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Abstract

According to the rent-extraction hypothesis, weak corporate governance allows entrenched CEOs to capture the pay-setting process and benefit from events outside of their control—get paid for luck. In this paper, I find that the independence requirement imposed on boards of directors by the Sarbanes-Oxley Act of 2002 (SOX), together with the governance regulations subsequently introduced by stock exchanges, affects CEO pay structure. In firms whose corporate boards were originally less independent, and thus more affected by these provisions, CEO pay for performance strengthened while pay for luck decreased after adopting SOX. In contrast, those firms that exhibited strong board independence prior to SOX showed little evidence of pay for luck and little change in pay for performance following the adoption of SOX. The results are consistent with the rent-extraction hypothesis, and they are robust to alternative explanations such as asymmetric benchmarks, oligopoly, and managerial talent.

JEL classification: G38, J33, M52
Bank classification: Labour markets

Résumé

Pour les tenants de la théorie de l'appropriation de la rente, la faiblesse des mécanismes de gouvernance d'entreprise permet aux chefs de direction de contrôler le processus d'établissement de leur rémunération et de profiter des retombées d'événements indépendants de leur volonté (rétribution liée à la chance). L'auteure constate que l'indépendance prescrite par la loi Sarbanes-Oxley de 2002 a, tout comme les règlements en matière de gouvernance édictés plus tard par les bourses, modifié la structure de rémunération des chefs de direction. Dans les entreprises où les conseils d'administration ont été plus touchés par les dispositions du texte (parce qu'ils étaient au départ moins indépendants qu'ailleurs), les primes de rendement des dirigeants ont augmenté et la part de la rétribution attribuable à la chance a diminué à la suite de l'adoption de la loi Sarbanes-Oxley. Dans le cas des entreprises où se trouvaient déjà en place des conseils d'administration forts, par contre, peu de données ont confirmé l'existence de ce type de rétribution et la loi Sarbanes-Oxley n'a guère eu d'effets sur les primes versées. Ces résultats sont conformes à la théorie de l'appropriation de la rente et restent les mêmes lorsqu'on examine d'autres hypothèses d'explication telles que l'asymétrie conjoncturelle des émoluments, la présence d'une structure oligopolistique et la qualité des dirigeants.

Classification JEL : G38, J33, M52
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1 Introduction

Executive pay has recently been at the center of a heated debate in the United States due to the 200% increase in average CEO compensation over the last two decades (Hall and Liebman, 1998; Bebchuk and Grinstein, 2005). Two potential explanations for this increase include the greater use of managerial incentives, such as stock options, as well as the large growth in stock market valuations over that period (Bebchuk and Grinestein, 2005; Conyon, 2006). While the typical compensation package includes stock options in order to motivate the manager to increase shareholders' wealth, it is not clear how managers should be compensated when a firm's value increases as a result of general stock market movements and not from managerial effort (Jensen and Murphy, 1990). The bull market during the 1990s thus brought about a potential conflict of interest between managers and owners. Shareholders were concerned that managers were rewarded for riding the bull market, rather than being compensated for their own actions. The central question in this paper is whether CEOs are actually paid for their contribution to maximizing the value of the firm, or whether they are instead paid for "luck," i.e., for events outside of their control.

Prior research offers two competing views as to whether CEOs are primarily paid based on luck. In the first view, Bebchuk et al. (2002) argue that powerful CEOs can capture the pay-setting process in firms with weak boards which fail to oppose managerial opportunistic behavior. In such firms, CEOs have been awarded excessive pay, ultimately, undermining the interests of shareholders. Bertrand and Mullainathan (2001) find that CEOs are paid for luck, defined as pay for observable shocks in firm performance beyond the manager's control, such as movements in industry returns, oil prices, or exchange rates. Most importantly, their study shows that strongly governed firms, as defined by the presence of a large shareholder, pay their CEOs less for luck than do the more weakly governed firms.

In the second view, CEO pay is designed to respond to changes in industry return in order to motivate managers to exert an optimal level of effort. Rajgopal et al. (2006) document that the sensitivity of CEO compensation to industry-wide and market-wide performances is systematically higher for talented CEOs who enjoy outside employment

opportunities. Gopalan et al. (2007) also find that "pay for luck" is prevalent for talented CEOs operating in industries that offer greater strategic flexibility. According to these studies, pay for luck arises from an optimal contract.

It is important, from a shareholder's perspective, to know whether CEOs are skimming at the expense of shareholders (by being paid for luck), or whether they are instead being optimally paid as a result of movements in industry performance. If CEOs are paid for luck, compensation reform that aims to decrease this type of pay should be demanded. However, if a CEO's pay contract serves as an incentive device consistent with firm value maximization, then the owner intervention is not needed.

To understand whether CEOs are paid for luck, I explore how changes in corporate governance mechanisms affect this type of pay. In particular, the percentage of independent directors is used as a proxy for the efficacy of corporate governance. If a low fraction of independent directors is associated with low pay for luck, then it can be inferred that corporate governance mechanisms such as requiring a majority of independent directors, might work to reduce pay for luck and could potentially increase pay for performance. Consistent with the previous literature, I define pay for luck as the response of pay to industry-wide movements, versus pay for performance, which is the response of pay to changes in a firm's own performance (Bertrand and Mullainathan, 2001; Garvey and Milbourn, 2006). Finding evidence that CEO pay for luck is sensitive to changes in board independence provides support for the skimming view. The association between pay for luck and board structure, however, is determined endogenously by firm and CEO characteristics, which makes it difficult to infer causality (Core et al., 1999; Grinstein and Hribar, 2004). Powerful CEOs who manage to influence and control the board will tend to appoint directors with whom they have an affiliation. In return, weak boards comprised of inside directors are more likely to allow their CEOs to be paid for luck.

In order to analyze the underlying causality between board independence and pay for luck, I use a recent regulatory change in the U.S. corporate governance as a "natural experiment." Specifically, I consider a change requiring that the listed firms be composed of a majority of independent directors. This legal requirement was imposed by the Sarbanes-Oxley Act (SOX) of 2002. Together with the corporate governance amendments

to the New York Stock Exchange (NYSE) and the National Association of Securities Dealers Automated Quotation System (NASDAQ), the SOX act was aimed to restore investor confidence and to enhance the auditing standards of U.S. public companies after a wave of corporate scandals broke in 2000. This paper estimates the impact of these exogenous shifts in board independence on CEO pay for luck and pay for performance.[1]

To test the effect of these 2002 legal reforms on CEO pay for luck and pay for performance, I construct two groups of firms based on the degree to which they comply with the new rules. The group of compliant firms, comprised of firms with a majority of independent directors prior to 2002, is expected to be less affected by SOX and stock exchanges stipulations than firms that were forced to change their boards' structure.[2] The corporate governance rules of 2002 provide two sources of variation that I employ in my empirical methodology. First, I compare changes in CEO pay for performance (and pay for luck) before and after 2002, second, I compare the difference in CEO pay for performance (and pay for luck) before and after 2002 in independent board firms (more compliant) to the difference in CEO pay for performance (and pay for luck) before and after 2002 in independent board firms (less compliant). The first level of change measures the effect of SOX by using temporal identification, which fails to eliminate the effect of potential shocks occurring contemporaneously with the passage of the law and correlated with CEO pay. The second level of change, however, eliminates the effects of these shocks because it is sensitive to a firm's degree of exposure to the reform. Difference-in-differences methodology is applied to the ExecuComp data set over the period 1998-2005 as well as the Investor Responsibility Research Center (IRRC) data set over the period 1998-2002. The results show that CEO pay for luck is present only in less compliant "dependent-board firms" before SOX, and consistent with improved governance, the ef-

[1]Throughout the paper a reference to SOX will also take into account NYSE and NASDAQ regulations of 2002.

