Watch your basket - to determine CEO compensation

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Abstract

CEOs are paid more if they outperform other firms in their blockholders' portfolios. For every percentage point by which their own firm's return exceeds the return of the largest blockholder's basket of investments in a year, their compensation increases by over $9,800. Once we benchmark to this portfolio, industry returns and own firm returns are of little importance. When the firm is a larger portion of the blockholder's portfolio and when the blockholder is experienced, the reward for outperforming the blockholder's portfolio is greater. Our results are robust to alternate industry classifications and definitions of blockholders.

JEL Classification: G32, G34, J33, M12

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1 Introduction

John T. Schuessler, the CEO of Wendy's International, was no doubt pleased to receive a near 50% increase in his compensation package in 2002. Wendy's stock price had declined by almost 6.5% during the year, which appeared weak compared to the 1.7% return to the fast-food sector. Wendy's largest shareholder was Barrow, Hanley, Mewhinney and Strauss, who owned 9.9% of the firm at the close of 2001. Although Wendy's performance may have looked bad compared to its industry peers, it had done nicely compared to the *other* firms owned by Barrow, Hanley, Mewhinney and Strauss, whose portfolio had lost 19% of its value during 2002. By those standards, Schuessler appeared quite deserving of his $1.9 million bonus and $4.3 million in option grants. We suggest one rationale for a principal to benchmark an agent's performance to her portfolio, rather than the industry; owners with information about other firms in their portfolio will optimally choose to overweight co-owned firms relative to non-co-owned firms.

To highlight our main implication, we modify the standard principal-agent framework of Hölmstrom and Milgrom (1987). We incorporate the assumption, that a principal's information allows her to make more precise forecasts for firms in her portfolio than firms outside her portfolio, into the standard model.[1] When a principal has more information about firms in her portfolio than other firms, she faces less uncertainty about future performance of firms in her portfolio than firms outside her portfolio. The principal can therefore offer a lower-risk compensation contract to a risk-averse agent by placing more weight on the more certain co-owned firms' future profits to evaluate the agent.

We empirically test our prediction by estimating the pay-performance sensitivities for CEOs and relate those sensitivities to the portfolio of the largest institutional blockholder (an institution who holds at least five percent of the stock). Once we condition on the excess return of a firm's stock over the largest blockholder's portfolio, a firm's own stock return performance by itself, and outperformance relative to industry peers, appear to be of little importance. The economic effects of considering firm performance relative to the blockholder's portfolio are large. When a CEO's firm outperforms the largest blockholder's portfolio by an additional one percentage

[1] See Van Nieuwerburgh and Veldkamp (2009).

point, the CEO's pay is \$20,979 higher on average, or \$9,861 if we use a natural logarithm specification. In an alternative regression, we estimate that the CEO receives \$105 of every \$1,000 of excess performance that she delivers. A CEO's pay does not increase for returns that simply keep pace with the largest blockholder's portfolio, for example, general market upturns or declines. We find the largest sensitivities to the portfolio benchmark in option grants and, to a lesser extent, in bonuses. Sensitivities are greater when the firm is a large fraction of a blockholder's portfolio, and when the blockholder is experienced.

Standard agency models, starting with Hölmstrom (1979), imply CEO compensation should be benchmarked to other firms to reduce the risk of the contract. But an extensive literature shows mixed empirical evidence on RPE (especially of benchmarking pay to industry performance). Recent work explores potential explanations for the weak evidence.[2] We contribute by showing that a standard agency model, augmented with informed owners, predicts benchmarking not to the market or industry peers, but to owners' portfolio. We show strong empirical evidence for this version of RPE.

Kempf, Manconi, and Spalt (2016) argue that institutions cannot monitor all parts of their portfolio at all times, and that when an institution's portfolio is hit with a large shock, positive or negative, the institution is distracted. They find a more distracted institution permits a CEO to obtain more 'lucky' option grants. Their argument is that if an institution holds a large stake in a firm it will be less distracted in its monitoring of that firm by the other firms in its portfolio (see also Fich, Harford, and Tran (2015)). This implies firms which comprise a larger weight of the institution's portfolio should be *less* sensitive to portfolio shocks. In contrast, we show that the magnitudes of benchmarking CEO pay to portfolio firms are *stronger* in firms which comprise larger weights in the blockholder's portfolio. During firm-years in which the largest block is above the median portfolio weight of its largest blockholder (for firms in our sample), we show that a one percentage point increase in excess portfolio returns is associated with a \$33,894

[2]Theory suggests several possible explanations. Aggarwal and Samwick (1999) suggest that product market competition reduces RPE. Gopalan, Milbourn, and Song (2010) suggest a CEO can partly influence in which industry the firm operates, which also reduces RPE. Other research suggests measurement issues play a role. Albuquerque (2009) suggests industry and firm size-based benchmarks, and Drake and Martin (2016) consider peers in the same life cycle. De Angelis and Grinstein (2017) examine the stated structure of compensation contracts and show that a majority of firms benchmark to a peer group that is not simply the industry or market index. See also Edmans, Gabaix, and Jenter (2017) for a detailed review of the literature.

rise in CEO pay, or $28,797 with a log specification. In contrast, for firm-years in which the block is below the median, we do not observe benchmarking at statistically significant levels. This suggests that benchmarking to (seemingly unrelated) firms held by the same institution is consistent with optimal contracting and not just opportunism by managers when the blockholder is distracted.

Recent studies on institutional investors' monitoring effectiveness (e.g., Boyson and Mooradian (2012) and Kang, Luo, and Na (2017)) emphasize their governance experience. In a similar spirit, we repeat our analysis by splitting our sample based on whether or not the largest blockholder is (i) experienced at being a blockholder or (ii) experienced at being the *largest* blockholder in a firm. We find that experience matters. The benchmarking magnitude for experienced blockholders, but not for inexperienced blockholders, is statistically significant and economically meaningful. Our finding suggests that institutional investors who have recently reached blockholder status may find it more difficult to influence management than investors who have spent time as blockholders of other firms, thereby gaining 'hands-on' experience in how to influence corporate policy.

