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ABSTRACT

We empirically examine two competing views of CEO pay. In the contracting view, pay is used to solve an agency problem: the compensation committee optimally chooses pay contracts which give the CEO incentives to maximize shareholder wealth. In the skimming view, pay is the result of an agency problem: CEOs have managed to capture the pay process so that they set their own pay, constrained somewhat by the availability of cash or by a fear of drawing shareholders' attention. To distinguish these views, we first examine how CEO pay responds to luck, observable shocks to performance beyond the CEO's control. Using several measures of luck, such as changes in oil price for the oil industry, we find substantial pay for luck. Pay responds about as much to a "lucky" dollar as to a general dollar. Most importantly, we find that better governed firms pay their CEOs less for luck. Our second test examines how much CEOs are charged for the options they are granted. Since options never appear on balance sheets, they might offer an appealing way to skim. Here again we find a crucial role for governance: CEOs in better governed firms are charged more for the options they are given. These results suggest that both views of CEO pay matter. In poorly governed firms, the skimming view fits better (pay for luck and little charge for options) while in well governed firms, the contracting view fits better (filtering out of luck and charging for options).

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1 Introduction

There are two predominant ways to think about CEO pay. The first one, which we refer to as the contracting view, relies on principal-agent models. Because CEOs often own very little of the firm they control, shareholders face a classic moral hazard problem: CEOs may not always maximize firm value in making their decisions. Under the contracting view, shareholders (acting through the board or the compensation committee) use CEO pay to reduce moral hazard. Explicit pay for performance, such as long term contracts or options, and implicit pay for performance, such as a bonus payment, are all used by boards to increase CEOs' incentives to maximize shareholder wealth.[1]

The second view, which we refer to as the skimming view, has been championed by practitioners such as Crystal (1991). It also begins with the separation of ownership and control, but it argues that this separation allows CEOs to gain control of the pay setting process itself. By packing the board with their friends, or any other mean of entrenchment, many CEOs de facto set their own pay. They skim what they can from shareholders, constrained perhaps by the amount of funds in the firm, by an unwillingness to draw the attention of shareholder activist groups or by a fear of becoming a takeover target. Within these constraints, however, they pay themselves as much as possible. Whereas pay in the contracting view is an attempt to solve moral hazard, pay in the skimming view is the result of moral hazard.

We propose two tests to differentiate these models. In the first test, we examine whether CEOs

[1]Murphy (1985, 1986) is a forerunner of the vast literature that has empirically analyzed CEO compensation in the context of the principal-agent model. The resulting literature is summarized in Murphy (1999). The major econometric work has been to test for value-optimizing incentive scheme by studying the correlation between pay and performance. Jensen and Murphy (1990) use this framework to argue that political considerations constrain pay so that incentives are too low. Joskow, Rose and Shepard (1993) empirically examine this argument in regulated industries. Other tests of the agency framework can be found in Gibbons and Murphy (1990), who test for relative performance evaluation and career concerns, Garen (1994) and Aggarwal and Samwick (1999a), who test for risk-return tradeoffs, and Hubbard and Palia (1994) and Bertrand and Mullainathan (1998), who test whether pay incentives substitute for other disciplining devices (competition and takeovers respectively).

are rewarded for *observable* luck. By luck, we mean changes in firm performance that are beyond CEOs' control. In simple agency models, pay should not respond to luck since by definition the CEO cannot influence luck. Tying pay to luck will not provide better incentives; it will only add risk to the contract (Holmstrom, 1979).[2] Under the skimming view, on the other hand, pay will respond to luck since the CEO can divert those "lucky" dollars to pay herself as easily as she can divert earned dollars.

To empirically examine the responsiveness of pay to luck, we use three different measures of luck. First, we perform a case study of the oil industry where large movements in oil prices tend to affect firm performance on a regular basis. Second, we use changes in industry-specific exchange rate for firms in the traded goods sector. Third, we use year-to-year differences in mean industry performance to proxy for the overall economic fortune of a sector. This last measure very much resembles the approach followed in the relative performance evaluation literature. For all three measures, we find that CEO pay responds to luck. In fact, we find that for all three luck measures CEO pay is as sensitive to a "lucky dollar" as to a "general dollar."

This basic finding of pay for luck, however, can be explained by complicating the basic agency model. For example, suppose boards wanted their CEOs to forecast or respond to luck shocks. Tying pay to luck in this case may be necessary to provide better incentives. In the oil industry, rewarding the CEO after the fact for seeing an oil shock coming encourages him to keep his eyes open before the fact. Alternatively, suppose the "value" of a CEO's human capital rises and falls with industry fortunes. One would then find that pay correlates with luck because the CEO's outside wage moves with luck.

While we will argue that these arguments may be incorrect, they motivate us to search for further

[2]Note our emphasis on observable luck. In any model, given the randomness of the world, CEOs (and almost everybody else) will end up being rewarded for unobservable luck. Note also our emphasis on the fact that this prediction holds in simple agency models. As we will discuss shortly, complications to the agency model can in principle alter this result.

tests. We therefore examine another direct implication of the skimming model, that skimming will be less important in well governed firms. Good governance will make it hard for the CEO to gain control of the pay process. So if pay for luck comes from skimming, we expect to see less of it in the better governed firms.

We test this hypothesis using several measures of governance: presence of large shareholders (on the board and overall), CEO tenure (interacted with the presence of large shareholders to better proxy for entrenchment), board size and fraction of directors that are insiders. Consistent with skimming, we generally find that the better governed firms pay less for luck.[3] These effects are strongest for the presence of large shareholders on the board who reduce pay for luck by between 23 and 33%. Large shareholders are especially important as CEO tenure increases, consistent with the idea that unchecked CEOs can entrench themselves over time. The findings on governance cast doubts on the alternative interpretations which make pay for luck optimal through complications to the agency model. If pay for luck were in fact optimal, we would not expect to see well governed firms use less of it. For example, whether or not a large shareholder is present, CEOs would have to be rewarded for a rise in the value of their human capital. These findings instead suggest that at least some of the pay for luck in poorly governed firms is due to skimming by CEOs.

Our second test revolves around another aspect of CEO compensation that has received attention in recent years: the granting of new stock options. Principal-agent theory predicts that when options are granted, other components of compensation should be adjusted downwards to leave the CEO indifferent. In other words, the CEO should be charged for the options she is granted, if not their Black-Scholes value then at least this value times a risk correction factor.[4] Supporters of the

[3] Whenever we refer to "less pay for luck" we mean that there is less pay for luck relative to the amount of pay for performance. Thus, these results would not be driven by well governed firms simply giving less overall pay for performance.

[4] The basic idea is that options have value. For example, suppose a CEO is granted 10,000 options with a strike price of 50, a horizon of 3 years and the firm is currently trading at 50. These options have value in and of themselves because even if the firm under-performs relative to the market and earns a cumulative 3-year(nominal) return of only

skimming view, on the other hand, emphasize that stock options do not appear on balance sheets. Because of accounting treatments, firms do not take a financial charge for granting options. CEOs can therefore pay themselves through option grants without affecting the company's bottom line. Under the assumption that shareholders only (or mostly) pay attention to the accounting bottom line, the granting of new stock options would represent an easy way to skim more without attracting shareholders' attention. No cut in the other components of pay would be necessary. Thus while agency theory predicts a large charge for options, skimming predicts about no charge.

Unfortunately, a direct measure of how much CEOs are in fact charged for their options is not possible because of a natural omitted variable bias. Taking our lead from the pay for luck findings, we therefore focus on the question of how governance affects the charge for options. Using the same measures of governance, we generally find that more poorly governed CEOs are charged *less* for their new options grants. For example, for an options grant worth 1 million dollars (in Black-Scholes terms), an extra large shareholder on the board increases the charge for options by between 30 and 50 thousand dollars. As before, we also find that as a CEO tenure increases, the charge for options diminishes in firms without a large shareholder.

In summary, this paper contains three main results. First, CEO compensation shows on average a significant amount of pay for luck. Second, well governed firms display less pay for luck, suggesting that it is possible to filter out luck. Third, CEOs in well governed firms are charged more for their stock options grants. At a first glance, these results seem to provide support for the skimming view. CEOs are rewarded for luck and seem to be able to skim using options. But notice that they also provide support for the contracting view. Well governed firms do manage to filter out some luck from performance and do manage to charge more for options. We feel that the results suggest

10%, he still gains $(.1) * 50 * 10,000 = 50,000$ dollars. Even if the option is granted out of the money, the same effect will arise because the option may come into the money just because of movements in share price that comes from the firm's natural volatility. Agency theory therefore predicts that CEOs should be charged for the gift implicit in each option.

as a whole that both views of CEO pay are true. In practice, executive compensation seems to be better characterized by either the skimming or the contracting model depending on the extent to which there is an active "principal" (or principals) present to actually design pay contracts. Better governance means that there is more of an active principal and optimal contracting fits better. Worse governance means that there is less of an active principal and the CEO is more likely to set his own pay.[5]

The rest of this paper is organized as follows. We start by presenting our test of the lack of performance filtering (section 2). We first present a very simple theoretical background (section 2.1), review the existing evidence (section 2.2) and explain the empirical methodology (section 2.3). We then establish the existence of pay-for-luck, both in the specific case of the oil industry (section 3.1) and for more general sets of industries (section 3.2). In section 3.3, we demonstrate the role of governance in limiting the extent of pay-for-luck. In section 4, we establish that the same governance variables also matter in limiting the gift nature of new stock option grants. We summarize and conclude in Section 5.

2 Pay for Luck Test: Background

2.1 Theoretical Background

Our first test focuses on whether CEOs are rewarded for observable luck. A simple theoretical model will make precise what agency theory says about the reward for luck. Consider a standard agency setup where risk-neutral shareholders, perhaps operating through the board, try to induce a risk-averse top manager to maximize firm performance. Since the actions of the CEO can be

[5]This confirms the sentiment that emerges from conversations with compensation consultants as they describe being hired by two types of firms: the ones where they clearly have to respond to the CEO and the ones where they clearly have to respond to the shareholders.

hard to observe, shareholders will be unable to sign a contract that specifies these actions. Instead, shareholders will offer a contract to the CEO where her compensation level is made to depend on the firm's performance. Let p represent firm performance and a the CEO's actions, which by assumption are unobservable by the shareholders. Firm performance depends on the actions of the CEO and on random factors. We split the random factors into two components: those that can be observed by shareholders and those that cannot. For an oil firm, the price of crude oil would be an observable random factor. Letting o be the observable factor and u be the unobservable noise term, we assume that performance can be written as:

$$p = a + \delta o + u$$

Under some technical conditions, Holmstrom and Milgrom (1987) calculate the optimal incentive scheme for this model.[6] Let s denote this incentive scheme. Since shareholders can only observe two variables, p and o, the incentive scheme could at most depend on these two variables. In fact, shareholders will only reward CEOs for performance *net of the observable factor*:

$$s = \alpha + \beta(p - \delta o) = \alpha + \beta(a + u) \tag{1}$$

In other words, the optimal incentive scheme *filters* the observable luck from performance. This is because leaving o in the incentive scheme provides no added benefit to the principal as, by definition, the agent has no control over o. "Incentivizing" her on o has therefore no incentive effects. Beyond providing no benefit, it actually costs the principal because not filtering out luck increases the variance of the incentive scheme, thereby forcing the principal to increase mean pay to compensate the risk averse agent.[7]

How might we expect filtering of luck to occur in practice? Explicit incentive contracts, such as

[6]Essentially, we need to assume that the CEO has CARA utility and that outcomes follow a Brownian process. A much more general result can be found in Holmstrom (1979).

[7]In Section 3.2.4, we will consider changes to this basic model that might alter these results.

options, rarely filter. For example, options are rarely if ever indexed against market performance. This need not be inconsistent with a lack of filtering, however. One might expect that the best way to filter luck is through the use of subjective performance evaluation. In practice, we would expect the board to be the primary mechanism for doing this. The board should use the discretionary components of pay, such as bonus, salary or new options grants, to respond to luck shocks.