[2]SOX is a complex law consisting of new requirements for accounting firms, financial analysts, corporate officers, and corporate directors (See Section 2 for details.) In this paper, compliance level refers only to the requirement that a board is comprised of a majority of independent directors. More specifically, SOX mandates an independent audit committee, and stock exchanges requires that all member firms appoint a majority of independent directors who will sit on the nomination, compensation, and audit committees.

fect disappears after 2002.[3] Next, I find that a CEO's pay for performance, designed to make managers act in the best interest of shareholders, increases in the dependent-board firms after SOX and does not change for the rest of the firms.

These results are supportive of the skimming view, which suggests that regulatory interventions might help to resolve agency conflicts between CEOs and shareholders. However, these results could also be consistent with three alternative explanations. First, Garvey and Milbourn (2006) posit that a positive response of pay to changes in industry returns might not capture pay for luck but instead pay for taking systematic risk within an industry. To address this concern, I test whether the sensitivity of pay to industry returns remains when the "luck" turns out to be bad luck. The results suggest that the sensitivity is greater when industry returns are positive than when they are negative, but only in the dependent-board firms before SOX. The lack of such an asymmetry in the sensitivity of pay for luck to positive industry return after SOX suggests that the reforms have managed to diminish the impact of skimming by making mangers bear the effect of negative industry returns.

Second, Gopalan et al. (2007) and Milbourn (2003) find that pay for luck is more likely to be observed among talented CEOs who possess valuable human capital and who operate in an industry that offers strategic flexibility defined as the "choice of magnitude of the firm's exposure to sector or market factors." According to their model, this type of pay is designed to motivate executives to adjust the firm's risk exposure to sector movements. In examining the impact of CEO talent on firms with independent and dependent boards, I have demonstrated that CEO talent is not as consistently rewarded as an optimal contract design would predict. That is talent is rewarded only in dependent-board firms before SOX; however, it is not rewarded after SOX. Overall, the sensitivity of the results to board structure and the time of passage of SOX lend support to the argument that CEOs are paid for luck rather than for talent, and that the 2002 corporate governance regulations manage to decrease this type of pay.

Third, Aggarwal and Samwick (1999b) postulate that strategic interaction among

[3] "Dependent-board" firm is defined as a firm not reaching certain threshold of a percentage of independent directors before the adoption of SOX. See Section 3 for details.

firms may explain the presence of pay for luck. In less competitive industries, managers might not be paid for industry movements in order to discourage them from competing excessively with other firms in the industry. According to this explanation, pay for luck is expected to be lower in companies that operate in less competitive industries. I find empirical evidence of nondecreasing pay for luck as product market concentration increases. In addition, the dependent-board firms exhibited a larger decrease in pay for luck than did the independent-board firms. Hence, the presence of pay for luck does not seem to be related to strategic interaction within sectors, which further supports the skimming view that managers are indeed extracting rents.

This paper contributes to several strands of research on corporate governance and CEO pay. First, I add to the literature on CEO pay and board structure by suggesting a better strategy for identifying the relationship between CEO pay and the board structure (Hermalin and Weisbach, 2003; Becht et al. 2002). This paper circumvents the simultaneity between CEO pay and board independence by examining the requirement of maintaining a majority of independent directors imposed by SOX and stock exchange amendments. In a related study, Wang (2005) finds that chief financial officer (CFO) pay for performance decreases in compliant independent-board firms with high uncontrollable risk (i.e, risk that cannot be eliminated by maximum auditing) after SOX, while it increases in less compliant dependent-board firms and high controllable risk. Unlike the study by Wang (2005), this paper focuses on the impact of SOX on CEO pay for luck as opposed to CFO pay for performance. In addition, I find that CEO pay for performance increases in less compliant dependent-board firms after 2002, which compliments the finding of Wang (2005) that CFO pay for performance increases for the same type of firms. Further, my analysis builds on Bertrand and Mullainathan (2001) and Garvey and Milbourn (2006) that investigate the pay for luck phenomenon outside of the context of SOX.

I also contribute to the literature on CEO pay growth. Gabaix and Landier (2008) show theoretically that the recent rise in CEO pay is an efficient equilibrium response to the increase in the market value of firms rather than occurring as a result of agency problems. The results obtained in this paper indirectly imply that CEO pay structures,

associated with rent extraction, are affected by the 2002 legal reform, which, contrary to the model proposed by Gabaix and Landier (2008) implies that agency problems might still play a role in determining CEO pay.

Finally, the findings are relevant to the current debate regarding the impact of SOX, and whether or not its enactment was a costly political overreaction (Coates, 2007). In particular, the results should be of interest to: (i) company boards which have been strengthened and have presumably abandoned the practice of granting pay packages which provide the possibility for rent-extraction; (ii) regulators who have been criticized for implementing costly regulation; and (iii) shareholders who want to make sure that their return on investment is not expropriated by the managers of their companies.

The remainder of this paper is organized as follows. Section 2 provides background information on SOX and discusses related research. Section 3 describes the data and pay patterns. Section 4 discusses the identification strategy employed in the paper and the empirical specification. Section 5 proceeds with the results. Section 6 reports the results for alternative explanations of pay for luck. Section 7 presents several robustness tests. Concluding remarks are offered in Section 8.

2 Background, Prior Literature and Hypothesis

The Sarbanes-Oxley Act was enacted in 2002 as an anti-fraud measure in the wake of large accounting scandals at Enron, WorldCom, Tyco International, and Adelphia. Investors lost billions of dollars when the share prices of the affected companies collapsed. Concerns were also raised about the stability of the U.S. securities markets in the aftermath of the scandals. Initiated by the federal government, the Sarbanes-Oxley Act is considered to be among the most extensive reforms affecting U.S. corporate governance since the initial federal securities laws were adopted in 1933 and 1934. The Act consists of eleven provisions, which include new requirements for accounting firms, financial analysts, corporate officers and corporate directors. SOX established the Public Company Accounting Oversight Board (PCAOB) to oversee and regulate auditing. SOX also

strengthened corporate governance.[4] For example, the audit committee, which is the committee that oversees the auditors of a firm must be composed of only independent directors, defined as those who are: "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." Each member of the audit committee must be financially literate, and must be an "audit committee financial expert." If these conditions are not satisfied the company must disclose that it does not have such a committee and explain why it does not.

Immediately following the passage of SOX in July 2002, the NYSE and NASDAQ announced their own new governance requirements. According to these requirements, the board of directors of each NYSE- and NASDAQ-listed firm must have a majority of independent directors, who must comply with an elaborate definition of independence. Furthermore, the compensation, nomination, and audit committees shall consist of only independent directors.