Aggarwal and Samwick (1999), Antón, Ederer, Giné, and Schmalz (2016) and Liang (2016) argue that CEO pay should be positively correlated with industry peers' performance. Executives are discouraged from head-to-head competition, which is detrimental to the performance of all firms in an industry. To consider this possibility, we separate a blockholder's portfolio into co-owned same industry firms and co-owned different industry firms, using the three digit SIC. Indeed, we find that the response of CEO pay to firm performance, relative to co-owned firms in the same industry, is weak to non-existent. However, we document strong evidence of benchmarking to different industry firms in the largest blockholder's portfolio. To address concern that the SIC grouping may simply be an inaccurate representation of firms' operations, we repeat the analysis using Hoberg and Phillips (2016)' dynamic text-based industry classification (TNIC) of firms, and find that our results, concerning stronger benchmarking of pay to the largest blockholder's portfolio firms in different industries, are robust regardless of whether we use a SIC or textual-based industry classification.

Our study also complements the literature that documents the influence of large shareholders on CEO pay. Hartzell and Starks (2003) and Almazan, Hartzell, and Starks (2005), for example, show institutional shareholders' influence on CEOs' pay-for-performance sensitivity and level of compensation, which the authors interpret as an effective monitoring role that institutions play in the firm. Cronqvist and Fahlenbrach (2009) find systematic patterns across large shareholders when it comes to their attitudes toward CEO pay. Our study adds to this literature by emphasizing an important implication of large shareholders' portfolio holdings for CEO compensation.

Lastly, our study contributes to the literature that documents interactions among firms owned by the same blockholder (see Edmans and Holderness (2017)). Matvos and Ostrovsky (2008) and Harford, Jenter, and Li (2011) study the role of common ownership in voting for acquisition choices. Massa and Žaldokas (2016) suggest that lenders use signals that come from co-owned firms to estimate a firm's creditworthiness. Our work complements this literature by showing that blockholders use their portfolio firms as a benchmark to implement efficient CEO contracts.

2 Analytical Framework

We outline a simple framework to show that blockholders optimally benchmark one firm relative to other firms in their portfolios to implement executive compensation. We modify the classical relative performance evaluation (RPE) framework of Hölmstrom and Milgrom (1987) and assume that the principal who determines managerial compensation is a blockholder (or is influenced by a blockholder) who has better information about its portfolio firms, but only noisy signals about firms outside. With such a framework, our purpose here is to simply highlight our main implication—CEO pay should be benchmarked to blockholders' portfolios—that we empirically investigate. In particular, we do not model an investor's decision to become the blockholder of a particular firm. Van Nieuwerburgh and Veldkamp (2009) provide a model in which an investor chooses to learn about some assets and then selects a portfolio. The subsequent portfolio will overweight those assets about which the investor collects information, relative to the market. We take this learning and portfolio selection step as given for blockholders and investigate the implications of their portfolios for compensation practices.

As is standard in the RPE framework, all firms are exposed to common random fluctuations, which we term 'luck.' Luck may be aggregate technology shocks, exposure to energy price movements, or the effects of government policy that impact all firms. When the principal writes a contract to induce desirable actions by a risk-averse manager, the cost of the contract falls when the principal can completely filter out the exogenous shocks that are unrelated to the manager's actions. It is, however, implausible to directly contract on these shocks. Instead, by the informativeness principle of Hölmstrom (1979), any signals about the luck factor, such as the performance of other firms, are valuable to set compensation: higher returns due to luck should not result in higher CEO pay. If blockholders have more precise information about firms in their portfolio than firms outside their portfolio, the signal-to-noise ratio regarding the luck factor is stronger for firms in their portfolio than firms outside their portfolio. This implies that firms in the portfolio are better benchmarks for performance, all else equal, since they allow luck to be better filtered out.

Consider an economy in which there is one institutional investor and three all-equity firms. We use firm a as the one for which compensation policy is to be set. The institution owns blocks in firms a and c ('co-owned'), but does not hold a block in firm n ('non co-owned'). The remaining shares of all three firms are owned by dispersed shareholders who play no role in the model.

The profit of firm $i \in \{a, c, n\}$ before executive compensation is given by:

$$\pi_i = \nu + s_i + e_i + \epsilon_i, \tag{1}$$

where ν is the common, unobservable luck shock to all three firms; s_i is the skill of the manager; e_i is the unobservable effort of the manager; and ϵ_i is an unobservable, firm-specific shock drawn from a common distribution $\mathcal{N}(0, \sigma_\epsilon^2)$. (1) indicates that the manager's effort only affects own firm profits.

The skill level of manager i, s_i, is drawn from $\mathcal{N}(\mu_s, \sigma_s^2)$, and is unobservable to the dispersed small shareholders. For simplicity, we assume that s_i is independent of the common shock ν. The institutional owner, who is a blockholder in firms a and c, can observe s_a and s_c, but not s_n.

Neither the blockholder's ownership of firm a or firm c, nor the employment of the executive at firm i depends on the value of s_i.[3] This assumption rules out cases in which outsiders can infer s_i from either the fact that a blockholder owns a firm or the fact that a particular CEO was hired. The blockholder thus has an information advantage over the dispersed shareholders.