2.2 Existing Evidence

Previous work already hints at a relationship between pay and luck. First, Blanchard, Lopez-de-Silanes and Shleifer (1992) find that windfall gains from court rulings raise the pay of CEOs. Second, as we just mentioned, the stock options that are granted to CEOs are very rarely indexed to the market. While interesting, these two facts are only suggestive. A court ruling may not be luck, but rather the result of the CEO's work. And, as noted, while options may not be indexed (perhaps for simplicity or tax reasons), the board can always reissue them or adjust other parts of pay.

For many, the apparent lack of relative performance evaluation (RPE) is probably the best existing piece of evidence of pay for luck.[8] Even with this evidence though, some problems arise. First, mean industry movements are a special form of luck. Filtering this specific kind of luck may not be optimal from an agency theoretic point of view. In fact, Gibbons and Murphy (1990) themselves note that relative performance evaluation can distort CEO incentives if they can "take actions that affect the average output of the reference group."[9] Aggarwal and Samwick (1999b) also develop a specific model in which relative performance evaluation schemes may not be optimal

[8] While Gibbons and Murphy (1990) find some evidence for RPE, some of their results are puzzling. For example, there appears to be more filtering of general stock market shocks than of shocks specific to the relevant industry. Most of the other work on the topic, such as Janakiraman et al. (1992) and Aggarwal and Samwick (1999a), find no evidence of RPE.

[9] They list four different kinds of such actions: sabotage, collusion, choice of reference group and production externalities.

for shareholders as they try to provide CEOs with the best incentives.[10] Our test addresses these criticisms. We will examine a variety of shocks, including but not restricted to mean industry movements. We will verify that other shocks to performance that are even more objectively beyond managerial influence, such as shocks to the price of crude oil or exchange rates shocks, also fail to be filtered.

2.3 Empirical Methodology

Within the agency framework, most of the empirical literature estimates an equation of the form:

$$y_{it} = \alpha_i + \alpha_t + \alpha_X * X_{it} + \beta * perf_{it} + \epsilon_{it} \tag{2}$$

where y_{it} denotes total CEO compensation in firm i at time t, α_i are firm fixed effects, α_t are time fixed effects, X_{it} are firm (and CEO) specific variables such as tenure or firm size, and $perf_{it}$ represents a performance measure. The coefficient β captures the strength of the pay for performance relationship.

Performance is typically measured either as changes in accounting profits or stock market returns and we will use both measures.[11] In measuring compensation, y_{it}, one problem permeates the literature and our paper is no exception. Ideally, the compensation in a year would include the change in value of unexercised options granted in previous years. Such a calculation requires data on the accumulated stock of options *held* by the CEO each year, whereas existing data contains only information on new options granted each year. Consequently, our compensation measure does not include this component of the change in wealth. As we discuss in Section 3.2.1, this data problem

[10]The basic idea is that the mean performance in the rest of the industry may actually provide some information about the CEO's effort to attenuate or strengthen the level of competition in that industry. For example, if product market competition in an industry needs to be softened, shareholders might in an efficient contracting environment reward the CEO when the rest of the industry is doing well as this might indicate that the CEO acted successfully in attenuating the competitive pressures in that industry.

[11]These are flow measures. In practice, given the firm fixed effects, we will use market value and level of accounting profits as measures of $perf_{it}$.

should, if anything, bias our results towards overstating the case towards filtering and understating the extent of pay for luck.

To estimate the general sensitivity of pay to performance, we will follow the literature and estimate equation (2) using a standard Ordinary Least Squares (OLS) model. To estimate the sensitivity of pay to luck, we need to use a more complicated two stage procedure. In the first stage, we will predict performance using luck. This will isolate changes in performance that are caused by luck. In the second stage, we will see how sensitive pay is to these *predictable* changes in performance. This two stage procedure is essentially an Instrumental Variables (IV) estimation where the luck variable is the instrument for performance.[12]

Letting o be luck, the first equation we estimate is:

$$perf_{it} = a_i + a_t + a_X * X_{it} + b * o_{it} + e_{it} \tag{4}$$

where o_{it} represents the luck measure (oil price for example). Again, this equation allows us to predict a firm's performance using only information about luck. We then ask how pay responds to this luck induced performance, $\hat{perf}_{it}$:

$$y_{it} = \alpha_i + \alpha_t + \alpha_X * X_{it} + \beta_{Luck} * \hat{perf}_{it} + \epsilon_{it} \tag{5}$$

The estimated coefficient β_{Luck} indicates how sensitive pay is to changes in performance that come from luck. Since such changes should be filtered, basic agency theory predicts β_{Luck} should equal 0.

[12]One might wonder why we should use this procedure rather than simply include o directly into the pay for performance equation (2) and run OLS to estimate:

$$y_{it} = \alpha_i + \alpha_t + \alpha_X * X_{it} + \beta * perf_{it} + \gamma * o + \epsilon_{it} \tag{3}$$

This equation is hard to interpret, however. Even if there is no pay for luck, the coefficient γ will not equal $-\beta$ but rather $-\beta\delta$, as we can see from equation 1. Since we we do not estimate δ, the estimated coefficient γ can be small either because there is pay for luck or simply because δ is small. The first equation in the IV procedure, on the other hand, scales the effect of luck on performance, circumventing this problem.

3 Testing for Pay for Luck

3.1 Oil Industry Study

We now turn to the oil industry to test whether in fact there is zero pay for luck. As Figure 1 shows, the price of crude oil has fluctuated dramatically over the last 25 years. These large fluctuations have caused large movements in industry profits. Over this period, a CEO of one of these firms would have found that a measurable variable (oil prices) greatly influenced the performance of his firm. Moreover, these large fluctuations in crude oil prices are likely to have been beyond the control of a single US CEO. For example, the sharp decline in crude oil price at the end of 1985 was caused by Saudi Arabia's decision to reform its petroleum policy and to increase it production, an action hardly attributable (and never attributed) to the CEOs of US oil firms. Similarly, the large oil price increase between 1979 and 1981 is usually attributed to an internal policy change by OPEC. Oil price movements therefore provide an ideal place to test for pay for luck: they affect performance, are measurable and are plausibly beyond the control of the CEOs.

We use a data set on the pay and performance for the 51 largest US oil companies between 1977 and 1994 to implement the methodology of the previous section.[13] Before moving to regression analysis, it is useful to look directly at how pay fluctuates compared to the movements in Figure 1. In Figure 2, we have graphed changes in oil prices for each year and changes in mean log pay in the industry. Two striking facts emerge. First, pay changes and oil price changes correlate quite well. In 12 of the 17 years, they are of the same sign: both are up or both are down. This is suggestive of a large amount of pay for luck. The second fact comes from the remaining 5 years where they are

[13] We are extremely grateful to Michael Haid for making the data set used in this section available to us. See Haid (1997) for further details about the construction of the data set. Table A1 in the appendix provides mean and standard deviations for the main variables of interest. While the original data set covers 51 companies over the period 1977 to 1994, information on CEO pay is available for only 50 of these original 51 companies. Moreover, CEO pay is available from 1977 on for only 34 of these 50 companies. The final data set we use covers 827 company/year observations.

of opposite sign: all these 5 years are years in which oil price drops but pay does not. This hints at an asymmetry: while CEOs are always rewarded for good luck, they may not always be punished for bad luck. While we will not formally pursue the asymmetry, it is worth keeping in mind.

This figure, however, does not allow us to quantify the size of pay for luck: how does it compare to the pay for general performance? It also does not control for other firm specific variables that might be changing over time. Table 1 follows the empirical methodology presented in Section 2.3, which allows a more systematic analysis. The regressions use log(total compensation) as dependent variable and include firm fixed effects, age and tenure quadratics and a performance measure as dependent variables.[14] We also allow for a year quadratic to allow for the fact that CEO pay has been trending up during this period. Column (1) estimates the sensitivity of pay to a general change in accounting performance. The coefficient of .82 suggests that if an oil firm increases its accounting return by one percentage point, total compensation rises by $.82 * .01 = .0082 \approx 1$ log points. Roughly, a one percentage point increase in accounting returns leads to a .8 percent increase in pay. Note that the sign and magnitude of all the other covariates in the regression seem sensible. Pay increases with age and to a lesser extent with tenure. Both the age and tenure profile are concave (the negative coefficient on the quadratic term).

Column (2) estimates the sensitivity of pay to luck. As described, we instrument for performance with log oil prices.[15] This allows us to narrow down on movements in accounting returns that are due to oil price changes. The coefficient in column (2) now rises to 2.15. This suggest that a one percentage point rise in accounting returns *due to luck* raises pay by 2.15 percent. Given the large standard errors, one cannot reject that the pay for luck coefficient and pay for general performance coefficient are the same. One can however strictly reject the hypothesis of complete filtering: oil

[14]Total compensation in this table and all others includes salary, bonus, other incentive payments and value of options *granted* in that year.

[15]This table does not report the first stage regressions of performance measure on oil price. But as one would expect from Figure 1, these regressions show very significant coefficients on oil price ($p < .001$).

CEOs are paid for luck that comes from oil price movements.

Columns (3) and (4) perform the same exercise but for a market measure of performance: shareholder wealth. The coefficient of .38 on column (3) suggests that a one percent increase in shareholder wealth leads to roughly a .38 percent increase in CEO pay. In column (4), we find that a one percent increase in shareholder wealth due to luck leads to .35 percent increase in CEO pay. Again, pay for luck matches pay for general performance.

3.2 More General Tests

The oil industry case study has been instructive about the magnitude of pay for luck. CEO pay responds as much to a lucky dollar than to a general performance dollar. This is only one industry, however, and one might ask how generalizable these results are. In this section, we will examine luck shocks that affect a broader set of firms. We focus on two measures of luck: movements in exchange rates and mean industry performance. By affecting the extent of import penetration and hence foreign competition, exchange rate movements can strongly affect a firm's profitability. Movements in mean industry performance also proxy for luck to the extent that a CEO does not influence how the rest of her industry performs.[16]

3.2.1 CEO Compensation Data

To implement these tests, we use compensation data on 792 large corporations over the 1984-1991 period. The data set was graciously made available to us by David Yermack and Andrei Shleifer. It is extensively described in Yermack (1995). Compensation data was collected from the corporations' SEC Proxy, 10-K, and 8-K filings. Other data was transcribed from the *Forbes* magazine annual survey of CEO compensation as well as from SEC Registration statements, firms'

[16]As we mention before, this last assumption is more questionable. In practice, we find that mean industry movements operate exactly like the exchange rate movements (and like oil price movements).

Annual Reports, direct correspondence with firms, press reports of CEO hires and departures, and stock prices published by Standard & Poor's. Firms were selected into the sample on the basis of their *Forbes* rankings. *Forbes* magazine publishes annual rankings of the top 500 firms on four dimensions: sales, profits, assets and market value. To qualify for the sample a corporation must appear in one of these *Forbes* 500 rankings at least four times between 1984 and 1991. In addition, the corporation must have been publicly traded for four consecutive years between 1984 and 1991.

Yermack data is attractive in that it provides both governance variables and information on options *granted*, not just information on options exercised. It does not, however, include changes in the value of options held. Our compensation measure, therefore, will not include the change in value of pre-existing options. If anything, this biases us towards finding *less* pay for luck than there is. Since options are not indexed, changes in the value of options held will covary perfectly with luck. Including them would only increase the measured pay for luck. This data limitation therefore pushes us towards favoring the filtering hypothesis, making our statistical rejection of complete filtering that much stronger.