Scholars and practitioners are debating whether the costs of implementing the 2002 reforms outweigh their benefits.[5] This legislation has forced firms to spend significantly more on internal controls. In return for these higher costs, investors will presumably face a lower risk of losses from fraud and theft and benefit from greater transparency and accountability. Apart from these direct costs and benefits, SOX might indirectly affect certain stakeholders. Although the Act does not regulate CEO pay, agency theory

[4]Timely and accurate information for investors is ensured by drastically increasing the sanctions for management "misconduct." SOX 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 profits from the sale of stock received 12 months after the misreporting (Section 304). Furthermore, 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 window of ten days, after the transaction (Section 306).

[5]Eldridge and Kealey (2005) document a significant increase in audit fees associated with internal control systems between 2003 and 2004. In an event study, Zhang (2007) finds negative cumulative abnormal returns around SOX. This Act is also blamed for the increased incidence of delisting after 2002 and for the lost competitiveness of the NYSE compared to the London Stock Exchange. 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 a higher level of pre-SOX disclosure that were cross-listed in the U.S.

suggests that improved monitoring through board independence will affect CEO pay for performance (Demsetz and Lehn, 1985).

Even prior to the passage of SOX and the preceding scandals, the role of board structure on CEO pay had been studied extensively. Hallock (1997) finds that boards with interlocking directors—directors of two companies who sit simultaneously on each other's company boards—pay a higher wage to the CEO. Similarly, Core et al. (1999) show that CEO wages are positively correlated with the presence of interlocking directors. CEOs seem to be paid more when they are appointed as board chairmen and when the percentage of affiliated directors is high. Grinstein and Hribar (2004) discover that a powerful CEO, who is also chairman, manages to extract higher bonuses. All these studies remain silent, however, on the potential endogeneity among firm value, CEO pay and board structure. Core et al. (1999) use ex-post performance to infer causality. Their study investigates the consequences of excessive CEO compensation in firms with weaker governance and find a negative relationship with future performance.

An alternative approach to examining the impact of board structure on CEO pay is to look at changes in board structure due to factors outside the firm. For example, changes in legislation associated with board requirements might be viewed as an exogenous source of variation potentially explaining pay variation. In the current analysis, I use the SOX requirement for board independence to examine changes in CEO pay structure.

Research examining SOX and CEO pay is closely related to my study.[6] Holmstrom and Kaplan (2003) reason that SOX might increase the risk of CEOs and CFOs of being accused of "misconduct" when selling a large number of stock options. Henceforth, executives will be more reluctant to cash in their equity holdings after the passage of SOX. Furthermore, their portfolios will be less liquid and will shift managerial attention from short- to long-term stock prices.

[6]The impact of law regulations on executive pay has received attention in the literature before SOX. Hubbard and Palia (1995) find that CEOs in the banking industry earn more after U.S. banking deregulation occured in the 1980s and exhibit a stronger pay-for-performance link. Bertrand and Mullainathan (1998) consider state anti-takeover legislation. They suppose that weak takeover threat should raise pay because the entrenched CEOs can "skim" more easily whatever pay they can. In other words, the lack of takeover threats allow entrenched CEOs to increase their rents at the expense of 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.

Cohen et al. (2004) examine the change in the structure of executive compensation after the passage of SOX. Focusing on pre- and post-SOX comparisons, firms are expected to respond to the increased liability by lowering the incentive component of managerial pay and by increasing the fixed component so that managers are insured against risks beyond managerial 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 passage of the Act. The observed 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 choose less risky projects after SOX, which might negatively affect shareholder returns because of forgone profitable projects. Cohen et al. (2004) rely on time series identification of SOX, which makes it difficult to isolate the effect of other contemporaneous events related to the reform's passage.

Wang (2005) explores the effect of the Act on CFO pay in firms with strong and weak board oversight prior to the passage of SOX. According to Wang (2005), two factors are expected to affect CFO pay. The first is increased risk of material misstatement of unaudited financial reports in the absence of internal control procedures, and the second factor is increased monitoring. According to standard agency theory, firms with a strong board of directors will respond to the increased risk with reduced incentive pay. 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. Wang (2005) finds that CFO incentive pay is reduced after SOX in firms with independent boards and a high proportion of uncontrollable risk. Furthermore, firms with weak boards before the Act and low uncontrollable risk increase CFO incentive compensation after the reform.

My paper borrows from the methodology of Wang (2005) to identify groups of firms with different level of pre-SOX exposure regarding board independence. Unlike Wang (2005), I focus on CEO pay for luck. CEOs are a highly visible group, with their corporate responsibility increasing after the 2002 legal reforms. CEOs have recently been accused of being excessively paid, presumably because they have managed to largely determine

their own pay. Bebchuk and Fried (2004) argue that because option contracts lack explicit relative performance valuation executives receive windfall gains as market value increases. In general, an optimal CEO contract should not depend on luck because this practice fails to realign the interests of CEOs and shareholders.

The passage of SOX act aims to strengthen corporate governance which potentially may reduce pay for luck. Dependent-board firms might be weak and dominated by entrenched CEOs who appoint their friends to the board and subsequently capture the pay-setting process. These firms are subject to stronger consequences of the reform than better-governed firms in terms of meeting the board independence requirement. Furthermore, the improved board oversight is expected to decrease the incidence of pay-for-luck practices. The above argument leads to Hypotheses 1a and 1b:

Hypothesis 1a. All else being equal, CEO pay for luck decreases in less compliant dependent-board firms after the passage of the 2002 reforms.

Well-governed firms are not expected to change their pay structure after SOX because pay for luck was not part of their compensation package before the reform was implemented. I summarize this prediction in the following hypothesis:

Hypothesis 1b. All else being equal, CEO pay for luck remains unchanged in more compliant independent-board firms after the passage of the 2002 reforms.

This paper derives predictions about the impact of SOX not only on CEO pay for luck but also on CEO pay for performance. Agency theory suggests that board structure and pay for performance are connected. The role of the board is to offer a pay package that would give managers incentives to act in the best interest of shareholders.[7] Apart from offering a contract, boards also monitor whether managers act in the owner's best interests. Board monitoring, however, comes at a cost. The role of monitoring is to

[7]In this optimal contracting world, the board might use an alternative mechanism to realign the interests of managers with these of owners. Bertrand and Mullainathan (1998) see the threat of a takeover as another incentive scheme to motivate CEOs to perform better.

transfer risk from the risk-averse managers to the risk-neutral owners and to reduce information asymmetry, which will enable owners to tailor the managers' rewards more closely to their actions rather than to firm profits. Hence, the expected result of improved monitoring should be a reduction in pay-for-performance costs relative to the situation without monitoring (Demsetz and Lehn, 1985). Monitoring will happen only if the cost of doing so is offset by the additional payoff of economizing pay for performance.

The passage of SOX demands stronger monitoring through the rule for a majority of independent directors. According to the principal-agent theory, improved monitoring leads to lower levels of pay for performance at the margin, because strong boards can instruct managers to take actions that maximize shareholders' value. If monitoring is too costly, however, boards can motivate managers by using pay for performance mechanisms. Stated differently, increased board oversight after SOX might increase or decrease pay for performance depending on monitoring costs. The magnitude of pay for performance changes due to the adoption of SOX is an empirical question, which is addressed by testing the following hypotheses:

Hypothesis 2a. All else being equal, CEO pay for performance changes in less compliant dependent-board firms after the passage of the 2002 reforms.