We now consider firm a's compensation decision. As in other studies of large shareholders (e.g., Shleifer and Vishny (1986), Huddart (1993), and Admati, Pfleiderer, and Zechner (1994)), we assume that the blockholder acts as the principal to determine managerial contracts for firms a and c. The principal is risk-neutral, whereas the manager is risk-averse and has CARA preferences with a risk aversion parameter η. The manager incurs a quadratic effort cost, $c(e_a) = \frac{1}{2}\kappa e_a^2$, and we restrict attention to linear contracts. We assume firm n also has a contract that induces an effort level known by the institutional investor.[4]

2.1 A Single Firm as the Benchmark

First, consider the case in which the blockholder implements a linear contract that is contingent not only on the profit of manager a's own firm, but also on the profit of the co-owned firm c:

$$w_a = \alpha_a + \theta_a \pi_a + \gamma_{a,c} \pi_c. \tag{2}$$

Given the contract, the optimal effort for the manager is:

$$e_a^* = \arg\max_{e_a} E\left[-\exp\left(-\eta\left(w_a - c(e_a)\right)\right)\right] \Rightarrow e_a^* = \frac{\theta_a}{\kappa}. \tag{3}$$

The manager's optimal effort depends only on own-firm pay sensitivity and the unit cost of effort.

[3] This assumption only implies that there is some noise in hiring executives and in selecting the stocks for the institution's portfolio.

[4] Alternatively, the blockholder could know the inputs of the contracting problem for firms a and c, but not n. In that case, the blockholder would not know the equilibrium effort level of firm n, but would for firms a and c. Such a setting would provide an additional information advantage concerning firms a and c, with the same basic result.

Maintaining the manager's reservation wage $\underline{w}$ requires an expected wage such that:

$$E[w_a] = \alpha_a + \theta_a E[\pi_a(e_a^*)] + \gamma_{a,c} E[\pi_c] \geq \underline{w} + c(e_a^*) + \frac{\eta}{2} V[w_a], \tag{4}$$

where the last two terms represent compensation payments to the manager for her effort costs and risk sharing through the contract. Substituting the minimum acceptable wage into the blockholder's objective function yields:

$$\max_{\theta_a, \gamma_{a,c}} E[\pi_a(e_a^*) - w_a] = E[\pi_a(e_a^*)] - \left(\underline{w} + c(e_a^*) + \frac{\eta}{2} V[w_a]\right). \tag{5}$$

In the above problem, the pay sensitivity to co-owned firm profits, $\gamma_{a,c}$, for a given own-firm pay sensitivity, θ_a, only affects the costs of risk sharing (the last term). With a linear contract, the variance of the wage is:

$$V[w_a] = V[\theta_a(\nu + s_a + e_a + \epsilon_a) + \gamma_{a,c}(\nu + s_c + e_c + \epsilon_c)] = (\theta_a + \gamma_{a,c})^2 \sigma_\nu^2 + (\theta_a^2 + \gamma_{a,c}^2)\sigma_\epsilon^2, \tag{6}$$

where we use the fact that, for the blockholder, the managers' skill levels s_a and s_c, as well as their effort levels e_a and e_c under the optimal contracts are known.[5] The variance of the wage is then minimized with respect to $\gamma_{a,c}$ at:

$$\gamma_{a,c}^* = -\theta_a \times \frac{\sigma_\nu^2}{\sigma_\nu^2 + \sigma_\epsilon^2}. \tag{7}$$

The first term, θ_a, is the pay for performance sensitivity to own-firm profits. The second term is the signal to noise ratio for the co-owned firm c. The negative weight on co-owned firm profits, $\gamma_{a,c}^*$, implies that benchmarking the wage of manager a to firm c's performance will reduce the cost of risk sharing by filtering out the common shock and, thereby, the expected wage.

[5] We assume that the blockholder can credibly communicate information about s_c (the skill of manager c) to manager a, so that the manager also ignores the variance of s_c to calculate the variance of firm c's profits. There is no incentive for the blockholder to lie to manager a about s_c, because s_c does not affect manager a's effort. Moreover, manager a is compensated at her reservation wage, so there are no cost savings associated with reporting a high value of s_c. An exaggerated report of s_c would be exactly offset by a change in fixed compensation.

Substituting (3) and (6) into (5), differentiating with respect to θ_a, and setting the derivative equal to zero yields:

$$0 = \frac{1-\theta_a}{\kappa} - \eta\left[\theta_a\left(\sigma_v^2+\sigma_\epsilon^2\right)+\gamma_{a,c}\sigma_v^2\right] = \frac{1-\theta_a}{\kappa} - \eta\left[\theta_a\left(\sigma_v^2+\sigma_\epsilon^2\right)-\theta_a\frac{\sigma_v^2}{\sigma_v^2+\sigma_\epsilon^2}\sigma_v^2\right] =$$
$$\frac{1-\theta_a}{\kappa} - \eta\theta_a\left(\sigma_v^2+\sigma_\epsilon^2\right)\left[1-\left(\frac{\sigma_v^2}{\sigma_v^2+\sigma_\epsilon^2}\right)^2\right],$$

where the second and third equalities follow from substituting $\gamma_{a,c}^*$ in (7) and factoring. Thus:

$$\theta_a^* = \left[1+\eta\kappa(\sigma_v^2+\sigma_\epsilon^2)\left(1-\left(\frac{\sigma_v^2}{\sigma_v^2+\sigma_\epsilon^2}\right)^2\right)\right]^{-1}. \tag{8}$$

In the standard optimal contract, which is contingent only on own profits, the optimal sensitivity is given by $\theta_a^* = \left[1+\eta\kappa(\sigma_v^2+\sigma_\epsilon^2)\right]^{-1}$. The optimal pay for own performance sensitivity in our model is higher than in the standard case because the blockholder observes managerial skill, which allows them to better filter out luck from their firms' performances.

