent and dependent-board firms.

	1998	1999	2000	2001	2002	2003	2004	2005
Analysis-Ready Sample								
Total Pay	4,045.27	5,322.04	7,122.72	6,430.23	5,16	4,800.14	5,437.45	6,134.31
Total Pay1	1,859.02	2,091.47	2,352.03	2,300.74	2,455.6	2,944.82	3,322.82	4,12
Sales	3,860.65	4,152.5	4,831.73	5,038.89	4,923.15	5,322.22	6,003.78	7,672.71
ROA	0.039	0.043	0.037	0.0159	0.017	0.025	0.039	0.047
Option Value	2,186.26	3,230.56	4,770.71	4,129.49	2,702.98	1,855.54	2,114.63	2,006.72
Stock Volatility	0.17	0.21	0.278	0.316	0.34	0.35	0.35	0.25
Non-Matched Sample								
Total Pay	7,472.19	4,677.82	4,709.75	5,822.71	3,846.32	3,758.11	4,523.45	5,012.14
Total Pay1	4,738.57	1,757.97	1,718.99	1,801.21	1,815.01	2,140.93	2,617.39	3,381.99
Sales	3,001.38	2,875.66	2,898.37	3,860.86	3,395.29	3,383.47	3,568.58	4,977.58
ROA	0.01	0.02	0.02	0.01	0.004	0.02	0.035	0.04
Option Value	2,733.62	2,919.84	2,990.75	4,021.50	2,031.31	1,617.18	1,906.058	1,630.15
Stock Volatility	0.37	0.37	0.44	0.52	0.58	0.44	0.43	0.28
Independent-Dependent								
Total Pay	-907.38**	-1,093.52**	-1,090.63***	-2,023.17***	-625.07*	-733.73**	-451.43	-1,051.671***
Total Pay1	-176.95*	-24.40	-268.57	-522.72*	-276.96*	-572.21**	-136.40	-666.67**
Sales	-187.57**	-392.24	-722.63	-823.68	-1,198.6*	-1,455.63*	-1,530.56*	-2,354.29*
ROA	-0.013**	0.00	0.005	-0.02	-0.013*	0.005	-0.001	-0.009**
Option Value	-750.42**	-1,121.25**	-806.91	-1,500.44*	-348.11	-162.59	-315.03	-603.47***
Stock Volatility	0.84***	0.85**	0.91*	0.94	0.95	0.91***	0.80***	0.78***

Table 4: **CEO Pay for Industry-Induced and Firm-Specific Return**

Second-stage ordinary least squares regressions of CEO pay on industry-induced and firm-specific ROA. The dependent variable is the log of CEO total pay, which is comprised of salary, bonus, other annual pay, total value of restricted stock granted, long-term incentives and all other pay. Columns 1-3 correspond to regression specification defined in equation (2) and columns 4-6 to the specification in equation (3). *SOX* is an indicator variable taking on the value of one for 2003-2005 period and zero otherwise. *ROA* is net income before extraordinary items and discounted operation divided by total assets. *Industry-Induced ROA* is the predicted company return from a first-stage regression, specified in equation (1) in which firm performance is regressed on industry return (asset-weighted industry ROA in the firm's 2-digit SIC industry, where the firm itself is excluded from the mean calculation). *Firm-Specific ROA* is the residual from the same regression. Each regression includes sales, time and firm fixed effects and a complete set of interaction terms (untabulated). *Down1* takes on the value of one if *Industry-Induced ROA* is negative. *Down2* takes on value of one if *Firm-Specific ROA* is negative. *** Significant at the 1% level; ** Significant at 5%; * Significant at 10%. Robust standard errors are clustered at the firm level. Board independence is based on the median percent independent directors in sales decile portfolios.