Hypothesis 2b. All else being equal, CEO pay for performance remains unchanged in more compliant independent-board firms after the passage of the 2002 reforms.

3 Data Sample and Descriptive Statistics

Standard & Poor's (S&P) 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, and CEO age and CEO tenure. The database covers firms from the S&P 500, the S&P MidCap 400, the S&P SmallCap 600 and other supplemental S&P indices.[8] The IRRC

[8]Since the sample contains both LargeCap and SmallCap firms, ex-post survivorship bias is less likely.

data are of annual frequency and cover the directors of the S&P 500, S&P 400 MidCap and S&P 600 SmallCap firms for the period 1998 to 2005. The data provide details on the structure and practices of the boards of directors and historical information for each director, such as the committees to which they belong to, board affiliations, shares held and total voting power.

The ExecuComp sample contains 2,350 firms, or 14,592 firm-years, for the period 1998 to 2005 (See Table 1). Officers named as CEOs are defined by the CEOANN field for each year.[9] 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, a sample selectivity analysis is made on the relationship between the incidence of not reporting CEOs records and firm characteristics. The results from a logit regression analysis shows that none of the estimated set of parameters is statistically significant, which insures against biases caused by systematic non-reporting.

The IRRC data cover 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 to 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 to 2002 in the IRRC data. This restriction allows me to calculate the yearly average of board independence. Under this condition, there are 217 firms present in the ExecuComp data but missing from the IRRC data. A sample selectivity analysis explores whether the non-matched firms, which are available in the ExecuComp sample but missing from the IRRC data for the period 1998 to 2002, are randomly distributed across firms with different characteristics. The results show that SmallCap firms are more likely to be missing in comparison to the LargeCap and MidCap firms.

Two alternative measures of board independence are used. First, I construct ten portfolios according to firms' sales for the period 1998 to 2001 and define the median percentage of independent directors in each portfolio as a threshold. Then, for each

[9]Chief operating officers (COOs) and Chief financial officers (CFOs) 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/or they are not reported in the data.

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 consists of firms with a lower percent of independent directors than the portfolio median. Second, I employ an alternative measure that relies on the majority of independent directors (more than 50% of all board members) .

Firm-level data are taken from the Compustat industrial annual database. The industry affiliation is based on the Standard Industrial Classification. The three largest industry groups in the sample comprise Commercial Banks (SIC 6020, 4.5% of the sample), Prepackaged Software (SIC 7372, 4.19% of the sample) and Crude Petroleum and Natural Gas (SIC 1311, 2% of the sample). Furthermore, after eliminating firms with missing data for either total pay or return and trimming the pay variable at the 1% level, the analysis-ready sample consists of around 1,650 firms and 10,000 CEO-firm-years.

Table 2 reports summary statistics. The upper panel of the table presents the full sample of all matched firms, the middle one details the unmatched 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 occurred. The value of granted options in the total pay package reaches its maximum in the same year. Firms seem to divert the most from granting options to their CEOs in 2003 and 2004.

The middle panel covers firms that are not present in the IRRC data but that are available in the ExecuComp data. Except for 1998, the unmatched firms pay less than the matched firms; these firms also report lower net sales and return on assets but larger volatilities compared to the volatilities of the matched sample. Furthermore, I investigate whether or not the non-matched group is similar to the independent or dependent-board firms in terms of pay and firm performance. Over the whole period, the unmatched firms seem to be significantly smaller than both the dependent- and independent-board group of firms; 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 unmatched firms seem 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 and less profitable but exhibit pay levels similar to that of the independent-board firms.

The bottom panel of Table 2 shows that the dependent-board firms pay their managers a greater amount than the independent-board firms do. The difference of approximately $2 million in annual pay in 2001 is the highest over the sample period. The main reason for this pay differential is the particularly large option grants that the dependent-board firms bestow on their CEOs. The value of options grants is calculated as the number of options times the Black-Scholes option value,[10] and it captures the effect of the size of the option grants and any equity overvaluation.

Inspecting the value of a single option grant shows that the grants of dependent-board firms are overvalued compared to the grants of independent-board firms only before SOX; after SOX this differential disappears. As for the size of the grant measured by 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 in 2004 and 2005.

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

[10]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 $z = (ln(P/X) + [ln(1+r) - ln(1+d) + \sigma^2/2]T)/(\sigma\sqrt{T})$.

4 Identification and Empirical Specification

The fall of Enron in 2001 is used as a motivating event for the corporate governance reforms in 2002. The pre-reform period of analysis is from 1998 to 2001 and the post-reform from 2003 to 2005. Year 2002 is dropped, since it is the year when the reform was enacted. Although SOX is a complex regulation, this paper looks only at the impact of improved board oversight through the requirement that boards be comprised of a majority of independent directors. The level of board independence before SOX permits the analysis of a more compliant group of firms with strong board oversight and a less compliant group of firms with weak board oversight. The former group is defined as a "control" group and the latter as a "treatment" group. The differences in pay-performance sensitivities between these two groups of firms are more accurate measure of the impact of SOX on CEO pay compared to only relying on before-after changes in pay-performance sensitivities.

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). For example, talented CEOs may influence the composition of company boards, equally plausible, company boards may affect CEO pay. Using the act as a "surprising" event that causes a forceful change in 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 change of the percentage of independent directors to determine whether or not firms expected the upcoming regulation and thus adjusted 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 before 2002.

The share of independent directors has increased over the whole period from 1998 to 2005. To distinguish the trend effect from the potential effect of SOX, I estimate a preliminary regression where a percent of independent directors 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 percentage of independent directors increases after 2002 even when accounting for the time trend (results are untabuilated). Although the trend

towards more independence has started before SOX, the regulation itself contributes a more significant increase.

Table 3 summarizes the changes in board independence after the passage of SOX and confirms the actual reform's treatment. Each cell of the table reports the percentage change of the share of independent directors from before to after SOX across board committees (rows) classified as independent or dependent (columns). Regardless of the way an independent board committee is defined, we observe that the reform affects firms with originally dependent boards to a greater extent than firms with initially independent boards. The table shows that the share of independent audit committee members increases by 13% when using the median-portfolio-based approach and by 6% for the majority-rule-based method. Overall, the percentage increase in the share of different types of independent directors is significantly higher (at the 1% level) in firms with pre-SOX dependent boards than in firms with pre-SOX independent boards, which supports the use of board independence as a proxy for changed monitoring environment.