Table 2 presents summary statistics for the main variables of interest in the full Yermack data.[17] All nominal variables are expressed in 1991 dollars. The average CEO earns 900 thousand dollars in salary and bonus. His total compensation is nearly twice that amount at one million and 600 thousand dollars. The difference indicates the large fraction of a CEO's pay that are due to options grants. The average CEO is roughly 57 years old and has been CEO of the firm for 9 years. As far as governance goes, the average firm in our sample has 1.12 large shareholders, of which less than a fourth are sitting on the board. There are on average 13 directors on a board. 42 percent of them are insiders.[18]

[17]In practice, depending on the required regressors, the various tests in the following sections will be performed on various subsamples of the original data. None of these main variables of interest significantly differ in any of these subsamples.

[18]Technically, we define "insiders" to be both inside and grey directors. An inside director is defined as a director

3.2.2 Exchange Rate Movements as Measures of Luck

Our first general measure of luck focuses on exchange rate movements. We exploit the fact that exchange rates between the US dollar and other country currencies fluctuate greatly over time. We also exploit the fact that different industries are affected by different countries' exchange rates. For example, since the toy industry may be more affected by Japanese imports while the lumber industry may be more affected by Bolivia, these two industries may experience very different shocks in the same year. This allows us to construct *industry-specific* exchange rate movements which we are arguably beyond CEOs' control since they are primarily determined by macroeconomic variables. The exchange rate shock measure is based on the weighted average of the log real exchange rates for importing countries by industry. The weights are the share of each foreign country's import in total industry imports in a base year (1981-1982). Real exchange rates are nominal exchange rates (expressed in foreign currency per dollar) multiplied by U.S. CPI and divided by the foreign country CPI. Nominal exchange rates and foreign CPI's are from the International Financial Statistics of the International Monetary Fund.

Panel A of Table 3 examines the effect of this measure of luck. Note that since the exchange rate measure can only be constructed for industries where we have imports data, the sample size is much smaller here than for our full sample. All regressions control for firm and year fixed effects as well as for quadratics in tenure and age.[19] Column (1) uses as dependent variable the *level* (not the log) of cash (not total) compensation. Thus, relative to our standard specification, we run this regression in levels and do not include value of options granted. Since profits are reported in millions and pay is reported in thousands, the coefficient of .17 in column (1) suggests that

that is a current or former officer of the company. A grey director is a relative of a corporate officer, or someone who has substantial business relationships with the company.

[19]We do not report the coefficients on age and tenure to save space, but they resemble the oil industry findings: positive but diminishing effects of tenure and age.

$1,000 increase in profits leads to a 17 cent increase in performance. Column (2) performs the same exercise but now for pay for luck: we instrument for performance using the exchange rate shocks.[20] As in the oil case, we find a pay for luck coefficient that is of the same order of magnitude as the pay for general performance coefficient.

Columns (3) through (6) run the more standard regression where we use the logarithm of pay and an accounting measure of performance (operating income divided by total assets). In columns (3) and (4) we use only cash compensation, while in columns (5) and (6) we use total compensation. In both cases, we find the sensitivity of pay to luck to be about the same as the sensitivity of pay to a general shock. When accounting performance rises by one percentage point compensation (either total or cash) rises by about 2 percent, whether that rise was due to luck—exchange rate movements—or not.

Columns (7) through (9) replicate these four columns but for market measures of performance. Again, we find pay for luck that matches the pay sensitivity to a general shock. A rise in shareholder wealth of one percent leads to a rise in pay (again either total or cash) of about .3 percent irrespective of whether this rise was caused by luck.

Two important points should be taken away from this panel. First, to a first approximation, the *average firm* rewards its CEO as much for luck as it does for a general movement in performance. There seems to be very little if any filtering. Since we use a totally different shock, these findings address theoretical concerns about the use of mean industry shocks (such as those raised in Gibbons and Murphy (1990) and Aggarwal and Samwick (1999b)) and shows that the lack of filtering observed in RPE findings generalizes to other sources of luck.

Second, there is as much pay for luck on totally discretionary components of pay (salary and

[20] First stage regressions are reported in Table A2. In practice we use as instruments a set of dummy variables that indicate any significant exchange rate appreciations or depreciations in the current and past year. The instruments are jointly highly significant.

bonus) as there is on other components such as options granted. This rules out the notion that pay for luck might arise because firms commit (implicitly or explicitly) to multi-year stock option plans where the *number* of options grants is fixed ahead of time. As firm values rise, the prices of options rise and so does the value of options grants (Hall, 1999). More generally, bonus is the most subjective component of pay for performance sensitivity. To find pay for luck on this component is quite suggestive. Boards are rewarding CEOs for luck even when they could filter it.

3.2.3 Mean Industry Movements as Measures of Luck

In Panel B of Table 3, we replicate Panel A except that our measure of luck becomes mean performance of the industry, which is meant to capture external shocks that are experienced by all the firms in the industry. More specifically, as an instrument for firm-level rate of accounting return in a given year, we use the weighted average rate of accounting return in that year in the 2-digit industry that firm belongs to, *excluding* the firm itself from the calculation.[21] The weight of a given firm in a given year is the share of its total assets in the "total" total assets of the 2-digit industry the firm belongs to. Similarly, as an instrument for firm-level logarithm of shareholder wealth in a given year, we use the weighted average of the log values of shareholder wealth in the 2-digit industry in that year, again excluding the firm itself from the calculation and using total assets to weight each individual firm.[22]

Like in Panel A, all regressions include firm fixed effects and year fixed effects. We also control for a quadratic in CEO age and a quadratic in CEO tenure. The regressions include more than twice the data points of Panel A because we can now use all firms, not only those in the traded

[21] We also investigated the use of 1-digit and 3-digit industry means as instruments and found qualitatively similar results.

[22] These mean industry performance measures are constructed from COMPUSTAT. To maximize consistency of the performance measures between Yermack's firms and the rest of industry, we also compute shareholder wealth and income to assets ratios from COMPUSTAT for the firms in Yermack's. Because not all firms in Yermack's data are present in COMPUSTAT in every year, we lose about 800 firm-year observations.

goods sector. Panel B shows a pattern quite similar to Panel A. The pay for luck relationship in all specifications again roughly matches the pay for general performance. Besides reinforcing the findings of Panel A, these latest findings suggest that previous RPE results arose probably not because of mismeasurement of the reference industry or of the industry shock but because of true pay for luck.

3.2.4 Could Pay for Luck Be Optimal?

Since the results so far clearly establish pay for luck or a lack of performance filtering, it is natural to ask whether pay for luck could in fact be optimal. Are there complications to the agency model that would generate pay for luck in an optimal contract? We could think of at least three.

First, we have assumed that o is contractible. If o cannot be contracted upon or measured well, the empirical tests developed in section 2.3 are no longer valid. In practice, we do not believe this is important for most of our findings. First, it is difficult to believe that non-contracting issues can explain our results in the oil industry case study: the price of crude oil can easily be measured and written into a contract. Second, even in the presence of non-contractibility, subjective performance evaluation should effectively filter (see Baker, Gibbons and Murphy, 1994). The only problem with subjective performance evaluation relates to commitment issues, but these are unlikely to be a problem for the boards of directors of the large firms we study here.

Second, we have neglected the possibility of indirect incentives one may want to provide to the CEO, for example to forecast, respond to, or hedge against luck.[23] This kind of argument can be most readily evaluated in our oil industry application. Suppose a particularly talented CEO in the oil industry understood the political subtleties of the Arab countries and forecasted the coming of

[23] An argument similar to hedging has been made by Diamond (1998). Tying pay to luck may generate incentives for the CEO to change his correlation with the luck variable. In practice, diversification would seem to be in the interest of management and not shareholders. Tufano (1996), for example, demonstrates that managerial characteristics, such as share or option ownership, are quite predictive of risk management in a sample of gold firms.

the positive oil shock at the beginning of the 1980's. By increasing output from existing oil wells, increasing inventories, or intensifying search for new wells, he could have increased his firm's profits when the shock did come. Shouldn't shareholders reward this farsighted CEO? The important point here is that those CEOs who were *exceptional* in having forecasted should indeed be rewarded. But this is not what we test for. We use *none* of the firm to firm variation in response to the oil shock. We merely test whether the *average* firm experiences a rise (or fall, for the negative shocks) in pay. Put another way, our results suggest that a CEO who responds to the shock exactly the same way as every other oil CEO is rewarded. This cannot be a reward for having forecasted well. Again, one may want to reward CEOs for exceptional responsiveness to shocks, but there is little reason to reward them for just average responsiveness.

Third, the reservation utility of the CEO could be affected by the random factor o. When the oil industry enjoys good fortune, the human capital of oil CEOs may simply become more valuable. Firms then pay their oil CEOs more simply to match their increased outside options. Thus, pay for luck is optimal here not as an incentive device, but merely because the optimal *level* of pay increases with luck. Some objections can be raised against this view as well. First, it is unclear why CEO human capital should become more valuable as industry fortunes rise. For example, it may be exactly in bad times that having the right CEO is most valuable. A priori, either relationship seems plausible. Second, we have found some evidence of asymmetries in the pay-for-luck relationship that are hard to reconcile with that view (and easy to reconcile with a skimming view). "Good luck" seems to matter more than "bad luck". For example, average CEO compensation in the oil industry always goes up when the price of crude oil goes up but does not always go down when the price of crude oil goes down. Also, when we separate positive and negative mean industry shocks, it appears that pay responds more to positive industry shocks than to negative industry shocks (while there are no asymmetries in the sensitivity of pay to individual firm performance).[24]

Finally, one might argue that pay for luck is a form of risk sharing between CEOs and firms. If firms are effectively risk averse, perhaps because of liquidity constraints, they may want to share some of the risks they face with their CEO. This argument is best evaluated in the context of our oil industry study. It is hard to imagine why the large oil producers we study, which are usually awash in cash and have excellent bond ratings (perhaps because large holdings of pledgeable assets), would need to share risk with the CEO. Even if these firms needed to lay off risk, they can readily take futures positions in oil which would allow them to share the risk with a market better able to take on the risk than the CEO. Similarly, exchange rate futures markets are active. Of course, one could argue that for mean industry movements futures markets may not be as readily available. But this explanation would then only apply to this third luck measure, whereas our results hold similarly for all the measures.

While we have provided arguments against these various extensions of the simple agency model, in the end we still believe that they merit serious consideration. They suggest to us that the pay for luck finding does not per se rule out agency models. We deal with this issue by examining how corporate governance affects CEO pay.

3.3 The Effect of Governance

The skimming view makes a further prediction. Since it emphasizes the CEOs' ability to gain control of the pay process, corporate governance should play an important role in skimming. It is exactly in the poorly governed firms where we expect CEOs to most easily gain control of the pay process. This suggests that we should expect more pay for luck in the poorly governed firms.

To examine how pay for luck differs between well and poorly governed firms, we estimate two

[24]These results, not directly reported here, are available upon request from the authors. They hold quite strongly for accounting measures of firm performance but are not present for market measures of firm performance.

equations. First, in order to provide a baseline, we ask how pay for general performance (not luck) differs between well and poorly governed firms. We estimate an OLS equation similar to equation (2) except that we allow the pay for performance coefficient to depend on governance:

$$y_{it} = \alpha_i + \alpha_t + \alpha_X * X_{it} + \alpha_G * Gov_{it} + \beta * perf_{it} + \gamma * (Gov_{it} * perf_{it}) + \epsilon_{it} \tag{6}$$

where Gov_{it} is a measure of governance. To understand this equation, differentiate both sides with respect to $perf_{it}$:

$$\frac{\partial y_{it}}{\partial perf_{it}} = \beta + \gamma * Gov_{it}$$

The sensitivity of CEO pay to performance depends on the governance variable. A positive value for γ would imply that better governed firms show greater pay for performance.

Equation (6) of course tells us nothing about pay for luck, merely about pay for performance. To get at pay for luck, we re-estimate this equation using our two stage instrumental variables procedure.[25] We then compute an estimate of the effect of governance on pay for general performance, $\hat{\gamma}$ and an estimate of the effect of governance on pay for luck, $\hat{\gamma}_{Luck}$.