	Log(Total Pay1)					
	Full	Independent	Dependent	Full	Independent	Dependent
	1	2	3	4	5	6
Industry-Induced ROA	2.89	-0.471	11.762***	3.528	0.075	12.829***
	[2.297]	[2.470]	[3.616]	[2.345]	[2.484]	[3.645]
Firm-Specific ROA	1.100***	1.248***	0.933***	1.808***	1.545***	2.208***
	[0.172]	[0.212]	[0.273]	[0.342]	[0.442]	[0.531]
SOX*Industry-Induced ROA	-1.505	-0.201	-6.797*	-2.124	-0.626	-8.014*
	[2.426]	[2.856]	[4.114]	[2.474]	[2.876]	[4.152]
SOX*Firm-Specific ROA	0.694**	0.1	1.477***	0.463	0.082	0.876
	[0.296]	[0.363]	[0.484]	[0.578]	[0.673]	[1.009]
Industry-Induced ROA*Down1				-4.570**	-5.114*	-3.171
				[2.134]	[2.618]	[2.645]
Firm-Specific ROA*Down2				-1.228**	-0.469	-2.239**
				[0.588]	[0.721]	[0.916]
SOX*Industry-Induced ROA*Down1				3.280**	3.136*	3.494
				[1.487]	[1.813]	[2.278]
SOX*Firm-Specific ROA*Down2				0.396	-0.027	1.047
				[0.872]	[1.010]	[1.471]
Observations	8,303	4,654	3,649	8,303	4,654	3,649
Number of Firms	1,644	892	752	1,644	892	752
R-squared	0.26	0.26	0.27	0.26	0.26	0.28

Table 5: **Asymmetric Pay for Industry-Induced and Firm-Specific Return**
Coefficients come from Table 4, Columns 4-6. They present total before/after-SOX effect for positive/negative *Industry-Induced* and *Firm-Specific ROA*. *Good (Bad) Luck* indicates positive (negative) *Industry-Induced ROA*. *Good (Bad) Skill* indicates positive (negative) *Firm-Specific ROA*. *SOX* is an indicator variable taking on the value one for the 2003-2005 period and zero otherwise. *Industry-Induced ROA* is the predicted company return from a first-stage regression, specified in equation (1) in which firm performance is regressed on industry return (asset-weighted industry ROA in the firm's 2-digit SIC industry, where the firm itself is excluded from the mean calculation). *Down1* takes on the value of one if *Industry-Induced ROA* is negative. *Down2* takes on the value of one if *Firm-Specific ROA* is negative. *** Significant at the 1% level; ** Significant at 5%; * Significant at 10%. Robust standard errors are clustered at the firm level.

	Good Luck	Bad Luck	Good Skill	Bad Skill
	$Down1 = 0$	$Down1 = 1$	$Down2 = 0$	$Down2 = 1$
		Panel A: Full Sample		
Before SOX	3.53	-1.04	1.8***	0.58*
	[2.345]	[3.07]	[0.34]	[0.33]
After SOX	1.4	0.11	2.27***	1.44***
	[2.13]	[2.64]	[0.49]	[0.35]
		Panel B: Independent		
Before SOX	0.075	-5.04	1.54***	1.07***
	[2.484]	[3.57]	[0.44]	[0.39]
After SOX	-0.55	-2.53	1.62***	1.13**
	[2.67]	[3.26]	[0.57]	[0.45]
		Panel C: Dependent		
Before SOX	12.83***	9.65**	2.21***	-0.03
	[3.645]	[3.98]	[0.53]	[0.52]
After SOX	4.81	5.14	3.08***	1.89***
	[3.19]	[3.94]	[0.88]	[0.55]

Table 6: **CEO Talent: Before/After Pay for Industry-Induced Return**

Second-stage ordinary least squares regressions of CEO pay on industry-induced and firm-specific ROA, as in Table 4, columns 1-3, however estimating the effect of CEO talent. The dependent variable is the log of CEO total pay, which is comprised of salary, bonus, other annual pay, total value of restricted stock granted, long-term incentives and all other pay. Each column comes from a separate regression. Reported are coefficients on *Industry-Induced ROA* separately before/after SOX. *Industry-Induced ROA* is the predicted company return from a first-stage regression, specified in equation (1) in which firm performance is regressed on industry return (asset-weighted industry ROA in the firm's 2-digit SIC industry, where the firm itself is excluded from the mean calculation). *SOX* is an indicator variable taking on the value of one for 2003-2005 period and zero otherwise. In Panel A *Talent (No Talent)* is measured by positive (negative) *Firm-Specific ROA*. In Panel B *Talent (No Talent)* is measured as being any figure which is higher (lower) than the median CEO tenure. *** Significant at the 1% level; ** Significant at 5%; * Significant at 10%. Robust standard errors are clustered at the firm level.