To filter out luck, the blockholder could consider benchmarking to firm n instead of firm c: $w_a = \hat{\alpha}_a + \hat{\theta}_a\pi_a + \gamma_{a,n}\pi_n$. The optimal weight with which to benchmark firm n, $\gamma_{a,n}$, is:

$$\gamma_{a,n}^* = -\hat{\theta}_a \times \frac{\sigma_v^2}{\sigma_v^2+\sigma_s^2+\sigma_\epsilon^2}. \tag{9}$$

The only difference is that the blockholder is uncertain about the level of manager n's skill, s_n, so that the variance of s_n, σ_s^2, is included. The optimal pay sensitivity to own profits is then:

$$\hat{\theta}_a^* = \left[1+\eta\kappa(\sigma_v^2+\sigma_\epsilon^2)\left(1-\frac{\sigma_v^2}{\sigma_v^2+\sigma_s^2+\sigma_\epsilon^2}\times\frac{\sigma_v^2}{\sigma_v^2+\sigma_\epsilon^2}\right)\right]^{-1}. \tag{10}$$

Comparing (8) and (10) implies that the optimal own firm sensitivity is higher when benchmarking to firm c rather than firm n. This observation, together with (7) and (9), implies that the magnitude of $\gamma_{a,c}^*$ exceeds the magnitude of $\gamma_{a,n}^*$. Since the blockholder does not know the skill component of the non co-owned firm, benchmarking to firm n's profits is riskier for the blockholder, and by extension, the executive.

2.2 Multiple Firms as the Benchmark

Why not use both the co-owned and non co-owned firms as benchmarks? A combination of the two signals diversifies the idiosyncratic risk of each, and the blockholder should use some information from each firm. However, it is still the case that the blockholder will place a larger weight on the co-owned firm than on the non co-owned firm as the co-owned firm's profits are less noisy for the blockholder.

We again consider linear contracts, but we allow any firm's profit to be a possible signal. Compensation takes the form:

$$w_a = \alpha_a + \theta_a \pi_a + \gamma_{a,c}\pi_c + \gamma_{a,n}\pi_n.$$

The variance of the wage is now:

$$V[w_a] = (\theta_a + \gamma_{a,c} + \gamma_{a,n})^2 \sigma_\nu^2 + (\theta_a^2 + \gamma_{a,c}^2)\sigma_\epsilon^2 + \gamma_{a,n}^2(\sigma_\epsilon^2 + \sigma_s^2). \tag{11}$$

Minimizing the variance over the γ terms yields:

$$\gamma_{a,c} = -(\theta_a + \gamma_{a,n}) \times \rho_c^2 \tag{12}$$

$$\gamma_{a,n} = -(\theta_a + \gamma_{a,c}) \times \rho_n^2, \tag{13}$$

where ρ_c^2 and ρ_n^2 are the signal to noise ratios for the co-owned and non co-owned firms, respectively:

$$\rho_c^2 \equiv \frac{\sigma_\nu^2}{\sigma_\nu^2 + \sigma_\epsilon^2}$$

$$\rho_n^2 \equiv \frac{\sigma_\nu^2}{\sigma_\nu^2 + \sigma_s^2 + \sigma_\epsilon^2}.$$

These conditions imply:

$$\gamma_{a,n} = -\theta_a \times \rho_n^2 \times \frac{1-\rho_c^2}{1-\rho_c^2\rho_n^2} \tag{14}$$

$$\gamma_{a,c} = -\theta_a \times \rho_c^2 \times \frac{1-\rho_n^2}{1-\rho_c^2\rho_n^2} = \gamma_{a,n} \times \frac{\rho_c^2}{\rho_n^2} \times \frac{1-\rho_n^2}{1-\rho_c^2}. \tag{15}$$

Since $\rho_c^2 > \rho_n^2$, we know that $\gamma_{a,c} > \gamma_{a,n}$ in absolute value. As in the simpler case of only using one firm as the benchmark, the weight on the non co-owned firm's profits is smaller in magnitude but still negative. When using multiple firms as the benchmark, blockholders and CEOs have an incentive to benchmark compensation more closely against firms whose profits are a more precise signal about the luck factor. As blockholders observe managerial skill for firms within their portfolio, co-owned firms yield more precise signals and serve as a better benchmark.

If there are costs to contract on a signal some blockholders will ignore signals from non co-owned firms. Suppose, for example, the executive and blockholder must negotiate to include a new firm in the benchmark. When negotiation is costly, the number of benchmark firms will be limited, and each benchmark firm will be more likely to come from inside the blockholder's portfolio than from outside, all else equal.

We substitute the new variance (11) and (3) into (5), and differentiate with respect to θ_a, and set the derivative equal to zero, which yields:

$$0 = \frac{1-\theta_a}{\kappa} - \eta\left[\theta_a\left(\sigma_\nu^2+\sigma_\epsilon^2\right) + (\gamma_{a,c}+\gamma_{a,n})\sigma_\nu^2\right] =$$

$$\frac{1-\theta_a}{\kappa} - \eta\left[\theta_a\left(\sigma_\nu^2+\sigma_\epsilon^2\right) - \theta_a\left(\rho_n^2\frac{1-\rho_c^2}{1-\rho_c^2\rho_n^2} + \rho_c^2\frac{1-\rho_n^2}{1-\rho_c^2\rho_n^2}\right)\sigma_\nu^2\right] =$$

$$\frac{1-\theta_a}{\kappa} - \eta\theta_a\left(\sigma_\nu^2+\sigma_\epsilon^2\right)\left[1-\left(\rho_n^2\frac{1-\rho_c^2}{1-\rho_c^2\rho_n^2} + \rho_c^2\frac{1-\rho_n^2}{1-\rho_c^2\rho_n^2}\right)\rho_a^2\right],$$

where ρ_a^2 is the signal to noise ratio for own firm:

$$\rho_a^2 \equiv \frac{\sigma_\nu^2}{\sigma_\nu^2+\sigma_\epsilon^2}.$$

The second equality follows from substituting $\gamma^*_{a,c}$ and $\gamma^*_{a,n}$ in (14) and (15), and the third from factoring. Thus:

$$\theta^*_a = \left[1 + \eta\kappa(\sigma^2_v + \sigma^2_\epsilon)\left[1 - \left(\rho^2_n \frac{1-\rho^2_c}{1-\rho^2_c\rho^2_n} + \rho^2_c \frac{1-\rho^2_n}{1-\rho^2_c\rho^2_n}\right)\rho^2_a\right]\right]^{-1}. \tag{16}$$

The single firm benchmark equilibrium, in which the co-owned firm acts as the only benchmark, arises as a limiting case as $\rho^2_n \to 0$ or, equivalently, $\sigma^2_s \to \infty$ (see (8)). The optimal pay for own performance sensitivity is higher when multiple firms are used as a benchmark. This is because the blockholder can better filter out the luck factor by diversifying the idiosyncratic risks of benchmark firms. As discussed earlier, by comparing (14) and (15), we see that the optimal contract does not impose an equal weight on multiple benchmark firms, but places a greater weight on co-owned firms.