Our test then consists in comparing $\hat{\gamma}$ and $\hat{\gamma}_{Luck}$. We will speak of *more pay for luck* in poorly governed firms when poorly governed firms display more pay for luck *relative* to pay for general performance. If poorly governed firms simply gave more pay for performance and pay for luck rose as a consequence, we would not refer to this as more pay for luck. In practice, we will see that it is pay for luck that changes with governance, while pay for performance hardly changes.

[25] An extremely important caveat here: our approach allows for the possibility that better governed firms may have a different responsiveness of *performance* to luck. Technically, performance $perf_{it}$, the endogenous variable we need to instrument, appears both directly and indirectly (the term $Gov_{it} * perf_{it}$) in this equation. When we instrument, we perform *two* first stages, one for the direct effect $perf_{it}$ and one for the interaction term $Gov_{it} * perf_{it}$. This procedure is crucial because it allows the effect of luck on performance to depend on governance.

3.3.1 Large Shareholders

In Table 4, we implement this framework for the case of large shareholders. We ask whether the presence of large shareholders affects pay for luck. Shleifer and Vishny (1986), among others, argue that large shareholders improve governance in a firm. A single investor who holds a large block of shares in a firm will have greater incentives to watch over the firm than a dispersed group of small shareholders.[26] In our context, the idea of large shareholders fits most naturally as this matches our intuition of "having a principal around." Yermack data contains a variable which counts the number of individuals who own blocks of at least 5 percent of the firm's common shares.[27] We further know whether these large shareholders are on the board or not. A priori, one might expect that large shareholders on the board have the greatest impact. They can exert their control not just through implicit pressure or voting, but also with a direct voice on the board. Since the information is available, we will consider the effect of both all large shareholders and of only those on the board.

The first four columns of Table 4 use all large shareholders as our measure of governance. All regressions include the usual controls. Column (1) estimates how the sensitivity of pay to performance depends on governance for accounting measures of performance. The first row tells us that a firm with no large shareholders shows a sensitivity of log compensation to accounting return of 2.18. An increase in accounting return of one percentage point leads to an increase in pay of about two percent. The second row tells us that adding a large shareholder only weakly decreases the sensitivity of pay to general performance, and this effect is not statistically significant. For example, a one percentage point increase in accounting return now leads to a 2.09 percent increase in pay when the firm has one large shareholder and not a 2.18 percent increase in pay. Column

[26]They also point out a possible opposite effect: very large shareholders may have a greater ability to expropriate rents for themselves. This effect is likely to be greatest in other countries where investor protection is weakest.

[27]Whenever CEOs happen to own such a block, we exclude them from the count.

(2) estimates how large shareholders affect pay for luck.[28] As before, the first row tells us that there is significant pay for luck. The second row here tells us, however, that this pay for luck diminishes significantly in the presence of a large shareholder. A one percentage point increase in accounting returns due to luck leads to roughly a 4.6 percent increase in pay when there is no large shareholder but only a 4.2 percent increase in pay when there is one more large shareholder. Each additional large shareholder decreases this effect by .4 percent. This is a 10% drop in the pay for luck coefficient for each additional large shareholder.

Columns (3) and (4) estimate the same regressions using market measures of performance. In this case, the pay for general performance does not depend at all on the existence of a large shareholder (a coefficient of .001 with a standard error of .007). We again find, however, that pay for luck diminishes with the presence of a large shareholder. While the result is only significant at the 10% level, the economic magnitude is larger. The pay for luck coefficient now drops $\frac{.066}{.383} \approx 17\%$ for each large shareholder.

In columns (5) through (8) we repeat the above exercise but altering the governance measure. We now focus only on large shareholders on the board. Comparing columns (6) and (2), we see that the governance effect strengthens significantly with respect to the filtering of accounting performance. We see that the pay for luck drops by 33 percent for each additional large shareholder. The results are very statistically significant. On market performance measures, we find the effect also rises but less dramatically. In column (8), the pay for luck drops 23 percent with each large shareholder on the board. Moreover, this last result is insignificant. In summary, our findings in Table 4 highlight how large shareholders (especially those on the board) affect the extent of pay for luck. Firms with more large shareholders show far less pay for luck.

[28] In all that follows, we will use mean industry performance as our measure of luck since this produces the most powerful first stages in the IV framework.

3.3.2 Entrenchment and Large Shareholders

The results in Table 4 simply compare firms with large shareholders to firms without. This ignores the effects of CEO tenure, another important determinant of governance. A common belief is that CEOs who have been with the firm longer have had a chance to become entrenched, perhaps by appointing friends on the board. In this case, we would expect high tenure CEOs to show the greatest pay for luck. Moreover, we would expect this effect to be strongest in those firms where governance is weak and there is no large shareholder present to limit the increased entrenchment. Hence, in the absence of large shareholders, we expect fairly strong governance early in a CEO's tenure but this governance should weaken over time as he entrenches himself. In the presence of large shareholders, we not only expect stronger governance but also that this stronger governance should last throughout the CEO's tenure. It is harder for a CEO to begin stacking the board when there is a large shareholder around. Thus we expect a rise in pay for luck with tenure in the absence of a large shareholder, but less of a rise (or even no rise) in the presence of a large shareholder.

Table 5 tests this idea. We first sort firms into two groups based on whether they have a large shareholder present on the board.[29] This produces 740 or so data points for firms with large shareholders and 3880 or so data points for firms without large shareholders. For each set, we now *separately* estimate regression 6 for these two groups with tenure as our governance measure.

Columns (1) and (2) focus on accounting measures of performance in firms without a large shareholder. The second row tells us that while tenure does not affect pay for performance, it greatly increases pay for luck. In fact, a CEO with (roughly) the median tenure of 9 years shows about $\frac{.13*9}{3.35} \approx 35\%$ greater pay for luck than one who just began at the firm. Let us contrast this with columns (3) and (4) which estimates the same effect for firms with a large shareholder present.

[29] We focus only on large shareholders on the board because these provided the strongest results in Table 4. We have used all large shareholders and found similar, though statistically weaker, results.

Here we find that tenure does not affect pay for luck at all, while, if anything, it seems to raise pay for performance slightly.[30] Thus pay for luck increases with tenure without large shareholders but does not change with tenure with them.

Columns (5) through (8) repeat the tests of columns (1) through (4) but for market measures of performance. Here the results are less stark but still very suggestive. Comparing columns (6) and (5), we see that both pay for performance and pay for luck rise with tenure, but pay for luck rises three times as fast (.003 versus .009). The coefficient on the pay for luck, however, is only significant at the 10% level. The economic significance however stays large as a CEO with a tenure of 9 years shows an increase in pay for luck of $\frac{.009*9}{.26} \approx 31\%$ but a rise in pay for performance of only 10%. In columns (8) and (7), we see that if anything pay for luck and pay for performance both diminish with tenure.

3.3.3 Other Governance Measures and Robustness Checks

While large shareholders correspond most closely to the idea of a principal, other governance measures could also be used. Our data contain two variables that have shown to be important governance measures in the past: the size of the board and the fraction of board members that are insiders in the firm.[31] Small boards are thought to be more effective at governing firms. Yermack (1996), for example, shows that smaller boards correlate with larger q values for firms. The first four columns in Table 6 estimate the effect of board size on pay for luck. Columns (1) and (2) show that for accounting measures, the direction of the effect is the opposite of what we postulated but the coefficient is statistically insignificant. Note that the actual size of the coefficient is tiny: even a

[30] Gibbons and Murphy (1992) present evidence that CEOs with longer tenure have greater pay for performance generally.

[31] We have also examined CEO ownership and whether the founder is present. We do not report these for space reasons but both produce generally significant effects. Founders and CEOs with high insider ownership both show greater pay for luck.

huge increase in board size of 10 board members leads only to a 2% drop in pay for luck. Columns (3) and (4), however, show that there are significant effects for market measures of performance and these are of the expected sign. Consider the difference between two boards, one of which has 10 board members and one of which has 6. The big board firm shows a pay for performance coefficient of .240 and a pay for luck coefficient of .229. The smaller board continues to show a pay for performance coefficient of .228. But, it shows a pay for luck coefficient of .177. This represents a drop of $\frac{.229-.177}{.177} \approx 30\%$ in the pay for luck coefficient.

The other measure we examine is a measure of insider presence on the board. This variable is measured as fraction of board members that are firm insiders or grey directors. Columns (5) and (6) show that on accounting measures, insider presence dramatically increases the pay for luck coefficient (significant at the 10% level). In a board with ten directors, turning one of the outside directors from an outsider to an insider increases pay for luck by $\frac{4.51*.1}{2.27} \approx 20\%$. The effect on pay for performance is negative and small. Columns (7) and (8) show that on market performance measures, insider board presence again increases pay for luck, but while the coefficient continues to be economically large it is statistically quite insignificant.

We turn to our last governance measure in columns (9) through (12), where we construct an index that aggregates all the governance measures used so far: number of large shareholders, number of large shareholders on the board, board size and insider presence on board. To form the index, we demean each of the four governance variables, divide it by its standard deviation, and then take the sum of these standardized variables. For board size, we use negative of board size in this procedure. For fraction of insiders on the board, we use one minus that fraction. This guarantees that the resulting governance index has larger values whenever the firm is better governed.[32]

[32]This particular way of proceeding will tend to count large shareholders on the board *twice*, once as on the board and once as general large shareholders. This is a crude way of incorporating our prior belief (supported by the findings in Table 4) that large shareholders on the board matter more. When we use either measure in the index alone, we find qualitatively similar results. We have also estimated a regression in which we include all four governance measures

For accounting measures of performance (columns (9) and (10)), we again find that pay for luck diminishes with the governance, while pay for performance does not change. The coefficient, however, is only significant at the 10% level. To gauge the magnitude of these effects, consider a one standard deviation increase in the governance index, about 2. Such an increase leads to a $\frac{-.216*2}{4.23} \approx 10\%$ fall in the pay for luck coefficient. When we use market measures (columns (11) and (12)), increase in the governance index greatly reduces pay for luck but hardly affects pay for performance. In this case, the coefficients are significant at the 5% level. Moreover their magnitude is bigger. A one standard deviation increase in governance decreases pay for luck by 26%.

Finally, we investigate the robustness of our findings. The primary concern one might have is that we have not adequately controlled for firm size. One might worry that large firms have quite different pay for performance sensitivities than small firms (Baker and Hall, 1999). If this also translates into different pay for luck sensitivities, the estimates above might confuse this size effect for a governance "effect."[33] A concrete version of this problem might arise in the risk sharing hypothesis above. If larger firms are simply more able to bear risk then they may pay less for luck.

In Table 7, we address this problem by controlling for size interacted with performance. We re-estimate equation 6 but this time include a term $Size * perf_{it}$. Our measure of size in these regressions is average log real assets of the firm over the period. We investigate two governance measures: large shareholders on the board and the governance index.[34] Columns (1) through (4) are to be compared to columns (5) through (8) of Table 4. We see that the effect of governance on the filtering of accounting rates of return in fact strengthens when these controls are added (−2.23 versus −1.48). The effects on market performance measures, however, weaken slightly (.059 versus

(and their interactions) together. These regressions showed all the governance measures entering with the same sign and only the large shareholder variables being statistically significant.

[33]We have also attempted other robustness checks. We checked whether pay for luck happened over longer time horizons by aggregating our data over several years as well as looking at lags. We also allowed for interactions between performance and year in our regressions. These modifications did not alter our qualitative findings.

[34]We have reestimated all the previous tables with these controls and found similar results.

.076). Columns (5) through (8) use the governance index and are to be compared to columns (9) through (12) in Table 6. This comparison shows that the results weaken very slightly (−.197 versus −.216) for accounting measures as well as for market measures (−.027 versus −.033). For both governance measures, however, the results remain economically significant. In two of the cases (column 4 and to some extent column 6), they remain statistically insignificant. In the other two, they remain statistically significant.