	Full Talent	No Talent	Independent Talent	No Talent	Dependent Talent	No Talent
			Panel A: Firm-Specific Return			
Before SOX	1.62	5.61	-4.27	7.12**	16.34***	2.03
	[2.90]	[2.81]	[3.01]	[2.99]	[4.61]	[6.33]
After SOX	2.46	1.497	-0.77	1.82	6.57*	1.15
	[2.76]	[2.84]	[3.42]	[3.40]	[3.87]	[5.36]
			Panel B: CEO Tenure			
Before SOX	8.10**	4.75*	3.81	4.49*	21.07***	5.65
	[3.39]	[2.84]	[3.07]	[2.64]	[7.20]	[5.96]
After SOX	2.10	2.33	2.39	0.57	2.04	8.13
	[2.56]	[3.54]	[3.20]	[3.62]	[4.04]	[8.09]

Table 7: **Market Competition: CEO Pay for Industry-Induced and Firm-Specific Return**

Second-stage ordinary least squares regressions of CEO pay on industry-induced and firm-specific ROA. The dependent variable is the log of CEO total pay, which is comprised of salary, bonus, other annual pay, total value of restricted stock granted, long-term incentives and all other pay. *SOX* is an indicator variable taking on the value of one for the 2003-2005 period and zero otherwise. *ROA* is net income before extraordinary items and discounted operations divided by total assets. *Industry-Induced ROA* is the predicted company return from a first-stage regression, specified in equation (1) in which firm performance is regressed on industry return (asset-weighted industry ROA in the firm's 2-digit SIC industry, where the firm itself is excluded from the mean calculation). *Firm-Specific ROA* is the residual from the same regression. Each regression includes sales, time and firm fixed effects and a complete set of interaction terms (untabulated). *Herfindahl* index is the sum of a firm's market share in an industry at the three-digit SIC level. *** Significant at the 1% level;** Significant at 5%; * Significant at 10%. Robust standard errors are clustered at the firm level. Board independence is based on sales decile portfolios.

	Log(Total Pay1)					
	Full	Independent	Dependent	Full	Independent	Dependent
	1	2	3	4	5	6
Industry-Induced ROA	4.074*	6.180*	3.359	3.642	5.452	3.345
	[2.273]	[3.611]	[3.036]	[2.278]	[3.594]	[3.101]
Firm-Specific ROA	0.699**	0.932**	0.554	0.626	0.689	0.502
	[0.313]	[0.366]	[0.533]	[0.384]	[0.454]	[0.632]
Herfindahl Percentile	-0.198**	-0.226**	-0.11	-0.206**	-0.199	-0.174
	[0.090]	[0.112]	[0.144]	[0.102]	[0.129]	[0.153]
Industry-Induced ROA*Herf. Percentile	0.82	0.425	0.325	1.325	0.679	0.974
	[1.277]	[1.580]	[2.120]	[1.386]	[1.718]	[2.263]
Firm-Specific ROA*Herf. Percentile	0.773	0.578	0.75	0.937	1.122	0.875
	[0.555]	[0.673]	[0.919]	[0.765]	[0.967]	[1.193]
SOX*Industry-Induced ROA	-0.547	-2.827	1.112	0.634	0.006	0.51
	[2.711]	[4.175]	[3.584]	[2.810]	[4.298]	[3.820]
SOX*Firm-Specific ROA	0.677**	0.056	1.516***	0.806	0.562	1.627
	[0.299]	[0.367]	[0.504]	[0.585]	[0.658]	[1.122]
SOX*Herfindahl Percentile				0.032	-0.001	0.089
				[0.065]	[0.084]	[0.104]
SOX*Industry-Induced ROA*Herf. Percentile				-1.28	-1.623	-0.849
				[0.980]	[1.282]	[1.608]
SOX*Firm-Specific ROA*Herf. Percentile				-0.271	-1.116	-0.228
				[1.183]	[1.476]	[1.979]
Observations	8117	4569	3548	8117	4569	3548
Number of Firms	1618	882	736	1618	882	736
R-squared	0.26	0.26	0.27	0.26	0.26	0.27