Even to benchmark against what is effectively a market-wide shock, our results suggest that the blockholder should not make a standard market adjustment (i.e., subtracting the market index return is not the best filter) when blockholders have an information advantage. The reason: blockholders should place greater weight on firms for which they have an information advantage, and benchmarking against the market is no longer optimal for an informed blockholder.

3 Data and Methodology

Our initial sample consists of the S&P 1500 firms which are covered in Execucomp (merged with Compustat data) from 1992 through 2016 (47,800 observations). We exclude firm-years with (i) no CEO identification or no compensation variable available for the CEO (1,514 observations); (ii) a CEO change within the year (3,285 observations); (iii) a fiscal year that does not end in December (13,810 observations); (iv) no CRSP (Center for Research in Security Prices) common stock data (3,561 observations); (v) no relevant institutional ownership information or total institutional ownership greater than 100% (1,892 observations) in the Thompson Reuters Institutional Holdings (13F) database; (v) no blockholders (3,855 observations); or (vi) missing control variables such as return volatilities (4,723 observations). We further exclude observations whose compensation and/or returns places them in the bottom 1% or top 1% for that year (878 observations). Our final sample, which we use for the baseline regressions, thus includes 14,282 firm-year observations (1,974 unique firms).

For each firm in our sample in year t, we identify all of that firm's blockholders in December of year $t-1$ using the Thomson Reuters 13F data.[6] For each blockholder-firm-year, we identify the blockholder's holdings of all other common stocks in December of year $t-1$ from which to calculate portfolio performance in year t. We use the CRSP monthly returns file to calculate the compounded annual return to the firm's own stock, the value-weighted return of that firm's three-digit Standard Industrial Classification (SIC) industry, and the weighted return of the blockholder's portfolio. We use the firm's market value of equity, as at the end of year $t-1$, as the weight for the industry return, and the blockholder's dollar value of equity stake as the weight for their portfolio return, respectively.[7] As in prior studies (such as Garvey and Milbourn (2006) and Gopalan, Milbourn, and Song (2010)), we include only firms with fiscal years ending in December in our sample, and compute the industry and portfolio returns across firms with fiscal years ending in December (excluding the firm itself). For robustness, we repeat our tests using industry and portfolio returns including firms with fiscal years ending in any month other than December.

Our measure of CEO pay is Execucomp's total direct compensation, *TDC1*, which includes each year's salary, bonus, long-term incentive payouts, other cash payouts, total value of restricted stock granted, and the total value of stock options granted. This measure excludes stocks and options that were granted and vested in past years. We express pay and return variables in real terms using the gross domestic product (GDP) deflator.

The main implication of our model is that CEO pay should be benchmarked to the performance of a blockholder's co-owned firms. To empirically test the implication, we estimate pay sensitivities to own-firm and benchmark performances, including both industry and blockholder

[6] BlackRock reports holdings by seven subsidiaries separately. This means the 13F data does not match the beneficial owner data in a firm's proxy statement. We aggregate BlackRock subsidiaries using data from the SEC website to alleviate this problem. We also correct JP Morgan Chase's data for Thomson Reuters errors using the SEC data in 2003 and 2013. See also Azar et al. (2017).

[7] If we use the market value of equity (instead of the dollar value of the blockholder's equity stake) as the weight for the blockholder's portfolio performance, our results are little changed.

portfolio performances. The empirical literature has used a variety of measures for pay-for-performance sensitivities by choosing whether to use dollar compensation or the logarithm of compensation and whether to use percent or dollar returns. Edmans et al. (2017) (see also Baker and Hall (2004) and Edmans, Gabaix, and Landier (2008)) emphasize the importance of choosing an empirical measure of incentives that is consistent with the theoretical specification. Our standard moral hazard framework, presented in Section 2, assumes additive effort for firm profit and manager utility (i.e., effort has a fixed dollar effect on firm value and manager utility). Therefore, pay sensitivities in our framework correspond to the dollar change in pay for a one dollar change in firm value ($-$ incentives).

Another empirical specification used by empirical studies is to relate pay to firm percentage returns (the dollar change in pay for a one percentage point change in firm value: $-% incentives). One can motivate this specification via a slight change in our theoretical framework. Instead of managerial effort increasing dollar profit, we could follow Edmans et al. (2017) and consider multiplicative effort: $\pi_i = A_i \times (1 + be_i) + s_i + \nu + \epsilon_i$, where A_i is a measure of firm size. The only impact of this choice is that pay sensitivities should be related to percent returns rather than dollar returns to induce managerial effort. Our main implication that pay should be benchmarked to co-owned firms' performances is unaffected by the choice of additive or multiplicative nature of effort on firm value.

Empirical papers often consider log pay and return specifications (%-% incentives). Edmans and Gabaix (2011, Section 2.3) show how a model that incorporates multiplicative effort in both firm profit and manager utility implies the empirical log specification. The intuition is that, as effort cost increases with manager wage (i.e., shirking is more valuable for richer CEOs), the right incentive measure needs to be $-% incentives scaled by wage, thereby implying %-% incentives. Even in this model specification, our prediction of benchmarking to co-owned firms, which occurs to reduce the cost of the contract by minimizing the variance of wage, remains the same. Therefore, we consider all the three different empirical measures ($-%, %-%, and $-$ incentives) for pay-performance sensitivities in our empirical analysis.