3.3.4 Summary of Pay for Luck Findings

The pay for luck regressions have helped establish five main facts. The first three facts relate to the direct finding of a pay for luck relationship. First, CEOs are rewarded for luck as much as they are rewarded for general performance changes. Second, the pay for luck occurs for various luck measures, such as oil price changes and exchange rate movements, and not only for mean industry movements. Third, CEOs are as much rewarded for luck through changes in salary and bonus as they are through changes in the value of options granted.

The last two facts relate to the effects of governance on the pay for luck relationship. Fourth, the presence of large shareholders (and to a lesser extent, smaller boards or less insiders on the board) reduces the extent of pay for luck. An additional large shareholder on the board reduces the pay for luck by 23 to 33%, depending on the performance measure. Fifth, as CEO tenure increases, pay for luck increases but only when there is no large shareholder present on the board.

4 Charge For Options

We now turn to a second prediction of the skimming view. The idea for this second test centers around the fact that stock option grants never appear on balance sheets.[35] Under the skimming model, this makes options grants an attractive way to skim. If shareholders primarily focus on the balance sheet bottom line, stock options might allow the CEO to take money out of the firm without attracting shareholder attention. In skimming models, therefore, options represent "free money." Because CEOs are not charged for them, they cannot lose. If the stock does well, they make money. If it does not, they are no worse off.

In contrast to this prediction, agency models predict that CEOs should be completely charged for their options. Consider a firm that *for an exogenous reason* increases the amount of stock options it gives to its CEO. Further suppose that this increase in options is worth one million dollars according to Black-Scholes. While these extra options incentivize the CEO, they are also an increase in his overall utility. In expected value, he is been given one million dollars. Agency theory predicts, therefore, that other components of pay would be adjusted downwards in order to leave the CEO indifferent between the new and old compensation packages. Since the CEO is risk averse, the million dollars in options is worth less to him than one million dollars in expected utility terms. So other components of pay would go down by less, but they would go down nevertheless. Examining whether CEOs are charged for options could therefore provide another test of skimming against agency models.

[35] Accounting rules for stock options issued to employees were decided by the predecessor of the Financial Accounting Standards Board, the Accounting Principles Board. They date back to 1972. See Murphy (1999) for more details.

4.1 Empirical Methodology

To implement this test, consider the following regression:

$$Other_{it} = \alpha_i + \alpha_t + \alpha_X * X_{it} + \beta * Option_{it} + \epsilon_{it} \tag{7}$$

where $Other_{it}$ is the *level* of CEO compensation for firm i in year t, *excluding* the value of the new option grants, α_i are firm fixed effects, α_t are time fixed effects, X_{it} are firm and CEO specific characteristics and $Option_{it}$ is the *level* of the new stock options granted in that year.

Directly testing whether CEOs are being optimally charged when they are granted new stock options would require an *exogenous* shock to $Option_{it}$, the use of stock options in CEO compensation packages. Under the optimal contracting model, we would then expect the coefficient on $Option_{it}$, β_1, to be negative but larger than -1. Moreover, the higher the CEO's level of risk aversion, the smaller the absolute value of β.

In practice, however, such a regression would be mispecified. Changes in options grants are at least partly driven by a desire to give the CEO more overall compensation (perhaps because of changes in the executive's performance or outside opportunities). This suggests that when options rise, other components of pay will also rise. Because we cannot perfectly control for all the factors that might induce a rise in overall compensation in X_{it}, the estimated β will be biased upward and could even be positive. We would then tend to erroneously reject the hypothesis that individual rationality constraint holds in CEO compensation.[36] The exogeneity assumption required to estimate equation (7) is too severe.

Fortunately, we can get around this problem. As with the pay for luck coefficient, we can focus not on the direct effect of $Options_{it}$ on $Other_{it}$ but on how this effect varies with the level of

[36] In practice, when we directly regress the level of option grants on the other components of compensation, only accounting for CEO tenure and CEO age in addition to the firm and year fixed effects, we find a positive coefficient of .046. Interestingly, when we add various firm performance measures (sales, income to assets ratio, level of shareholder wealth) and also allow for industry specific shocks (interactions of time dummies with 2-digit SIC industries), the coefficient on $Option_{it}$ goes *up*, not down (.051).

governance. We thus propose to estimate instead the following regression:

$$Other_{it} = \alpha_i + \alpha_t + \alpha_X * X_{it} + \alpha_G * Gov_{it} + \beta * Option_{it} + \gamma * (Option_{it} * Govit) + \epsilon_{it} \quad (8)$$

where Gov_{it} is the governance variable under study (ownership concentration for example) and $Option_{it} * Gov_{it}$ is the interaction of the governance variable with the value of the new options granted. As before, differentiate both sides with respect to $Option_{it}$ to get:

$$\frac{\partial Other_{it}}{\partial Option_{it}} = \beta + \gamma * Gov_{it}$$

showing that the charge for options depends on the level of governance. We propose to test whether the coefficient γ is negative indicating that CEOs are more charged for options when governance increases.

Could the same biases that led to an upward bias of β lead to a bias of γ? In short, if the omitted variables problem affects both well governed and poorly governed firm equally, we have a valid test. It is only when well governed firms are *less* affected by the bias that we would spuriously estimate a coefficient of $\gamma < 0$. While it is typically quite hard to imagine why this particular omitted variable bias structure should arise (or why it should be similar across governance measures), there is one scenario where it might occur. Suppose following an increase in reservation utility or performance, well governed firms tended to pay out a greater fraction of the subsequent pay increase as options. In other words, suppose better governed firms used more options in their pay packages for the marginal increase in compensation. This difference would lead to an apparently smaller coefficient β for them and lead to a bias downward on γ.[37]

We can actually test whether this is the case by computing whether in the data stock option grants are a bigger fraction of total compensation for better governed firms. Table A3 in the appendix shows that, except for the presence of any large shareholder, the relative use of stock

[37] For details, an appendix is available from the authors.

options grants is not larger among the firms with better governance. In fact, it is 4% smaller for the firms that have at least one large shareholder on their board than among the firms that do not.[38]

4.2 Large Shareholders and the Charge for Options

In Table 8, we use large shareholders as our measure of governance and examine whether the CEOs that are monitored by large shareholders are more charged for the options they are given. Columns (1) through (4) use all large shareholders as the measure, while columns (5) through (8) use only those on the board. In all regressions, the dependent variable is the real value of compensation *excluding* the value of option grants. Included as regressors in each regression are year fixed effects, firm fixed effects, a quadratic in age, a quadratic in experience and performance controls such as real sales, income to assets ratio and shareholder wealth. Also included are, of course, the real value of options grants, the corporate governance variable under study and the interaction of the governance variable with the real value of options grants.

The first row of column (1) tells us that, in the absence of any large shareholders, each extra dollar of option grants leads to another 5 cents in non-option based compensation. This positive coefficient emphasizes the omitted variable bias that we face. The second row indicates a statistically significant coefficient on the large shareholders interaction term, suggesting large shareholders lead CEOs to be more charged for the options for they are given. The economic size, however, is small. Each additional large shareholders leads the CEO to be charged an extra cent for each dollar in options he is given.

We verify the robustness of our findings to allowing the coefficients on the governance variable

[38]In fact, this pattern makes more sense from an agency standpoint. Assuming that governance and pay-for-performance are substitute incentive mechanisms, better governed firms would use less options. It also makes more sense from a skimming standpoint. Poorly governed CEOs would skim more, since they are charged less for them and so would have options be a bigger part of total compensation.

and on the options grants variable to change over time. For example, one might be concerned that the relative use of options has trended up over time and that the governance variable displays a similar trend. Allowing for year dummies interacted with the options grants variable takes care of this concern. Allowing the coefficient on large shareholders to change over time (column 2) does not affect the basic finding. When we allow the coefficient on option grants to be time dependent (column 3), the effect of large shareholders on the charge for options, while qualitatively unchanged, drops in both economic and statistical significance. The same pattern holds in column 4 where we allow both the coefficient on option grants and the coefficient on large shareholders to change over time.

In columns (5) to (8), we focus on large shareholders that sit on the board and find somewhat stronger results. The $-.05$ coefficient in column (6) suggests that one extra shareholder increases the charge on options by 5 cents on the dollar. To assess the magnitude of these findings, consider a CEO who gets one million dollars worth of options in each year. If we add a large shareholder on to the board of his firm, the charge he faced on these options would increase by $50,000$ dollars. The effect becomes slightly smaller (about 3 cents on the dollar or $30,000$ dollars in our example) when we allow for the coefficient on option grants to be time-dependent, but it stays strongly significant (columns (7) and (8)).

In summary, the results in Table 8 confirm our previous finding of an important role of large shareholders in increasing the rationality of CEO compensation. The contrast between large shareholders sitting and not sitting on the board is stronger here than it appeared in our analysis of the reward for luck. When it comes to financially charging CEOs for the options they are granted, a large shareholder that is also a director appears much more effective than a large shareholder that is not represented on the board.

In the reward for luck test, we examined CEO entrenchment by comparing the effect of CEO tenure on pay for luck in firms with and without large shareholders on their board. We replicate this exact same exercise in Table 9 in our test of the charge for options grants. Columns (1) and (2) examine the effect as a function of whether there is a large shareholder present. As before, we separate firms into two groups based on whether they have or not a large shareholder on their board. The patterns in Table 9 strikingly match the patterns in Table 5. In the absence of large shareholders on the board, CEOs get charge less and less for their options as their tenure increase. Each extra year of tenure increases the coefficient on "value of options grants" by .4 and .8 cent, depending on the specification. On the contrary, when large shareholders are present to limit board capture, there is no evidence that longer tenure is associated with more uncharged options. In fact, among the firms with such active boards, we find that the more experienced CEOs are the more they are charged for new options grants.

To gauge the magnitude of this effect, let's compare two CEOs, one with 9 years of tenure and one just beginning with the firm (0 years of tenure), Suppose both are given options grants of one million dollars. The entrenched CEO would be charged 80,000 dollars less according to column (1) for his options if there is no large shareholder present. If there is a large shareholder present (column 2), he would be charged 40,000 dollars more. Thus the presence of a large shareholder costs 120,00 dollars *more* to the entrenched CEO.

4.2.1 Other Governance Measures and Robustness

As with the pay for luck test, we replicate our results with other governance measures. Columns (1) to (4) of Table 10 use board size. We find that larger boards charge CEOs less for the options they grant. Consider again a grant of one million dollars worth of options. Relative to a board with 6 directors, a board with 10 directors charges its CEO between 36,000 and 72,000 dollars less (columns (1) and (4)).

In columns (5) to (8), we examine the effect of insider presence on the board. Here we find a sign on the interaction term that is contrary to our initial expectation and that is in fact significant in columns (5) and (6). However, unlike what we observe for the other governance measures, this result is not robust. When we allow the effect of options grants to vary by year, the effect greatly diminishes. While it remains of the wrong sign, it is not statistically significant and it is economically very small. Converting a board member to an insider in a 10 person board reduces the charge for a million dollar option grant by only four thousand dollars. This is an order of magnitude smaller than the effects we found earlier. Thus the results in columns (5) and (6) seem to arise primarily from a spurious relationship between fraction insiders and time.

We then ask how a composite index of governance explains variation in the financial charge for options across firms. As before, we construct this index by taking the unweighted average of the standardized values of four governance variables: the number of all shareholders, the number of large shareholders in the board, minus board size and the share of outsiders on the board.[39] In all specifications (columns (9) to (12)), we find that better general corporate governance is associated with a higher charge for options grants. The magnitude is again moderate. A one standard deviation increase in the governance index (about 2) leads to an extra charge of between 36,000 and 56,000 dollars for a million dollar grant in options.