A two-stage approach that allows for the simultaneous examination of the impact of SOX on pay for luck and pay for performance is used. At 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), pay for luck is measured by the response of pay to changes in industry-wide returns, and pay for skill (i.e., pay for performance) is measured by the response of pay to changes in firm-specific performance. At the first stage, the time series of each firm's performance is decomposed as:

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

where $IndustryReturn$ is asset value weighted (or equal-weighted) industry return on assets based on the two-digit SIC industry j in year t and firm i itself is excluded from the mean calculation,[11] t is year fixed effects, η_{1i} is firm fixed effects and ε_{1jit} is resid-

[11] A mechanical correlation arises if a firm's return itself is included in the calculation of the average industry return and then included in equation (1) to predict firm performance.

ual, which is the firm-specific component of firm performance. 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, the following regression is estimated:

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

where SOX takes a value of one for the period 2003 to 2005 and zero for the period 1998 to 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; 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 and stock return volatility; $\theta_{1jit} = \eta_{1i} + \varepsilon_{1jit}$; η_{2i} is firm fixed effects and ε_{2jit} is residual.

The above specification is estimated separately for dependent- and independent-board firms. Following previous literature on CEO pay, time-invariant firm heterogeneity is accounted for by including firm fixed effects.[12] The standard errors are clustered at the firm level, allowing for correlation between different observations within firms across different years. The effect of the reform is captured separately by the post-SOX change in pay for industry-induced (i.e., pay for luck) and pay for firm-specific return (i.e., pay for performance) in dependent-board (treatment group) and independent-board firms (control group).

It is well known that the difference-in-differences estimator is based on strong identification assumptions.[13] 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

[12]Murphy (1999) shows that controlling for firm fixed effects is important in the managerial pay literature.

[13]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 on CEO pay in the US during the 1980s.

value of option grants is the component that induces significant variation between the pay levels in both groups of firms. To reduce the existing disparity, I first consider pay without options as a dependent variable in the main specification (Section 5) and pay plus options' value is presented in Section 7 as a robustness check.

Garvey and Milbourn (2006) argue that the link between pay and industry performance might reflect compensation for taking systematic industry risk and not necessarily reflecting pay for luck. This argument assumes that managerial pay is symmetrically 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. To incorporate their argument in the current analysis, I estimate a model that allows for the sensitivity of pay for luck and skill to vary with positive and negative values of luck and skill. Particularly, the following terms (both with and without the SOX dummy) are added to equation (2):

$$[\xi \widehat{Return}_{jit} \times Down1 + \chi \varepsilon_{1jit} \times Down2](1 + SOX), \tag{3}$$

where $Down1$ takes on value one if $\widehat{Return}_{jit} < 0$ and zero otherwise, and $Down2$ takes on value one if $\varepsilon_{1jit} < 0$. If CEOs are expropriating by being asymmetrically paid for luck, ξ is expected to be negative significant. In the SOX framework, ξ is expected to be negative in dependent board firms before SOX and decreasing afterwards.

5 Are CEOs Paid for Luck?

The empirical analysis begins by examining whether the average CEO is paid for changes in firm-specific and/or industry-induced returns. To decompose firm performance into systematic and idiosyncratic components as specified in equation (1), I follow the methodology of Bertrand and Mullainathan (2001) and Garvey and Milbourn (2006). Because I explore the impact of SOX, I allow for pre- and post-SOX changes in pay sensitivities separately for dependent- and independent-board firms. The estimates of total pay (op-

tions excluded) regressions are reported in Table 4.[14] This 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.[15] 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 this analysis is on the potential influence of SOX on executive pay, rather than on the optimal managerial pay dynamics.

Since board decisions are the major channel through which SOX may affect CEO current pay, I use pay levels instead of annual changes in pay. Another reason for using the current level of CEO pay is that I study the impact of SOX on pay for luck, which does not vary with fluctuations in previously granted pay. It is expected that SOX has limited control 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 and firm-specific performances from equation (1). Columns 1 thought 3 of the table report the results for the full sample, independent- and dependent-board firms. Column 1 shows that the coefficient on industry-induced return is not significant. On the contrary, firm-specific performance is linked positively to pay, which confirms that the more skilful a manager is, the higher her or his pay will be. Columns 2 and 3 provide a better understanding of the impact of SOX on pay structure because this specification not only accounts for the passage of SOX but also, for differences between treatment and control groups. The estimates presented in Column 2 include only independent-board

[14]Financial Accounting Standards Board (FASB) issued a revised statement No.123 in December 2004 according to which all U.S. public firms are now required to expense stock options for all financial reporting periods that begin after June 15, 2005. To avoid the impact of these changes on CEO pay levels, I examine pay without options in the main specification.

[15]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.

firms and confirm that these firms, associated with strong governance, do not pay their CEOs for changes in industry performance, either before or after the passage of SOX. On the contrary, the dependent-board firms reward managers for industry performance before SOX, which is consistent with Hypothesis 1b. After the passage of SOX, however, the dependent-board firms seem to abandon this practice by decreasing the sensitivity of pay to industry performance by 70%, which supports Hypothesis 2b. One standard deviation increase in industry-induced return (0.045 units) corresponds to a 0.30% less pay for industry-induced ROA for a dependent-board CEO after SOX than before SOX .[16]

Next, concerning the estimates of firm-specific return, the results show that there are no differences between the dependent- and independent-board firms before SOX. The post-SOX period, however, is associated with a notable 1.47 increase on a base of 0.93 in firm-specific performance estimate in the dependent-board firms, while the sensitivity remains unchanged for the independent-board firms, which supports Hypothesis 2a and 2b.[17] These results are consistent with those of Wang (2005), who studies the impact of SOX on CFO pay. In particular, the author finds that CFO incentive pay is reduced after SOX in firms with strong boards prior to the reform, while firms with weak boards increase their incentive compensation for CFOs after the reform.[18]

The overall impact of SOX on CEO pay for industry-induced performance is the difference between the estimates of *SOX*Industry-Induced ROA* for dependent- and independent-board firms. The estimate of -6.59, with a p-value of 0.13, shows that

[16]A test for the equality of variance of industry returns before and after SOX is performed. The results suggest that industry returns are more volatile after SOX. Another set of tests of equality of variances of industry return separately before and after SOX between dependent- and independent-board firms indicates that industry returns for the independent-board firms are more volatile than the industry returns for the dependent-board firms both before and after the passage of SOX.

[17]I also explore CEO pay in firms present in the ExecuComp data but unavailable in the IRRC data. These unmatched firms exhibit CEO pay similar to the pay in the independent-board firms, but both groups of firms differ substantially in terms of firm performance and size. Both samples, the unmatched and the independent-board, are combined and the specification in equation 2 is re-estimated. 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 conclusion of the main results.

[18]Wang (2005) estimates the sensitivity of pay to firm-specific return in a one-stage pay regression where only a firm's performance is controlled for. I estimate similar and the results 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.

the reform reduce the impact of industry return on pay. The other notable effect of SOX, measured by the differences in pay for firm-specific performance between dependent- and independent board firms, is a relative increase in pay for skill by 1.37%. As a whole, the reform seems to better link CEO pay to company performance and to reduce pay for industry-induced return.