We regress CEO compensation (*TDC1*), in year t, on contemporaneous performance measures: the firm's own return *(Own Return)*, the difference between the firm's own return and the industry return *(Excess over Industry)*, and the difference between the firm's own return and the value-weighted portfolio return for that firm's *largest* blockholder *(Excess over Portfolio)*. We consider three empirical specifications: (i) *TDC1* on the performance measures which are measured in percent returns ($-% incentives); (ii) the natural logarithm of *TDC1* on the performance measures, in percent returns (%-% incentives); (iii) *TDC1* on the performance measures in dollar returns ($-$ incentives), in which we multiply the percent return variables by the market value of the firm's equity as of December in year $t-1$. The dollar-dollar specification allows us to interpret the coefficients on the return variables as the fraction of each dollar generated in year t that the CEO receives in compensation.

Recent theoretical studies on managerial incentives, such as Baker and Hall (2004) and Edmans, Gabaix, and Landier (2008), suggest that pay-performance sensitivities optimally vary with firm size.[8] To allow for heterogeneity in pay-performance sensitivities with firm size, we include the interactions of the three performance measures, *Own Return*, *Excess over Industry*, and *Excess over Portfolio*, with firm size in each of the three regression specifications. The inclusion of these size interactions is also in line with the specifications of prior empirical studies that do not fix the pay sensitivities to be the same for all firms (e.g., Garvey and Milbourn (2006) and Gopalan, Milbourn, and Song (2010)).

All regressions condition on own return, industry return, and portfolio return volatilities, the natural logarithm of CEO tenure, the top-5 share of institutional ownership (see Hartzell and Starks (2003)), the number of blockholders in the firm, the number of blocks held by the firm's largest blockholder, the weight of the firm in the largest blockholder's portfolio, the number of prior years in which the firm's largest blockholder had been a blockholder (of any firm), and the natural logarithm of the market value of the firm's equity, all in year $t-1$. Hartzell and Starks (2003) document that the pay-for-performance sensitivity of executive pay is stronger when institutional ownership concentration is higher, which suggests an effective monitoring role that institutions play in the firm. Since it is possible that our largest blockholder's portfolio is correlated with institutional ownership concentration, we condition on that variable in all

[8]In their model of optimal CEO incentives, Edmans, Gabaix, and Landier (2008) show that, while percent-percent incentives should be independent of firm size, dollar-dollar incentives should decline with firm size, and dollar-percent incentives should increase.

regressions. We do not report coefficient estimates for the conditioning variables listed above to save space. In addition, we use firm, blockholder, year, and industry fixed effects.[9] We use blockholder fixed effects since Cronqvist and Fahlenbrach (2009) have shown important heterogeneity in corporate policies, such as executive compensation, by blockholder.

4 Results

Our data consists of observations on three main groups: CEOs, firms, and those firms' largest blockholders. A CEO receives an average total direct compensation package of $5.49 million (2014) dollars across all firms and years (see Table I). Compensation consists of $0.87 million in base salary; $0.51 million in bonus; $1.56 million in option grants; $1.46 million in stock grants; and $1.08 million in all other compensation. As is well known, CEO compensation is highly skewed with a median of $3.58 million. The mean CEO's tenure is 7.9 years with a median of 6 years service.

The average firm's market value of equity, in 2014 dollars, is $7.77 billion, with a median market capitalization of $1.94 billion. A firm's mean real return, *Own Return*, is 13.5% with a standard deviation of 42.2%. If we calculate the return of a firm's industry peers, at the three-digit SIC level, we observe a mean real return of 10.2%, which indicates a mean *Excess over Industry* return of 3.3%, albeit with no difference at the median. The average firm has 70.0% of its shares owned by institutions, of which the top five institutions own 43.0% of that institutional ownership. The mean firm has 2.6 institutional blockholders, with a median of 2.

A firm's largest blockholder holds a portfolio that yielded a real return of 9.1% with a standard deviation of 17.8%. The firm under consideration outperformed the value-weighted return of the largest blockholder's portfolio, *Excess over Portfolio*, by 4.4% on average, but with a median of only 0.4%. Importantly, for our identification purposes, there is a lot of variation in *Excess over Portfolio*, with a standard deviation of 38.5%, and an interquartile range of -17.7% to 20.5%. Within the largest blockholder's portfolio, the sub-portfolio of firms in different three-

[9] We control for industry fixed effects in addition to firm fixed effects to capture the (relatively rare) cases in which firms change their industry over time. Our results do not quantitatively change without industry fixed effects.

digit SIC industries obtained a real return of 9.1%, whereas the sub-portfolio of firms in the same industry obtained a real return of 10.7%. The firm's largest blockholder holds 10.0% of the firm itself on average, with an interquartile range of 7.2% to 11.5% ownership. This block is, on average, 2.0% of the entire portfolio of that blockholder.