Finally, assuming that the governance variables we have isolated in our data are correlated to firm size, one might wonder whether we are able to explain any of the variation in the charge for options grants beyond the variation that is related to firm size. We, therefore, reestimate equation 7 but with an additional control for $Size * Option_{it}$, where size is measured as in Table 7: average

[39]The variables are standardized by demeaning and dividing by standard deviations. Note the same caveat as before holds. Large shareholders on the board count twice in this measure. As before, if we include only large shareholders on the board, we find similar results.

log assets of the firm over the sample period. The addition of a size control does not change the coefficients of interest at all. The results are shown in Table 11 for 2 of the governance measures: large shareholders on board and the governance index. Comparing column (1) to column (6) and column (2) to column (8) in Table 8 shows that the coefficient is roughly the same (−.040 versus −.046 and −.031 versus −.030). Columns (3) and (4) can be compared to columns (10) and (12) in Table 10. Again the coefficients are roughly similar and stay highly significant. Note that for all the specifications in Table 11, we find some evidence that large firms charge less for the options they grant.

To summarize, the results in this second test closely mirror our findings in the pay for luck test.[40] Firms with large shareholders charge their CEOs more for the options they are granted. CEO tenure seems to decrease the charge for options if there are no large shareholder on the board, but perhaps even increase it if there is any. We find qualitatively similar results for board size and for the governance index. Finally, our results do not seem to be simply driven by firm size.

5 Summary and Conclusion

We began this paper in an attempt to "distinguish" between the agency and the skimming view of CEO compensation. To this end, we examined whether CEOs are rewarded for luck and whether they are charged for options. For each of these specific tests, we learned some lessons. In the pay for luck test, we found a significant amount of pay for luck for a variety of measures. As noted, this generalizes the findings of the relative performance evaluation literature and suggests that the lack of RPE is not a specific result due to strategic competitive effects in the product market. We also found that better governed firms use significantly less pay for luck than worse governed firms.

[40]The spurious estimates on fraction insiders is the exception.

Adding a large shareholder on the board, for example, decreased the pay for luck by 23 to 33%. This finding weakens two prominent explanations of pay for luck: "Paying for luck is optimal" and "Filtering out luck is too hard."

In the charge for options test, we found that better governance increased the charge for options. A CEO who is given one million dollars in options would be charged between 30 and 50 thousand dollars more for these options if his firm had a large shareholder present on the board. This dependence of the charge for options on governance suggests that poorly governed CEOs are not being charged enough for their options. Though we do not have direct evidence, the fact that options do not appear on balance sheets may well be the culprit. Small shareholders, not involved in board discussion and simply tracking the bottom line of their company's balance sheet, may simply not be aware of new options grants. These findings suggest that a simple policy intervention, forcing firms to put options on the balance sheets, could result in a curtailing of some skimming of pay.

More broadly, though, the results in this paper encourage a revision of our views on CEO pay. In contrast to the view painted in the introduction, the skimming and agency models are not to be "distinguished" but rather serve as complementary views. Well governed firms conform to the predictions of the agency theory, while poorly governed firms conform to the predictions of the skimming theory. In other words, principal agent models work best when there are in fact individuals around to act as principals.

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Table 1: Pay for Luck for Oil CEOs
(Luck Measure is log Price of Crude Oil)
Dependent Variable: Ln (Total Compensation)[a]

Specification:	General (1)	Luck (2)	General (3)	Luck (4)
Acc. Rate of Return	.82 (.16)	2.15 (1.04)	—	—
Ln(Sh. Wealth)	—	—	.38 (.03)	.35 (.17)
Age	.05 (.02)	.07 (.03)	.05 (.02)	.05 (.02)
$Age^2 * 100$	-.04 (.02)	-.05 (.02)	-.04 (.02)	-.04 (.02)
Tenure	.01 (.01)	.01 (.01)	.01 (.01)	.01 (.01)
$Tenure^2 * 100$	-.03 (.02)	-.03 (.01)	-.03 (.02)	-.03 (.02)
Firm Fixed Effects	Yes	Yes	Yes	Yes
Year Quadratic	Yes	Yes	Yes	Yes
Sample Size	827	827	827	827
Adjusted R^2	.70	—	.75	—

[a]Notes:

1. Dependent variable is the logarithm of total compensation. Performance measure is accounting rate of return in columns (1) and (2) and the logarithm of shareholder wealth in columns (3) and (4). All nominal variables are expressed in 1977 dollars.
2. Summary statistics for the sample of oil firms are available in Appendix Table A1.
3. The luck regression (columns 2 and 4) instrument for performance with the logarithm of the price of a barrel of crude oil in that year, expressed in 1977 dollars.
4. Each regression includes firm fixed effects and a quadratic in year.
5. Standard errors are in parentheses.

Table 2: Summary Statistics
Full Yermack CEO Sample [a]

	Mean	S. D.
Age of CEO	57.42	6.84
Tenure of CEO	9.10	8.08
Salary and Bonus	901.69	795.15
Ln(Salary and Bonus)	6.62	.60
Total Compensation	1595.85	3488.32
Ln(Total Compensation)	6.98	.81
Number of Large Shareholders (All)	1.12	1.42
Number of Large Shareholders on Board	.24	.74
Board Size	13.45	4.54
Fraction of Insiders on Board	.42	.19

[a]Notes:

1. Sample period is 1984-1991.
2. All nominal variables are expressed in thousands of 1991 dollars.

Table 3: Pay for Luck[a]

Dep. Var.:	Cash Comp		Ln(Cash)		Ln(Tot Comp)		Ln(Cash)		Ln(Tot Comp)	
Spec.:	General	Luck	General	Luck	General	Luck	General	Luck	General	Luck
Panel A: Luck Measure is Exchange Rate Shock										
Income	.17 (.02)	.35 (.16)	—	—	—	—	—	—	—	—
$\frac{Income}{Assets}$	—	—	2.13 (.16)	2.94 (1.28)	2.36 (.28)	4.39 (2.17)	—	—	—	—
Ln(Shareholder Wealth)	—	—	—	—	—	—	.22 (.02)	.32 (.13)	.31 (.03)	.57 (.23)
Sample Size	1737	1737	1729	1729	1722	1722	1713	1713	1706	1706
Adjusted R^2	.75	—	.75	—	.58	—	.75	—	.59	—
Panel B: Luck Measure is Mean Industry Performance										
Income	.21 (.02)	.34 (.10)	—	—	—	—	—	—	—	—
$\frac{Income}{Assets}$	—	—	2.18 (.12)	4.02 (.53)	2.07 (.21)	4.00 (.86)	—	—	—	—
Ln(Shareholder Wealth)	—	—	—	—	—	—	.20 (.01)	.22 (.12)	.25 (.02)	.29 (.19)
Sample Size	4684	4684	4648	4648	4624	4624	4608	4608	4584	4584
Adjusted R^2	.77	—	.81	—	.70	—	.82	—	.71	—

[a]Notes:

1. Dependent variable is the level of salary and bonus in columns (1) and (2), the logarithm of salary and bonus in columns (3), (4), (7) and (8) and the logarithm of total compensation in columns (5), (6), (9) and (10). Performance measure is operating income before extraordinary items in columns (1) and (2) (in millions), operating income to total assets in columns (3) to (6) and the logarithm of shareholder wealth in columns (7) to (10). All nominal variables are expressed in real dollars.
2. In the luck regressions in Panel A, the performance measure is instrumented with current and lagged appreciation and depreciation dummies and current and lagged exchange rate index growth. First-stage regressions are presented in Appendix Table A2.
3. In the luck regressions in Panel B, the performance measure is instrumented with the total assets-weighted average performance measure in the firm's 2-digit industry (the firm itself is excluded from the mean calculation).
4. Each regression includes firm fixed effects, year fixed effects and demographic controls (quadratics in age and tenure).
5. Standard errors are in parentheses.

Table 4: Large Shareholders and Pay for Luck

(Luck Measure is Mean Industry Performance)

Dependent Variable: Ln(Total Compensation)[a]

Governance Measure:	Large Shareholders				Large Shareholders on Board			
Spec.:	General (1)	Luck (2)	General (3)	Luck (4)	General (5)	Luck (6)	General (7)	Luck (8)
$\frac{Income}{Assets}$	2.18	4.59	—	—	2.14	4.49	—	—
	(.238)	(.912)			(.217)	(.882)		
Governance* $\frac{\textbf{Income}}{\textbf{Assets}}$	-.094	-.416	—	—	-.181	-1.48	—	—
	(.094)	(.204)			(.176)	(.396)		
ln(Shareholder Wealth)	—	—	.249	.383	—	—	.258	.318
			(.018)	(.219)			(.017)	(.199)
Governance* **ln(Shareholder Wealth)**	—	—	.001	-.066	—	—	-.019	-.076
			(.007)	(.036)			(.016)	(.053)
Governance	-.009	.018	-.017	.411	-.006	.084	.100	.480
	(.011)	(.018)	(.049)	(.240)	(.021)	(.033)	(.108)	(.356)
Sample Size	4610	4610	4570	4570	4621	4621	4581	4581
Adj. R^2	.695		.706		.694		.706	

[a]Notes:

1. Dependent variable is the logarithm of total compensation. Performance measure is operating income to total assets. All nominal variables are expressed in real dollars.
2. In all the luck regressions, both the performance measure and the interaction of the performance measure with the governance measure are instrumented. The instruments are the asset-weighted average performance in the 2-digit industry and the interactions of the industry performance with that governance measure.
3. "Large Shareholders" indicates the number of blocks of at least five percent of the firm's common shares, whether the block holder is or is not a director."Large Shareholders on Board" indicates the number of blocks of at least five percent of the firm's common shares that are held by directors of the board.
4. Each regression includes firm fixed effects, year fixed effects, a quadratic in age and a quadratic in tenure.
5. Standard errors are in parentheses.

Table 5: Tenure, Large Shareholders and Pay for Luck
(Luck Measure is Mean Industry Performance Mean Industry Performance)
Dependent Variable: Ln(Total Compensation)[a]

	Any Large Shareholder on the Board?							
	No		Yes		No		Yes	
Spec.:	Gen (1)	Luck (2)	General (3)	Luck (4)	General (5)	Luck (6)	General (7)	Luck (8)
$\frac{Income}{Assets}$	2.14 (.30)	3.35 (.96)	1.28 (.65)	2.47 (2.60)	—	—	—	—
CEO Tenure* $\frac{Income}{Assets}$	.00 (.02)	.13 (.05)	.063 (.045)	-.006 (.131)	—	—	—	—
Ln (Sh. Wealth)	—	—	—	—	.24 (.02)	.26 (.24)	.27 (.05)	.53 (.32)
CEO Tenure* Ln (Sh. Wealth)	—	—	—	—	.003 (.001)	.009 (.005)	-.005 (.003)	-.013 (.010)
CEO Tenure	.01 (.00)	-.00 (.01)	.010 (.011)	.016 (.016)	-.002 (.01)	-.045 (.04)	.044 (.020)	.084 (.059)
Sample Size	3884	3884	740	740	3841	3841	743	743
Adjusted R^2	.7030		.757		.715		.700	

[a]Notes:

1. Dependent variable is the logarithm of total compensation. All nominal variables are expressed in real dollars.
2. In all the luck regressions, both the performance measure and the interaction of the performance measure with the CEO tenure are instrumented. The instruments are the asset-weighted average performance in the 2-digit industry and the interactions of the industry performance with the CEO tenure.
3. Sample in columns (1), (2), (5) and (6) is the set of firm-year observations for which there is no large shareholder sitting on the board of directors; sample in columns (3), (4), (7) and (8) is the set of firm-year observations for which there is at least one large shareholder sitting on the board of directors.
4. Each regression includes firm fixed effects, year fixed effects, a quadratic in age and a quadratic in tenure.
5. Standard errors are in parentheses.