Table 8: **Robustness to CEO Pay and Stock Return**

Second-stage ordinary least squares regressions of CEO pay on industry-induced and firm-specific ROA. The dependent variable is the log of CEO total pay, which is comprised of salary, bonus, other annual pay, total value of restricted stock granted, total value of stock options, long-term incentives and all other pay. *SOX* is an indicator variable taking on the value of one for the 2003-2005 period and zero otherwise. *Return* is the one year total return, including monthly reinvestment of dividends. *Industry-Induced Return* is the predicted company return from a first-stage regression, specified in equation (1) in which firm performance is regressed on industry return (asset-weighted industry buy-and-hold annual stock return in the firm's 2-digit SIC industry, where the firm itself is excluded from the mean calculation). *Firm-Specific Return* is the residual from the same regression. Each regression includes sales, time and firm fixed effects and a complete set of interaction terms (untabulated). Columns 1-3 present estimates for a specification where the dependent variable is total pay with options included. Columns 4-6 present estimates of total pay regressions as in Table 4, however using *Stock Return* instead of *ROA*. *** Significant at the 1% level; ** Significant at 5%; * Significant at 10%. Robust standard errors clustered at the firm level are in parentheses. Independence is based on sales decile portfolios.

	Total Pay			Stock Return		
	Full	Independent	Dependent	Full	Independent	Dependent
	1	2	3	4	5	6
Industry-Induced Return	-0.228	-4.393*	12.9***	0.085	-0.232	0.335***
	[2.442]	[2.514]	[4.834]	[0.106]	[0.167]	[0.117]
Firm-Specific Return	1.070***	1.117***	1.013***	0.056***	0.098***	0.012
	[0.232]	[0.304]	[0.354]	[0.018]	[0.028]	[0.024]
SOX*Industry-Induced Return	2.883	7.388***	-10.57**	-0.35**	0.029	-0.319
	[2.403]	[2.631]	[4.683]	[0.162]	[0.251]	[0.19]
SOX*Firm-Specific Return	0.262	0.152	0.368	0.05	-0.009	0.122**
	[0.363]	[0.469]	[0.566]	[0.037]	[0.053]	[0.050]

Table 9: **Robustness to CEO Pay and Stock Return: Asymmetric Effects**

Coefficients come from Table 8. They present the total before/after-SOX effect for positive/negative *Industry-Induced* and *Firm-Specific Return*. *Before-SOX* covers 1998-2001, *After-SOX* covers the period of 2003-2005. *Good (Bad) Luck* indicates positive (negative) *Industry-Induced Return*. *Good (Bad) Skill* indicates positive (negative) *Firm-Specific Return*. Each regression includes sales, time and firm fixed effects and a complete set of interaction terms. *** Significant at the 1% level; ** Significant at 5%; * Significant at 10%. Robust standard errors are clustered at the firm level. Board independence is based on sale deciles portfolios.