The largest blockholder owns a portfolio which is $197.5 billion in size, in 2014 dollars, and comprises 1,017 firms, of which 992 are in different three-digit SIC industries. Of these 1,017 firms in the portfolio, 287.7 are of block size. *Prior years as Blockholder*, the number of years for which a blockholder had owned at least one block stake, is 11.6 years on average, with a standard deviation of 6.4 years.[10]

Table II presents our baseline results that relates CEO compensation (*TDC1*) to contemporaneous performance measures, *Own Return*, *Excess over Industry*, and *Excess over Portfolio*. Our key variables of interest are the firm's own performance, the industry performance, and the return of the largest blockholder's portfolio. Our econometric specification is equivalent to regressing compensation on own returns, industry returns, the largest blockholder's portfolio returns (and controls) separately. However, we regress compensation on *Own Return*, *Excess over Industry*, and *Excess over Portfolio* for the interpretation it allows. The coefficient on *Own Return* represents a sensitivity of compensation to a firm's own stock return, holding fixed performance relative to industry and the blockholder's portfolio. The coefficient on *Own Return* measures the extent to which firms do not evaluate performance simply relative to an industry or blockholder portfolio benchmark. The coefficient on *Excess over Industry* represents a sensitivity of compensation to outperforming industry returns, but holds fixed the overall stock return and performance relative to the blockholder's portfolio. The coefficient on *Excess over Industry* measures the extent to which CEO pay is benchmarked to industry. Finally, the coefficient on *Excess over Portfolio* represents a sensitivity of compensation to outperforming the blockholder's portfolio, holding fixed performance relative to industry and the overall stock return. This coefficient measures the extent to which CEO pay is benchmarked to the largest blockholder's portfolio.

[10]Observations are at the firm-year level, and huge institutions such as Fidelity, Dimension Fund Advisors, and BlackRock, appear many times per year.

As shown in Table II, when we condition only on *Own Return* and *Excess over Industry* and their interactions with firm size in each of the three regression specifications (columns (1), (3), and (5)), we see a strong sensitivity of CEO compensation to *Own Return* by itself. Based on the estimates of economic effects in the bottom of the table, a one percentage point increase in *Own Return* is associated with an increase in a CEO's total compensation of $11,277 to $11,616 (columns (1) and (3)). With dollar returns (column (5)), we find that, of every $1,000 of shareholder wealth created via an increase in own-firm returns, $55 is paid out as compensation to the CEO. Outperforming industry peers, when we measure peers using the three-digit SIC codes, is only important in the dollar-return specification (column (5)).[11]

When we add the performance of the portfolio of the largest blockholder, we observe markedly different results. CEO compensation is no longer related to *Own Return* by itself, rather it is tied to *Excess over Portfolio*. Beating the blockholder's portfolio by an additional one percentage point is associated with a $20,979 rise in CEO compensation (column (2)), or $9,861 if we run a natural log specification (column (4)). Out of every $1,000 by which CEOs beat the blockholder's portfolio, CEOs reap $105 for themselves in compensation.[12]

In Table II, we also report the coefficient estimates on the interaction terms between returns and firm size. We find that, consistent with Baker and Hall (2004) and Edmans, Gabaix, and Landier (2008), percent-percent (%-%) pay-performance sensitivities are not related to firm size (columns (3) and (4)), whereas dollar-dollar ($-$) sensitivities appear to decline with firm size (columns (5) and (6)). We always include (and use for the calculation of economic effects) the return-size interactions. However, to conserve space we do not report their coefficients in the subsequent tables.

In Table III, we investigate the sensitivity of the different components of CEO pay to firm performance. We do not find a clear relation between *Excess over Portfolio* and base salary

[11] We calculate the economic effects in two steps. For each firm-year observation we calculate the predicted value from our regression. We then calculate the predicted value assuming a: (i) one percentage point increase in *Own Return*, (ii) one percentage point increase in *Excess over Industry*, and (iii) one percentage point increase in *Excess over Portfolio*. We take the difference in predictions as the economic effect (converting logs to dollar units before differencing). We account for the size interaction terms in these predictions. We then average the difference in predicted compensation over all firm-years. For the dollar return specifications, we follow a similar procedure, but consider a $1,000 increase in each of the return measures.

[12] Although our analysis is based on CEO compensation, we find that the pay of other executives is also benchmarked to the largest blockholder's portfolio, with smaller economic magnitudes.

(columns (1)-(3)) or stock grants (columns (10)-(12)). Instead a CEO's bonus and option grants increase when the firm outperforms the largest blockholder's portfolio, as shown in columns (4)-(9). A one percentage point increase in *Excess over Portfolio* is associated with an increase of $3,863 to $4,008 in the CEO's bonus (columns (4) and (5)), or $25 of every $1,000 of shareholder wealth created in excess of the portfolio benchmark (column (6)). Most of the sensitivity of compensation to *Excess over Portfolio* comes via option grants. A one percentage point increase in *Excess over Portfolio* is associated with an additional $23,331 in option grants (column (7)), or $12,056 when the natural log specification is used (column (8)). Column (9) shows that the CEO receives an additional $92 in option grants for every $1,000 in additional firm value created by beating the portfolio benchmark. A firm's *Own Return* itself is not robustly associated with any of the components of CEO compensation, and if anything there is a negative correlation with option grants. Similarly, there is little clear relation between *Excess over Industry* and any of the components of CEO compensation.

Some institutional investors hold blocks in hundreds of companies. These investors' portfolios are large and far less sensitive to the performance of any particular company. The lower the sensitivity of an investor's portfolio to a particular company's performance, the less incentive that investor has to monitor or to intervene in a company (see Fich, Harford, and Tran (2015)). In Table IV, we compare benchmarking in companies where the largest blockholder's stake (as a percentage of the portfolio value) is small versus companies where the largest blockholder's stake is large. We split the sample into observations where the largest blockholder's stake in the firm is below the median, and equal to or greater than the median portfolio weight of the largest blockholder in that year. For the sub-sample where the weight is below the median, we do not find statistically significant results (columns (1)-(3)), which indicates that blockholders do not appear to use benchmarking against portfolio performance for the smaller blocks in their portfolio. By contrast, the relation between CEO compensation and *Excess over Portfolio* is strong for firms which comprise a large part of the largest blockholder's portfolio (columns (4)-(6)). A one percent increase in *Excess over Portfolio* is associated with a $33,894 rise in CEO pay (column (4)), or $28,797 when the natural log specification is used (column (5)). When we use dollar returns (column (6)), we find that creating an extra $1,000 of shareholder wealth, by beating the portfolio benchmark, leads to an extra $121 in CEO compensation.