Table 6: Corporate Governance and Pay for Luck
(Luck Measure is Mean Industry Performance)
Dependent Variable: Ln(Total Compensation)[a]

Governance Measure:	Board Size				Fraction Insiders			
Spec.:	General (1)	Luck (2)	General (3)	Luck (4)	General (5)	Luck (6)	General (7)	Luck (8)
Income/Assets	2.61	5.19	—	—	2.30	2.27	—	—
	(.558)	(1.62)			(.453)	(1.24)		
Governance* Income/Assets	-.045	-.093	—	—	-.482	4.51	—	—
	(.043)	(.094)			(.853)	(2.69)		
ln(Sh. Wealth)	—	—	.216	.099	—	—	.241	.241
			(.034)	(.210)			(.029)	(.215)
Governance* ln(Sh. Wealth)	—	—	.002	.013	—	—	.027	.126
			(.002)	(.006)			(.05)	(.190)
Governance	.012	.015	-.013	-.080	.158	-.315	-.066	-.742
	(.005)	(.007)	(.016)	(.041)	(.129)	(.271)	(.407)	(1.29)
Sample Size	4624	4624	4584	4584	4624	4624	4584	4584
Adj. R^2	.695		.706		.695		.706	

Governance Measure:	Governance Index			
Spec.:	General (9)	Luck (10)	General (11)	Luck (12)
Income/Assets	2.07	4.23	—	—
	(.210)	(.865)		
Governance* Income/Assets	.007	-.216	—	—
	(.057)	(.134)		
ln(Sh. Wealth)	—	—	.249	.252
			(.016)	(.232)
Governance* ln(Sh. Wealth)	—	—	-.003	-.033
			(.004)	(.015)
Governance	-.016	.000	.010	.210
	(.007)	(.011)	(.027)	(.103)
Sample Size	4610	4610	4551	4551
Adj. R^2	.695		.705	

[a]Notes:

1. Dependent variable is the logarithm of total compensation. All nominal variables are deflated. Each regression includes firm fixed effects, year fixed effects, a quadratic in age and a quadratic in tenure.
2. "Board Size" indicates the number of members of the board of directors, as listed in the proxy statement near the start of the fiscal year. "Fraction Insiders" is the fraction of inside and "grey" directors on the board of directors. "Governance Index" is the unweighted average of 4 standardized governance variables (number of large shareholders, number of large shareholders on board, minus board size and one minus fraction insiders).
3. In all the luck regressions, both the performance measure and the interaction of the performance measure with the governance measure are instrumented. The instruments are the asset-weighted average performance in the 2-digit industry and the interactions of the industry performance with that governance measure.
4. Standard errors are in parentheses.

Table 7: Corporate Governance and Pay for Luck
Robustness Checks
(Luck Measure is Mean Industry Performance)
Dependent Variable: Ln(Total Compensation)[a]

Governance Measure:	Large Shareholders on Board				Governance Index			
Spec.:	General (1)	Luck (2)	General (3)	Luck (4)	General (5)	Luck (6)	General (7)	Luck (8)
$\frac{Income}{Assets}$	.288	36.9	—	—	-.570	12.3	—	—
	(1.14)	(14.6)			(1.31)	(6.17)		
Governance* $\frac{\textbf{Income}}{\textbf{Assets}}$	-.118	-2.23	—	—	.056	-.197	—	—
	(.18)	(.52)			(.061)	(.126)		
ln(Shareholder Wealth)	—	—	.223	-.136	—	—	.251	-.194
			(.086)	(.334)			(.098)	(.345)
Governance* **ln(Shareholder Wealth)**	—	—	-.018	-.059	—	—	-.003	-.027
			(.016)	(.053)			(.004)	(.012)
Governance	-.010	.127	.094	.365	-.019	-.002	.007	.170
	(.021)	(.038)	(.109)	(.357)	(.007)	(.010)	(.029)	(.085)
Firm Size*Performance?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sample Size	4621	4621	4581	4581	4610	4610	4551	4551
Adj. R^2	.695	—	.706	—	.695	—	.705	—

[a]Notes:

1. Dependent variable is the logarithm of total compensation. Performance measure is operating income to total assets. All nominal variables are expressed in real dollars. Each regression includes firm fixed effects, year fixed effects, a quadratic in age and a quadratic in tenure.
2. In all the luck regressions, both the performance measure and the interaction of the performance measure with the governance measure are instrumented. The instruments are the asset-weighted average performance in the 2-digit industry and the interactions of the industry performance with that governance measure.
3. "Large Shareholders on Board" indicates the number of blocks of at least five percent of the firm's common shares that are held by directors of the board. "Governance Index" is the unweighted average of 4 standardized governance variables (number of large shareholders, number of large shareholders on board, minus board size and one minus fraction insiders). "Firm Size" indicates average log assets over the sample period.
4. Standard errors are in parentheses.

Table 8: How Much Are CEOs Charged for Options Grants? The Role of Large Shareholders

Dependent Variable: Cash Compensation[a]

Governance Measure:	Large Shareholders All				Large Shareholders on Board			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Value of Options Grants	.055 (.006)	.055 (.007)	—	—	.046 (.003)	.046 (.003)	—	—
Value of Options Grants* Governance	-.011 (.005)	-.011 (.005)	-.007 (.006)	-.007 (.006)	-.050 (.008)	-.051 (.008)	-.029 (.010)	-.030 (.010)
Governance	-20.5 (13.1)	—	-25.0 (12.3)	—	11.9 (27.4)	—	-3.84 (25.8)	—
Sales	.027 (.006)	.027 (.006)	.015 (.006)	.015 (.006)	.027 (.006)	.027 (.006)	.015 (.006)	.016 (.006)
$\frac{Income}{Assets}$	1195.3 (209.7)	1203.1 (209.8)	1236.9 (196.9)	1246.2 (197.0)	1220.2 (208.3)	1222.4 (208.6)	1251.2 (196.6)	1259.4 (196.8)
Sh. Wealth (billions)	.045 (.006)	.045 (.006)	.043 (.006)	.043 (.006)	.046 (.006)	.045 (.006)	.045 (.006)	.045 (.006)
Year F.E.*Governance?	No	Yes	No	Yes	No	Yes	No	Yes
Year F.E.*Value of Options Grants?	No	No	Yes	Yes	No	No	Yes	Yes
Sample size	5085	5085	5085	5085	5103	5103	5103	5103
Adj. R^2	.627	.627	.674	.674	.630	.630	.674	.674

[a]Notes:

1. Dependent variable is the level of salary, bonus and other compensations *excluding* the value of options granted. All nominal variables are expressed in real terms (1991 dollars).
2. "Large Shareholders" indicates the number of blocks of at least five percent of the firm's common shares, whether the block holder is or is not a director; "Large Shareholders on Board" indicates the number of blocks of at least five precent of the firm's common shares that are held by directors of the board.
3. Each regression includes firm fixed effects and year fixed effects. Demographic controls include a quadratic in CEO age and a quadratic in CEO tenure.
4. Standard errors are in parentheses.

Table 9: Tenure, Large Shareholders and Charge for Options

Dependent Variable: Cash Compensation[a]

	Any Large Shareholder on the Board?							
	No	Yes	No	Yes	No	Yes	No	Yes
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Value of Options Grants	-.025 (.004)	.019 (.015)	-.025 (.004)	.014 (.015)	—	—	—	—
Value of Options Grants* Tenure	.008 (.0004)	-.004 (.001)	.008 (.0004)	-.003 (.002)	.004 (.0008)	-.006 (.002)	.004 (.0008)	-.006 (.002)
Tenure	34.3 (8.2)	40.6 (14.7)	—	—	29.6 (7.5)	47.7 (14.2)	—	—
Performance Controls?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year F.E.*Tenure?	No	No	Yes	Yes	No	No	Yes	Yes
Year F.E.*Value of Options?	No	No	No	No	Yes	Yes	Yes	Yes
Sample size	4257	860	4257	860	4257	860	4257	850
Adj. R^2	.674	.676	.674	.674	.682	.701	.682	.699

[a]Notes:

1. Dependent variable is the level of salary, bonus and other compensations *excluding* the value of options granted. All nominal variables are expressed in real terms (1991 dollars).
2. Each regression includes firm fixed effects and year fixed effects. Performance controls are sales, income to assets ratio and the value of shareholder wealth. Demographic controls include a quadratic in CEO age and a quadratic in CEO tenure.
3. Standard errors are in parentheses.

Table 10: How Much Are CEOs Charged for Options Grants? The Role of Other Governance Variables

Dependent Variable: Cash Compensation[a]

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Governance Measure:		Board Size				Fraction Insiders		
Value of Options Grants	-.214	-.214	—	—	.226	.225	—	—
	(.012)	(.012)			(.016)	(.017)		
Value of Options Grants* Governance	.018	.018	.009	.009	-.27	-.27	-.04	-.04
	(.0007)	(.0008)	(.001)	(.001)	(.02)	(.02)	(.03)	(.03)
Governance	4.04	—	6.24	—	283.7	—	190.6	—
	(5.78)		(5.67)		(157.6)		(150.0)	
Performance Controls?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year F.E.*Governance?	No	Yes	No	Yes	No	Yes	No	Yes
Year F.E.*Value of Options Grants?	No	No	Yes	Yes	No	No	Yes	Yes
Sample size	5104	5104	5104	5104	5104	5104	5104	5104
Adj. R^2	.665	.665	.678	.677	.636	.636	.673	.673

	(9)	(10)	(11)	(12)
Governance Measure:		Governance Index		
Value of Options Grants	-.008	-.008	—	—
	(.005)	(.005)		
Value of Options Grants* Governance	-.028	-.028	-.018	-.019
	(.002)	(.002)	(.003)	(.003)
Governance	-11.7	—	-16.16	—
	(9.9)		(9.4)	
Performance Controls?	Yes	Yes	Yes	Yes
Year F.E.*Governance?	No	Yes	No	Yes
Year F.E.*Value of Options Grants?	No	No	Yes	Yes
Sample size	5084	5084	5084	5084
Adj. R^2	.637	.639	.676	.677

[a]Notes:

1. Dependent variable is the level of salary, bonus and other compensations *excluding* the value of options granted. All nominal variables are expressed in real terms (1991 dollars).
2. "Board Size" indicates the number of members of the board of directors, as listed in the proxy statement near the start of the fiscal year. "Fraction Insiders" is the fraction of inside and "grey" directors on the board of directors. "Governance Index" is the unweighted average of 4 standardized governance variables (number of large shareholders, number of large shareholders on board, minus board size and one minus insiders presence). Performance controls are sales, income to assets ratio and the value of shareholder wealth. Demographic controls include a quadratic in CEO age and a quadratic in CEO tenure.
3. Each regression includes firm fixed effects and year fixed effects.
4. Standard errors are in parentheses.

Table 11: How Much Are CEOs Charged for Options Grants? Robustness Checks

Dependent Variable: Cash Compensation[a]

Governance Measure:	Large Shareholders on Board		Governance Index	
	(1)	(2)	(3)	(4)
Value of Options Grants	-.279 (.051)	—	-.181 (.052)	—
Value of Options Grants* Governance	-.040 (.008)	-.031 (.011)	-.024 (.002)	-.017 (.003)
Governance	5.59 (27.2)	-4.33 (25.7)	-13.7 (9.9)	-17.1 (9.4)
Value of Options Grants* Size	.039 (.006)	.022 (.006)	.021 (.006)	.011 (.006)
Performance Controls?	Yes	Yes	Yes	Yes
Year F.E.*Value of Options Grants?	No	Yes	No	Yes
Sample size	5103	5103	5084	5084
Adj. R^2	.633	.6	.638	.680

[a]Notes:

1. Dependent variable is the level of salary, bonus and other compensations *excluding* the value of options granted. All nominal variables are expressed in real terms (1991 dollars).
2. "Large Shareholders on Board" indicates the number of blocks of at least five precent of the firm's common shares that are held by directors of the board. "Governance Index" is the unweighted average of 4 standardized governance variables (number of large shareholders, number of large shareholders on board, minus board sise and one minus fraction insiders on board). "Sise" is time average of log real total assets for each firm.
3. Each regression includes firm fixed effects and year fixed effects. Performance controls are sales, income to assets ratio and the value of shareholder wealth. Demographic controls include a quadratic in CEO age and a quadratic in CEO tenure.
4. Standard errors are in parentheses.