6 Evidence of Alternative Explanations

6.1 Asymmetric Benchmarking

Bertrand and Mullainathan (2001) interpret the response of pay to movements in industry returns as pay for luck, i.e., pay for actions outside of CEO control. Garvey and Milbourn (2006) argue that the positive sensitivity of pay to industry return might compensate for bearing systematic risk instead of being pay-for-luck scenarios. Similar questions arise in this paper's specification: whether the strong link between pay and industry return in dependent-board firms before SOX and its subsequent decrease after SOX is indeed pay for luck. To further clarify the interpretation of this evidence, following Garvey and Milbourn (2006), positive and negative industry changes are included 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 industrial 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 one if firm-specific ROA is negative, and zero otherwise; *SOX*Industry-Induced ROA*Down1* and *SOX*Firm-Specific ROA*Down2* account for the SOX-related changes in these sensitivities. Table 5 summarizes the total sensitivities from this specification 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 during recessions (*Industry-Induced ROA+Industry-Induced ROA*Down1*); however, the link between industry-induced return and pay disappears after SOX.[19] Analyzing the group of independent-board firms when industry return is positive shows that pay is not linked to industry performance; however, the negative sign in times of recession implies that systematic risk is filtered out. The results for the dependent-board firms depict a different picture. When downward industry returns are observed, CEO pay decreases by 9.7% before SOX and by 5.14% after it (not significant). In times of fortune, one percent increase in industry fortune leads to a 12.8% increase of pay before SOX and only a 4.8% (not significant) increases after SOX. This asymmetry of the pay-for-luck estimates for positive and negative industry returns before the passage of the reforms provides evidence that managers are paid for luck rather than being compensated for bearing industry risk.

In the independent-board firms the response of pay to firm-specific return remains the same as for the pre-SOX period. The independent-board firm results shown in Table 5 imply that CEOs are rewarded for skill in a similar way both before and after SOX. In the dependent-board firms, the estimates of pay for skill suggest a different story. Before the passage of SOX, CEOs are rewarded for skill without being punished for a lack of it. After SOX, pay for skill increases significantly in these firms, and CEOs are punished for the lack of skill.

Overall, the results of the sensitivity of pay to industry-induced and firm-specific return suggest that companies with different board structures pursue different pay policies. The results support the skimming view. CEOs of weakly governed firms are rewarded for industry performance when the industry is up, but they are punished to a lesser degree when the industry is down. In addition, after the passage of SOX, there is no evidence for such types of asymmetric benchmarking. Analysis of the robustness of this result to two alternative explanations follows in subsections 6.2 and 6.3.

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

6.2 The Impact of Managerial Talent

Gopalan et al. (2007) provide an explanation as to why it might be optimal to compensate managers for luck. Their model assumes that CEOs can affect industry performance by implementing the firm's strategy for exposure to industry factors. Since this strategy is partially under the control of the CEO, incentives are all-important for ensuring an optimal choice of the exposure level. Furthermore, the authors conclude that the optimal contract rewards a risk-averse manager more for good luck than punishing him/her for bad luck. The testable prediction of the model is that talented CEOs must be paid more for luck than their less talented peers to motivate them to choose efficiently the firm's exposure to industry fluctuations. Table 6 presents the results of pay for luck estimates for talented and less talented CEOs, incorporating the SOX framework. Unlike in Table 4 where firm specific return is a regressor, in Table 6 each regression is is estimated separately for positive and negative idiosyncratic return. Similarly to Gopalan et al. (2007), a positive (negative) idiosyncratic return is used as an indicator for talent (no talent). The lower part of the panel uses tenure as an alternative, yet somewhat cruder, proxy for talent. As in Gopalan et al. (2007) and Milbourn (2003), the presumption is that the longer CEOs manage to stay with a company, the more talented they are: hence, they are in a position to make better strategic choices.[20]

Starting with the upper panel, the results suggest that pay for industry-induced return is not sensitive to talent either before or after SOX. In the independent-board firms before SOX, it is precisely 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-board firms is interesting in terms of the skimming view. A talented CEO in a firm with weak board oversight is expected to dominate the pay-setting process more than less talented CEOs in similar firms. There is approximately a 60% decrease in pay for luck for talented CEOs only in dependent-board firms after the passage of SOX, which could imply that the reform manages to reduce pay for luck. The results in the lower panel of Table 6 reaffirm that the talent hypothesis cannot explain

[20]Rajgopal et al. (2006) use firm size to proxy for managerial talent. In Section 7 I check the sensitivity of the results to firm size.

pay-for-luck changes. The results tend to support the view that, for the period 1998 to 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 a 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 in 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 do not seem to be positively linked to CEO pay (See Table 5). This inconsistency allows us to rule out the demand-supply argument, as quantified by industry performance, when examining the before/after change of pay for industry performance among firms with different governance structures.

6.3 Market Concentration

Aggarwal and Samwick (1999b) suggest that pay for industry-induced return is affected by strategic interactions among firms in imperfectly competitive markets. In particular, managers operating in less competitive industries are expected to be exposed to a lower sensitivity of pay to industry return to discourage them from competing too aggressively. This lower sensitivity of pay for industry-induced return implies that executives will receive lower compensation if executives of other firms in the industry deliver lower return to their shareholders. Thus according to this model, in highly concentrated industries where oligopolistic structures are present, lower pay for industry performance is expected

to weaken competition. To empirically address this explanation, I investigate whether pay for industry-induced return varies with the Herfindahl-Hirschman Index, which is the sum of the industry's (two-digit SIC) squared market shares in percentages. By construction, an increase in the index indicates greater market concentration. Likewise, a small Herfindahl-Hirschman Index is indicative of a competitive market.

I follow the specification of Aggarwal and Samwick (1999b), where industry-induced return and firm-specific return are interacted with the cumulative distribution function of the Herfindahl-Hirschman Index, which is calculated over the five years prior to the event year. If it were optimal to soften product market competition, the interaction term of industry-induced return and the index would assume a negative coefficient. The results are presented in Table 7. The first three columns of the table present a specification where industry-induced ROA is interacted with the industry concentration index without allowing for before- or after-SOX changes. Focusing on the coefficients on *Industry-Induced ROA*Her.Percentile*, we see a significant increase in pay for industry-induced return with increase of industry concentration. When examining separately the independent- and dependent-board firms a large part of this sensitivity originates from the dependent board firms, although it is not statistically significant. The sign of the coefficient is opposite to the one predicted by the model of Aggarwal and Samwick (1999b), and therefore does not support the view that product market competition reduces the sensitivity of pay to industry return.

In an alternative specification, I interact the SOX dummy with the industry-induced and firm-specific returns. The estimates in columns 4 to 6 indicate that pay for industry return decreases significantly for highly concentrated industries after SOX only for the dependent board firms. Hence, the results are not consistent with the market competition explanation of pay for industry-induced return.

7 Robustness Tests

The results thus far strongly support the conclusion that CEOs managing companies with dependent-board firms were paid for luck, while CEOs in independent-board firms

did not manage to capture the pay-setting process and set their own pay before SOX. This section tackles several possible concerns with the baseline results.

i) Table 8 shows estimates from a specification in which the dependent variable is total pay instead of total pay without options presented in Table 4. Option grants constitute 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. The coefficient on industry-return, -4.393 ($p<10\%$), suggests that industry risk is filtered out in independent-board firms before SOX. 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 a 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 they are punished, however, to a smaller extent.

ii) Let's now suppose that 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 effort of the current manager. As an accounting measure, ROA is more easily manipulated than stock return 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). Stock return is used as an alternative measure of performance because it has remained unaffected by accounting procedures. Similar to previous evidence (Kaplan, 1994), the results from Ta-

ble 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 in the dependent-board firms only after SOX.