	Total Pay				Stock Return			
	Good Luck Down1=0	Bad Luck Down1=1	Good Skill Down2=0	Bad Skill Down2==1	Good Luck Down1=0	Bad Luck Down1=1	Good Skill Down2=0	Bad Skill Down2==1
		Full Sample				*Full Sample*		
Before SOX	0.88	-4.55	1.73***	0.58	0.16	0.023	0.036	0.09*
	[2.51]	[3.09]	[0.42]	[0.43]	[0.11]	[0.12]	[0.057]	[0.048]
After SOX	2.33	2.476	1.23**	1.34***	-0.17	-0.32*	0.029	0.21***
	[2.15]	[2.85]	[0.56]	[0.35]	[0.15]	[0.176]	[0.032]	[0.06]
		Independent				*Independent*		
Before SOX	-0.264	-7.26**	2.13	0.43	-0.124	-0.3*	0.06	0.14**
	[2.27]	[3.16]	[0.59]	[0.58]	[0.17]	[0.19]	[0.04]	[0.06]
After SOX	-0.99	-1.489	1.09	1.28	-0.079	-0.42*	0.017	0.21*
	[2.26]	[3.48]	[0.712]	[0.49]	[0.23]	[0.24]	[0.07]	[0.096]
		Dependent				*Dependent*		
Before SOX	13.65***	11.54**	1.23**	0.81	0.37***	0.297**	0.001	0.031
	[4.9]	[5.4]	[0.58]	[0.62]	[0.14]	[0.147]	[0.044]	[0.068]
After SOX	1.78	4.21	1.35	1.33***	0.032	0.115	0.064	0.23
	[3.69]	[4.29]	[0.9]	[0.46]	[0.22]	[0.26]	[0.086]	[0.087]

Table 10: **Robustness to Firm Size**

Second-stage ordinary least squares regressions of CEO pay on industry-induced and firm-specific ROA. The dependent variable is the log of CEO total pay, which is comprised of salary, bonus, other annual pay, total value of restricted stock granted, long-term incentives and all other pay. *SOX* is an indicator variable taking on the value of one for the 2003-2005 period and zero otherwise. *ROA* is net income before extraordinary items and discounted operation divided by total assets. *Industry-Induced ROA* is the predicted company return from a first-stage regression, specified in equation (1) in which firm performance is regressed on industry return (asset-weighted industry ROA in the firm's 2-digit SIC industry, where the firm itself is excluded from the mean calculation). *Firm-Specific ROA* is the residual from the same regression. *Big (Small)* indicates firm size higher (lower) than the yearly averaged median size. Each regression includes sales, time and firm fixed effects and a complete set of interaction terms (untabulated). *** Significant at the 1% level; ** Significant at 5%; * Significant at 10%. Robust standard errors are clustered at the firm level. Board independence is based on sales decile portfolios.

	Full		Independent		Dependent	
	Big	Small	Big	Small	Big	Small
Industry-Induced ROA	3.67*	2.69	0.514	-0.864	12.03***	11.73***
	[2.26]	[2.27]	[2.41]	[2.38]	[3.74]	[3.58]
Firm-Specific ROA	1.6***	0.74***	2.12***	0.7	0.99**	0.84***
	[0.33]	[0.197]	[0.378]	[0.26]	[0.49]	[0.3]
SOX*Industry-Induced ROA	-2.6	-0.93	-1.27	0.1	-7.73*	-5.48
	[2.49]	[2.39]	[2.9]	[2.7]	[4.32]	[4.11]
SOX*Firm-Specific ROA	0.966*	0.626**	-0.074	0.29	2.26***	1.05**
	[0.55]	[0.33]	[0.66]	[0.43]	[0.84]	[0.53]

Table 11: **Robustness to Stock Volatility**

Second-stage ordinary least squares regressions of CEO pay on industry-induced, firm-specific ROA and stock volatility. The dependent variable is the log of CEO total pay, which is comprised of salary, bonus, other annual pay, total value of restricted stock granted, long-term incentives and all other pay. *SOX* is an indicator variable taking on the value of one for the 2003-2005 period and zero otherwise. *ROA* is net income before extraordinary items and discounted operations divided by total assets. *Industry-Induced ROA* is the predicted company return from a first-stage regression, specified in equation (1) in which firm performance is regressed on industry return (asset-weighted industry ROA in the firm's 2-digit SIC industry, where the firm itself is excluded from the mean calculation). *Firm-Specific ROA* is the residual from the same regression. *Cdf Volatility* indicates the cdf of stock volatility computed over five years of monthly data preceding the data year. Each regression includes sales, time and firm fixed effects and a complete set of interaction terms (untabulated). *** Significant at the 1% level; ** Significant at 5%; * Significant at 10%. Robust standard errors are clustered at the firm level. Board independence is based on sales decile portfolios.