Appendix Table A1: Summary Statistics 50 Largest US Oil Companies CEOs [a]

	Mean	S. D.
Age of CEO	58.562	7.892
Tenure of CEO	10.181	9.781
Total Compensation	608.269	597.194
Ln(Total Compensation)	6.125	.722

[a]Notes:

1. Data set is 50 of the 51 largest US oil companies over the period 1977-1994.
2. Total Compensation is defined as the sum of salary and bonus (cash and stock bonus), company contributions to thrift plans, other annual income and the value of the options granted to the CEO during that year, in thousands of 1977 dollars.

Appendix Table A2: Pay for Luck: First-Stage Regressions (Luck Measure is Exchange Rate Shocks)[a]

Dep. Var.:	Income	Inc. to Assets	Ln(Sh. Wealth)
	(1)	(2)	(3)
2% < Appr. < 4%	-56.588	-.006	-.039
(Current)	(26.408)	(.004)	(.047)
2% < Appr. < 4%	-15.428	.004	-.027
(Lagged)	(24.271)	(.004)	(.048)
Appr. > 4%	-68.903	-.013	-.034
(Current)	(32.039)	(.005)	(.058)
Appr. > 4%	-12.045	.006	.053
(Lagged)	(30.646)	(.005)	(.055)
2% < Depr. < 4%	76.642	-.000	.153
(Current)	(24.647)	(.004)	(.045)
2% < Depr. < 4%	85.858	.010	.114
(Lagged)	(25.942)	(.004)	(.047)
Depr. > 4%	45.482	.007	.094
(Current)	(27.761)	(.005)	(.050)
Depr. > 4%	76.345	.017	.046
(Lagged)	(29.791)	(.005)	(.054)
Exch. Rate Index Growth	-19.273	-.000	-.077
(Current)	(167.134)	(.030)	(.302)
Exch. Rate Index Growth	216.140	.038	.237
(Lagged)	(175.302)	(.031)	(.316)
Sample Size	1737	1729	1713
Adjusted R^2	.622	.700	.873
F-stat	3.48	2.6	2.47
$(prob > F - stat)$	(.000)	(.004)	(.006)

[a]Notes:

1. Dependent variable is the level of income in column (1), the ratio of operating income to total assets in column (2) and the log value of shareholder wealth in column (3). Income and shareholder wealth are expressed in millions of 1977 dollars. 2% < *Appr.* < 4% is dummy variable that equals 1 if the industry-specific exchange rate index appreciated by more than 2% and less than 4% since the previous year. All the other appreciation and depreciation dummies are defined in a similar way.
2. Each regression includes firm fixed effects and year fixed effects. All regressions also include a quadratic in CEO age and a quadratic in CEO tenure.
3. The 3 regressions are the first-stage regressions associated with columns (2), (4), and (6) in Panel A of Table 3.
4. Standard errors are in parentheses.

Appendix Table A3: Mean Ratios of Options Grants to Total Compensation for High and Low Governance [a]

Governance Category	Mean	S. D.
No Large Shareholders	.16	.20
At Least One Large Shareholder	.18	.22
No Large Shareholders on Board	.18	.22
At Least One Large Shareholder on Board	.14	.22
Board Size Above Median	.18	.21
Board Size Below Mediam	.17	.22
Fraction Insiders Above Median	.17	.22
Fraction Insiders Below Median	.18	.21
Governance Index Above Median	.17	.22
Governance Index Below Median	.17	.21

[a]Notes:

1. "Large Shareholders" indicates the number of blocks of at least five percent of the firm's common shares, whether the block holder is or is not a director. "Large Shareholders on Board" indicates the number of blocks of at least five precent of the firm's common shares that are held by directors of the board. "Fraction Insiders" is the fraction of inside and "grey" directors on the board of directors. "Governance Index" is the unweighted average of 4 standardized governance variables (number of large shareholders, number of large shareholders on board, minus board size and one minus insider presence on board).

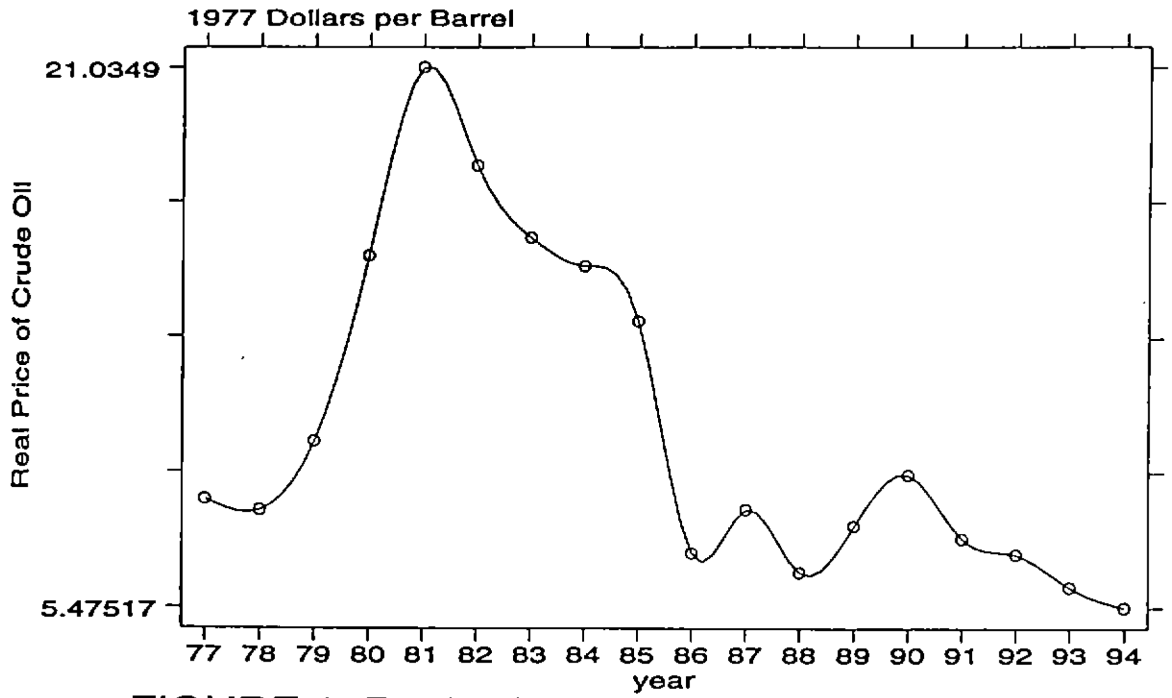

FIGURE 1: Real Price of a Barrel of Crude Oil

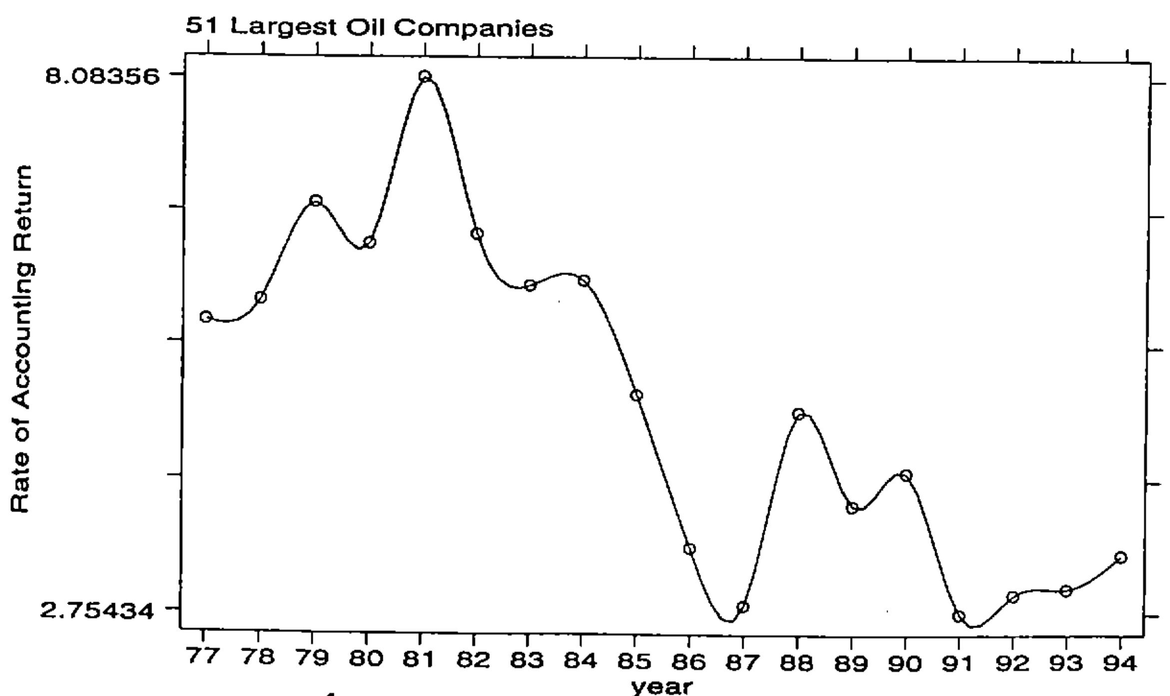

FIGURE 1: Mean Rate of Accounting Return

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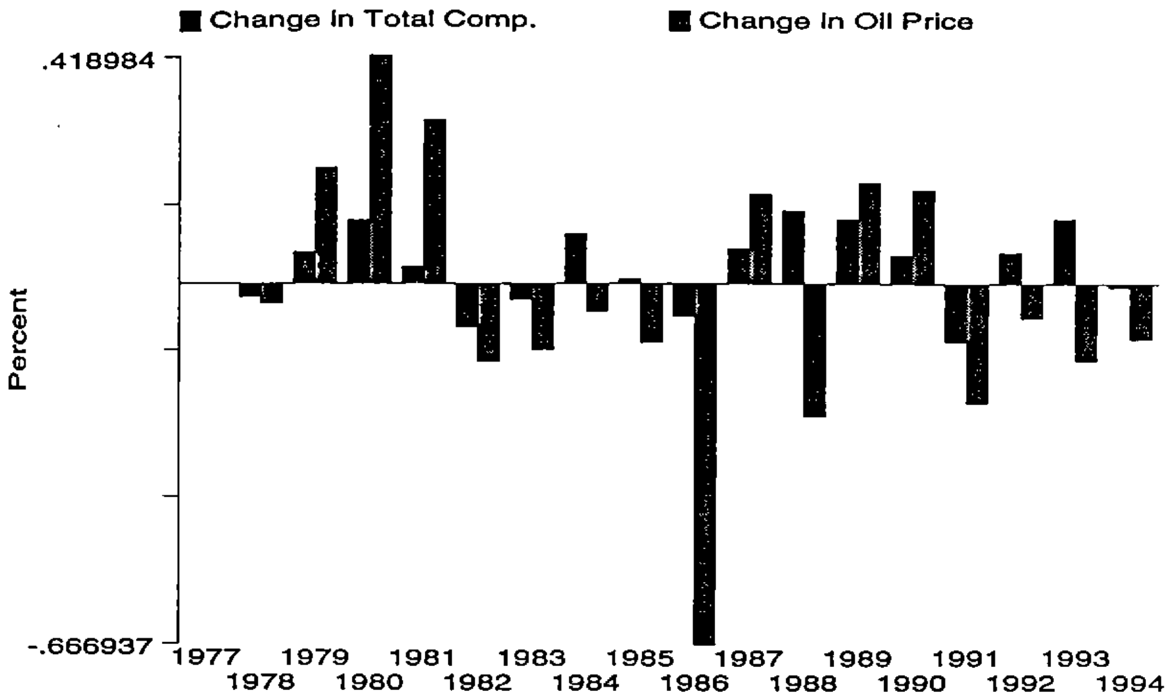

FIGURE 2: Oil Industry CEO Pay and Crude Oil Price