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 rewarding skill. When accounting for asymmetric response of pay to market performance, the results are very similar to those in Table 5.

iii) Whether pay for luck varies with firm size is also tested. Table 10 reports results separately for small and large firms. Small firms are defined as those with lower sales than the median sales level. The results remain unchanged for the large and small firms. Earlier work shows that talented CEOs manage large firms because doing so maximizes their impact and economic efficiency (Gabaix and Landier, 2008). In addition to the measures of talent used in Section 6, I look at firm size as a proxy for talent—large firms attract more talented CEOs. The results clearly indicate that there is no difference in pay for luck for large and small firms across board type, thus excluding the role of talent in 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. 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 for the period 1998-2005. However, the main result of

pay for luck across various board structures before and after SOX remains unchanged. These results are preserved also when accounting for positive and negative industry-return changes in Table 12.

v) I assess the sensitivity of the results to the measure of board independence. In Table 13, board independence is based on a majority rule, according to which companies with more than 50% independent directors are classified as independent. 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 the 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) who consider contemporaneous industry-induced and firm-specific returns 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 beginning of the year, while others, such as bonuses, are determined at the end of the year. Table 15 shows that when including lagged industry-induced and firm-specific returns, the sensitivity of pay to industry return decreases significantly after SOX, compared to the levels from the pre-SOX period in dependent-board firms. The effect of lagged industry-induced and firm-specific return is insignificant. This evidence further supports the conclusion from the base specification in Table 4.

8 Conclusion

This paper examines the change in executive pay before and after the passage of the Sarbanes-Oxley Act, NYSE and NASDAQ regulations of 2002. Introduced soon after a series of corporate scandals, the reforms mandated independent audit, nomination, and compensation committee. Employing a difference-in-differences methodology, this paper explores the effect of these reforms on CEO pay for performance and pay for luck.

The pre- and post-SOX differences are compared across two types of firms: those with stronger board monitoring before the reform and those with weaker board monitoring with respect to the percentage of independent directors. The pay-for-performance link was found to increase in firms with weaker board oversight (firms more affected by SOX stipulations) after 2002. In contrast, the pay-for-performance relationship changed little in firms with independent boards.

The results further show that pay for luck disappears in dependent board firms after SOX. Overall, the results are found to be robust to several alternative explanations: asymmetric benchmarking, CEO talent and the degree of industry concentration.

Unlike Wang (2005), who focuses on SOX and pay for performance of specific executive groups (CFOs and COOs), this study examines CEO pay for performance and pay for luck, thereby contributing to the contemporary literature on CEO pay. The results also confirm earlier findings of Bertrand and Mullainathan (2001) that stronger corporate governance decreases pay for luck associated with the inefficient transfer of wealth from executives to shareholders. Finally, this analysis contributes to the literature by employing a superior approach for identifying the effect of the recent governance reforms of 2002 on CEO pay for luck.

The policy implications of this paper suggest that stricter corporate governance rules, ensured by SOX, can be beneficial for shareholders. Reduced pay for luck can help to improve agency problems between CEOs and shareholders. 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: **Samples Overview**

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

	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 (CEOs)	1,731	1,810	1,792	1,671	1,671	1,688	1,690	1,649	13,702
Chief Operating Officers(COOs)	784	805	878	822	849	827	804	778	6,547
Chief Financial Officers (CFOs)	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 (CEOs)	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 2: **Descriptive Statistics**

Descriptive statistics 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 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 ExecuComp data and the IRRC data. *Non-Matched Sample* includes firms present in the ExecuComp data but not present in IRRC data. *Independent-Dependent* panel shows the annual average differences between independent- and dependent-board firms. In this panel, *Stock Volatility* shows the variance-comparison ratio between independent and dependent-board firms. *** Significant at the 1% level; ** Significant at 5%; * Significant at 10%.

	1998	1999	2000	2001	2002	2003	2004	2005
Analysis-Ready Sample								
Total Pay	4,045	5,322	7,122	6,430	5,163	4,800	5,437	6,134
Total Pay1	1,859	2,091	2,352	2,300	2,455	2,944	3,322	4,127
Sales	3,860	4,152	4,831	5,038	4,923	5,322	6,003	7,672
ROA	0.039	0.043	0.037	0.016	0.017	0.025	0.039	0.047
Option Value	2,186	3,230	4,770	4,129	2,702	1,855	2,114	2,006
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	4,677	4,709	5,822	3,846	3,758	4,523	5,012
Total Pay1	4,738	1,757	1,718	1,801	1,815	2,140	2,617	3,381
Sales	3,001	2,875	2,898	3,860	3,395	3,383	3,568	4,977
ROA	0.01	0.02	0.02	0.01	0.004	0.02	0.035	0.04
Option Value	2,733	2,919	2,990	4,021	2,031	1,617	1,906	1,630
Stock Volatility	0.37	0.37	0.44	0.52	0.58	0.44	0.43	0.28
Independent-Dependent								
Total Pay	-907**	-1,093**	-1,090***	-2,023***	-625*	-733**	-451	-1,051***
Total Pay1	-176*	-24	-268	-522*	-276*	-572**	-136	-666**
Sales	-187**	-392	-722	-823	-1,198*	-1,455*	-1,530*	-2,354*
ROA	-0.013**	0.00	0.005	-0.02	-0.013*	0.005	-0.001	-0.009**
Option Value	-750**	-1,121**	-806	-1,500*	-348	-162	-315	-603***
Stock Volatility	0.84***	0.85**	0.91*	0.94	0.95	0.91***	0.80***	0.78***

Table 3: **Change in Board Independence Before and After SOX**

Average percentage change in board independence from the pre-SOX period 1998-2001 to the post-SOX period 2003-2005 across three types of board committees: *Audit, Nomination and Compensation Committees. Median-Portfolio-Based* and *Majority-Based* present two different ways to define board independence. The *Median-Portfolio-Based* independent (dependent) board is a board with a percentage of independent directors higher (lower) than the median percentage of independent directors in sale deciles portfolios. *The Majority-Based* independent (dependent) board is a board with more (less) than 50% independent directors. Δ shows the mean percentage differences between dependent and independent board committees. All statistics are significant at the 1% level.

	Median-Portfolio-Based			Majority-Based		
	Independent	Dependent	Δ	Independent	Dependent	Δ
Audit Committee (% independence)	5	17	12	5	11	6
Nomination Committee (% independence)	14	33	20	16	24	9
Compensation Committee (% independence)	3	12	9	2	5	3
Total (% independence)	6	25	19	3	21	12

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 comprises of salary, bonus, other annual pay, total value of restricted stock granted, long-term incentives and all other pay. Columns (1)-(3) correspond to the 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 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 logarithm of sales, year fixed effects 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 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 in brackets. Board independence is based on the median percentage independent directors in sales deciles 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]
Number of CEOs	8,303	4,654	3,649	8,303	4,654	3,649
Number of Firms	1,644	892	752	1,644	892	752
R2	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- and 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 of 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). *Firm-Specific ROA* is the residual from the same regression. *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: Pay for Industry-Induced Return Before- and After-SOX**

Second-stage ordinary least squares regressions of CEO pay on *Industry-Induced* and *Firm-Specific ROA*, as in Table 4, columns (1)-(3). The dependent variable is the log of CEO total pay, which comprises 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. Coefficients on *Industry-Induced ROA* separately before- and after-SOX are reported. *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. *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 higher (lower) than the median CEO tenure values. *** Significant at the 1% level; ** Significant at 5%; * Significant at 10%. Robust standard errors are clustered at the firm level.