	Full	Independent	Dependent
Industry-Induced ROA	3.621	-0.039	13.010***
	[2.311]	[2.439]	[4.023]
Firm-Specific ROA	3.138***	2.939***	3.403***
	[0.531]	[0.620]	[0.951]
SOX*Industry-Induced ROA	-1.304	0.164	-7.01*
	[2.467]	[2.903]	[4.456]
SOX*Firm-Specific ROA	-0.275	-1.436	1.622
	[1.072]	[1.287]	[1.729]
Industry-Induced ROA*Cdf volatility	-2.084**	-1.451	-3.087*
	[1.034]	[1.287]	[1.689]
Firm-Specific ROA*Cdf volatility	-2.953***	-2.433***	-3.601***
	[0.735]	[0.834]	[1.317]
SOX*Industry-Induced ROA*Cdf volatility	1.158	0.296	2.5
	[1.128]	[1.516]	[1.666]
SOX*Firm-Specific ROA*Cdf volatility	1.413	2.206	-0.134
	[1.365]	[1.590]	[2.291]
SOX*Cdf volatility	-0.131**	-0.124*	-0.156
	[0.059]	[0.072]	[0.100]

Table 12: **Robustness to Stock Volatility: Asymmetric Effects**
Coefficients come from Table 11. They present the total before/after effect for positive/negative *Industry-Induced* and *Firm-Specific Return*. *Before-SOX* covers the 1998-2001 period, *After-SOX* covers 2003-2005. *Good (Bad) Luck* indicates positive (negative) *Industry-Induced Return*. *Good (Bad) Skill* indicates positive (negative) *Firm-Specific Return*. Each regression includes sales, time and firm fixed effects and a complete set of interaction terms. *** Significant at the 1% level; ** Significant at 5%; * Significant at 10%. Robust standard errors are clustered at the firm level. Board independence is based on sales decile portfolios.

	Good Luck Down1=0	Bad Luck Down1=1	Good Skill Down2=0	Bad Skill Down2=1
		Panel A: Full Sample		
Before SOX	2.42	1.37	1.81***	-0.984*
	[2.29]	[5.05]	[0.54]	[0.54]
After SOX	1.92	-1.14	5.86	0.88*
	[2.28]	[5.46]	[3.91]	[0.5]
		Panel B: Independent Boards		
Before SOX	-0.02	-5.37	1.287*	-0.001
	[2.57]	[4.17]	[0.67]	[0.67]
After SOX	0.18	-6.22	2.55	0.88
	[3.01]	[3.7]	[4.63]	[0.59]
		Panel C: Dependent Boards		
Before SOX	9.37**	7.47	2.55***	-2.02***
	[3.88]	[4.88]	[0.9]	[0.73]
After SOX	4.56	-0.437	11.62*	0.92
	[3.34]	[4.54]	[6.82]	[0.88]

Table 13: **Robustness to Board Independence**

Second-stage ordinary least squares regressions of CEO pay on industry-induced and firm-specific ROA. Board Independence is based on the presence of majority independent directors (50%). The dependent variable is the log of CEO total pay, which is comprised of salary, bonus, other annual pay, total value of restricted stock granted, long-term incentives and all other pay. *SOX* is an indicator variable taking on the value of one for the 2003-2005 period and zero otherwise. *ROA* is net income before extraordinary items and discounted operation divided by total assets. *Industry-Induced ROA* is the predicted company return from a first-stage regression, specified in equation (1) in which firm performance is regressed on industry return (asset-weighted industry ROA in the firm's 2-digit SIC industry, where the firm itself is excluded from the mean calculation). *Firm-Specific ROA* is the residual from the same regression. Each regression includes sales, time and firm fixed effects and a complete set of interaction terms (untabulated). *** Significant at the 1% level; ** Significant at 5%; * Significant at 10%. Robust standard errors are in parentheses.