	Full		Independent		Dependent	
	Talent	No Talent	Talent	No Talent	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 comprises 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 logarithm of sales, year fixed effects, 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 two-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 sale deciles portfolios.

	Log(Total Pay1)					
	Full	Independent	Dependent	Full	Independent	Dependent
	(1)	(2)	(3)	(4)	(5)	(6)
Industry-Induced ROA	2.637	0.185	11.756**	1.887	-0.796	10.645**
	[3.388]	[4.444]	[4.947]	[3.376]	[4.478]	[4.899]
Firm-Specific ROA	0.209	1.069**	-0.113	0.386	0.591	0.682
	[0.301]	[0.423]	[0.581]	[0.381]	[0.546]	[0.754]
Herfindahl Percentile	-0.086	-0.08	0.03	-0.10	-0.06	-0.02
	[0.1]	[0.140]	[0.158]	[0.101]	[0.145]	[0.167]
Industry-Induced ROA*SOX	-0.886	-0.141	-9.793*	2.027	4.997	-5.699
	[2.965]	[3.572]	[5.169]	[3.141]	[3.844]	[5.838]
Firm-Specific ROA*SOX	0.665**	0.045	1.497***	0.131	0.869	-0.66
	[0.260]	[0.377]	[0.470]	[0.549]	[0.797]	[1.060]
Industry-Induced ROA*Herf. Percentile	3.114**	1.24	3.353	3.809**	1.301	4.793**
	[1.443]	[2.186]	[2.106]	[1.487]	[2.231]	[2.166]
Firm-Specific ROA*Herf. Percentile	1.458***	0.352	1.919**	1.111*	1.238	0.446
	[0.477]	[0.696]	[0.926]	[0.659]	[0.976]	[1.249]
Herfindahl Percentile*SOX				0.078	0.006	0.143
				[0.058]	[0.089]	[0.105]
Industry-Induced ROA*SOX				-2.732***	-3.073**	-3.904**
				[0.920]	[1.290]	[1.696]
Firm-Specific*ROA				1.097	-1.657	4.147**
				[1.085]	[1.583]	[1.895]
Number of CEOs	9,734	4,414	3,569	9,734	4,414	3,569
Number of Firms	2,165	892	752	2,165	892	752
R2	0.24	0.24	0.28	0.25	0.24	0.28

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 comprises 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 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 brackets. Independence is based on sale deciles 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 Benchmarking**

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 the 1998-2001 period, *After SOX* covers the period of 2003-2005. *Good (Bad) Luck* indicates positive (negative) *Industry-Induced Return*. *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. *Good (Bad) Skill* indicates positive (negative) *Firm-Specific Return*. Each regression includes sales, year fixed effects, 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	Bad Luck	Good Skill	Bad Skill	Good Luck	Bad Luck	Good Skill	Bad Skill
	Down1=0	Down1=1	Down2=0	Down2=1	Down1=0	Down1=1	Down2=0	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 comprises 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. *Large (Small)* indicates firm size higher (lower) than the yearly median size. Each regression includes sales, year fixed effects, 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 deciles portfolios.

	Full		Independent		Dependent	
	Large	Small	Large	Small	Large	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 comprises 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, year fixed effects, 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 sale deciles portfolios.

	Full	Independent	Dependent
Industry-Induced ROA	3.978*	0.354	13.215***
	[2.333]	[2.487]	[4.056]
Firm-Specific ROA	3.187***	2.986***	3.448***
	[0.535]	[0.628]	[0.955]
Cdf Volatility	0.097	0.094	0.089
	[0.093]	[0.119]	[0.150]
SOX* Industry-Induced ROA	-1.381	0.089	-7.044
	[2.465]	[2.906]	[4.456]
SOX* Firm-Specific ROA	-0.279	-1.433	1.608
	[1.071]	[1.285]	[1.725]
SOX*Cdf Volatility	-0.163**	-0.155**	-0.187
	[0.066]	[0.078]	[0.116]
Industry-Induced ROA*Cdf Volatility	-2.869**	-2.207	-3.803*
	[1.228]	[1.472]	[2.092]
Firm-Specific ROA*Cdf Volatility	-3.002***	-2.477***	-3.648***
	[0.739]	[0.842]	[1.319]
SOX*Industry-Induced ROA*Cdf Volatility	1.39	0.515	2.725
	[1.139]	[1.514]	[1.722]
SOX*Firm-Specific ROA*Cdf Volatility	1.412	2.194	-0.123
[1.586] [2.286]			

Table 12: **Robustness to Stock Volatility: Asymmetric Benchmarking**
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*. *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. *Good (Bad) Skill* indicates positive (negative) *Firm-Specific Return*. Each regression includes sales, year fixed effect, 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.

	Good Luck Down1=0	Bad Luck Down1=1	Good Skill Down2=0	Bad Skill Down2=1
		Panel A: Full Sample		
Before	2.88	-2.14	1.94***	-1.07*
	[2.34]	[3.49]	[0.57]	[0.55]
After	2.12	-4.47	6.27	0.86*
	[2.3]	[2.99]	[3.89]	[0.5]
		Panel B: Independent Boards		
	Independent			
Before	0.22	-5.52	1.36*	-0.54
	[2.64]	[4.22]	[0.71]	[0.69]
After	0.28	-6.26	2.72	0.87
	[3.02]	[3.8]	[4.61]	[0.59]
		Panel C: Dependent Boards		
Before	10.13**	6.97	2.77	-2.16**
	[3.91]	[4.93]	[0.93]	[0.75]
After	4.93	-0.63	12.47*	0.90
	[3.33]	[4.56]	[6.84]	[0.88]

Table 13: **Robustness to Board Independence**

Second-stage ordinary least squares regressions of CEO pay on I*ndustry-Induced and Firm-Specific ROA*. Board independence is based on the presence of a majority of independent directors (50%). The dependent variable is the log of CEO total pay, which comprises 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, year fixed effects, 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 Benchmarking**

Coefficients come from Table 13. They present the total before/after-SOX effect for positive/negative *Industry-Induced* and *Firm-Specific Return*. *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. *Before SOX* covers the 1998-2001 period, *After SOX* covers the 2003-2005 period. *Good (Bad) Luck* indicates positive (negative) *Industry-Induced Return*. *Good (Bad) Skill* indicates positive (negative) *Firm-Specific Return*. Each regression includes sales, year fixed effects, 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 comprises 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, year fixed effect, 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 deciles portfolios.

	Full	Independent	Dependent
Industry-Induced ROA	1.530***	0.29	3.870***
	[0.487]	[0.643]	[0.746]
Industry-Induced ROA(lagged)	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(lagged)	-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(lagged)	-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]