	Full	Independent	Dependent
Industry-Induced ROA	2.89	2.18	12.58***
	[2.297]	[2.514]	[4.345]
Firm-Specific ROA	1.10***	1.043***	0.638
	[0.172]	[0.161]	[0.429]
SOX*Industry-Induced ROA	-1.505	1.307	-9.69**
	[2.426]	[2.670]	[4.754]
SOX*Firm-Specific ROA	0.694**	0.378	1.501**
	[0.296]	[0.266]	[0.703]

Table 14: **Robustness to Board Independence: Asymmetric Effects**

Coefficients come from Table 13. They present the total before/after-SOX effect for positive/negative *Industry-Induced* and *Firm-Specific Return*. *Before SOX* covers the 1998-2001 period, *After SOX* covers 2003-2005. *Good (Bad) Luck* indicates positive (negative) *Industry-Induced Return*. *Good (Bad) Skill* indicates positive (negative) *Firm-Specific Return*. Each regression includes sales, time and firm fixed effects and a complete set of interaction terms. Independence is based on majority rule. *** Significant at the 1% level; ** Significant at 5%; * Significant at 10%. Robust standard errors are clustered at the firm level.

	Good Luck Down1=0	Bad Luck Down1=1	Good Skill Down2=0	Bad Skill Down2=1
		Panel A: Independent Boards		
Before SOX	2.99	-3.52	1.67***	0.65**
	[2.51]	[2.96]	[0.32]	[0.3]
After SOX	3.83	0.11	1.89***	1.09***
	[2.29]	[2.59]	[0.44]	[0.31]
		Panel B: Dependent Boards		
Before SOX	12.91***	15.94***	1.76*	-0.189
	[4.45]	[5.16]	[0.81]	[0.824]
After SOX	2.48	7.22	2.14*	2.12***
	[3.89]	[5.76]	[1.19]	[0.75]

Table 15: **Robustness to Lagged Performance**

Second-stage ordinary least squares regressions of CEO pay on industry-induced, firm-specific ROA and their lagged values. The dependent variable is the log of CEO total pay, which is comprised of salary, bonus, other annual pay, total value of restricted stock granted, long-term incentives and all other pay. *SOX* is an indicator variable taking on the value of one for the 2003-2005 period and zero otherwise. *ROA* is net income before extraordinary items and discounted operations divided by total assets. *Industry-Induced ROA* is the predicted company return from a first-stage regression, specified in equation (1) in which firm performance is regressed on industry return (asset-weighted industry ROA in the firm's 2-digit SIC industry, where the firm itself is excluded from the mean calculation). *Firm-Specific ROA* is the residual from the same regression. Each regression includes sales, time and firm fixed effects and a complete set of interaction terms (untabulated). *** Significant at the 1% level; ** Significant at 5%; * Significant at 10%. Robust standard errors are clustered at the firm level. Board independence is based on sales decile portfolios.

	Full	Independent	Dependent
Industry-Induced ROA	1.530***	0.29	3.870***
	[0.487]	[0.643]	[0.746]
Industry-Induced ROA (lag)	0.658	0.8	0.347
	[0.628]	[0.817]	[0.973]
Firm-Specific ROA	0.552***	0.601***	0.518***
	[0.123]	[0.211]	[0.185]
Firm-Specific ROA(lag)	-0.033	-0.229	0.244
	[0.134]	[0.193]	[0.197]
SOX*Industry-Induced ROA	-0.641	0.499	-1.827***
	[0.899]	[1.239]	[0.9]
SOX*Industry-Induced ROA(lag)	-0.741	-1.219	-0.039
	[0.934]	[1.303]	[1.395]
SOX*Firm-Specific ROA	0.731***	0.334	1.297***
	[0.225]	[0.381]	[0.340]
SOX*Firm-Specific ROA(lag)	-0.058	-0.075	-0.053
	[0.223]	[0.310]	[0.329]