In Table V, we investigate if experience plays a role in setting CEO pay. Institutional investors who have recently reached blockholder status may find it more difficult to influence management than investors who have spent time as blockholders of other firms, thereby gaining 'hands-on' experience in how to influence corporate policy. For example, Kang, Luo, and Na (2017) documents that forced CEO turnover-performance sensitivity is stronger if a firm's largest institutional owner has continuously served as another portfolio firm's blockholder for at least one year during the previous three years. In the context of hedge fund activism, Boyson and Mooradian (2012) document that only hedge fund activists with relevant prior experience achieve significant improvements in their target firms' long-term stock performance. In a similar spirit, we split our sample based on whether or not the largest blockholder is experienced at being a blockholder or experienced at being the *largest* blockholder in a firm. In Panel A, we split the sample based on *Experienced as Blockholder*, and in Panel B we split based on *Experienced as largest Blockholder*.

Experience matters. Inexperienced blockholders (Panel A) show no statistically significant benchmarking of CEO pay to their portfolio, and two of the point estimates are negative (see columns (1) and (2)).[13] In contrast, the benchmarking magnitude for experienced blockholders is statistically significant for all three specifications. A one percent rise in *Excess over Portfolio* is associated with a $20,084 rise in CEO pay (column (4)), or $10,448 with the natural log specification (column (5)). The dollar-dollar specification indicates that having at least five years experience as a blockholder results in $106 increased CEO compensation for every additional $1,000 of firm value created relative to the blockholder's portfolio benchmark (column (6)).

If we split the sample based on *Experienced as largest Blockholder*, we obtain similar results as shown in Panel B. Inexperienced blockholders show no evidence of benchmarking CEO pay to their portfolios (columns (7)-(9)). Experienced institutions show clear evidence of benchmarking to their portfolios. The economic effects are between $9,734 and $17,497 depending

[13] In column (2), the economic effects are outliers. The predicted values include some extreme pay levels in the inexperienced blockholder sample.

on the specification (columns (10) and (11)). Using the dollar-dollar specification shows that the CEO reaps \$115 of each \$1,000 of firm value created in excess of the blockholder portfolio (column (12)).

All of our results to this stage indicate that blockholders benchmark CEO performance to the firms in their portfolios. We also show little influence of *Own Return* or *Excess over Industry* on CEO compensation. However, our use of the three-digit SIC codes may be an inappropriate way to classify firms, and may mask the importance of benchmarking by industry. There are two concerns in our industry classification. First, there may be differential treatment of CEO performance to same-industry firms within the blockholder's portfolio and different-industry firms within the blockholder's portfolio. Second, the SIC grouping may simply be an inaccurate representation of firms' operations, a point highlighted by Hoberg and Phillips (2016), and in the executive pay context by Jayaraman, Milbourn, and Seo (2015).

Aggarwal and Samwick (1999), Liang (2016), and Antón, Ederer, Giné, and Schmalz (2016) raise the first concern. Owners may wish to discourage competition within an industry. If widely diversified institutions own stakes in several firms in the same industry, then *industry* profits may be important for the institutional owners, not just *firm* profits. As such, the institutions may provide the CEO with an incentive to reduce intra-industry competition, so that industry profits are higher, and the institutions' portfolios achieve better returns in aggregate. To address this concern we split the largest blockholder's portfolio into same-industry and different-industry positions. If institutions are indeed trying to moderate intra-industry competition, we would expect to find a smaller coefficient on *Excess over Portfolio (Same Industry)*. To address the second concern that the SIC grouping is imprecise, we use Hoberg and Phillips' dynamic text-based industry classification (TNIC) of firms, which builds on firms' business descriptions in 10-K annual filings, in place of the three-digit SIC grouping. In particular, we use their TNIC-3 dataset constructed to be as coarse as are three-digit SIC codes.

Regardless of which industry classification we use, we find strong evidence that CEOs are benchmarked to firms in *different* industries within the largest blockholders' portfolios (see Table VI). As shown in Panel A, a one percentage point improvement in returns relative to firms in different industries (using the 3-digit SIC), within the largest blockholder's portfolio, is associated with a $18,503 (column (1)) to $12,409 (column (2)) rise in CEO compensation. The dollar-dollar specification shows that $1,000 of increased performance relative to the portfolio benchmark results in $76 extra compensation for the CEO (column (3)).

In Panel B, we repeat the analysis but we define a firm as being in the same industry as the firm under consideration if it has a similarity score according to the TNIC-3 dataset. Industry returns are weighted by the market value of equity. Benchmarking to the portfolio is again important for different industry firms. *Excess over Portfolio (Different Industry)* is associated with a $16,183 (column (4)) to $10,789 (column (5)) rise in CEO compensation per one percentage point increase. The dollar-dollar specification leads to an extra $57 in compensation (column (6)) per $1,000 of shareholder value created in excess of the portfolio benchmark. In Panel C we repeat the results of panel B except that industry returns are now weighted by the TNIC similarity scores (a closer match in terms of business descriptions has a higher weight). The results that concern benchmarking pay to the largest blockholder's portfolio firms in different industries are of similar economic magnitude and statistically significant. Outperforming an industry, even if it is defined using the TNIC classification, does not eliminate the importance of benchmarking to the largest blockholder's portfolio.

There is little relation between CEO compensation and the performance relative to *same industry* firms in the largest blockholder's portfolio. The coefficients switch from positive to negative and are rarely significant in Panels A, B, and C. This evidence is consistent with blockholders attempting to stifle intra-industry competition within firms in their portfolios, as in Aggarwal and Samwick (1999), Liang (2016), and Antón, Ederer, Giné, and Schmalz (2016).

Over time, certain institutions have come to dominate the ranks of the largest blockholders. For example, in 2016, BlackRock, Fidelity, and Vanguard were the largest blockholder in 495 of the 737 firms in our sample. These large institutions may benchmark differently to the smaller institutions that make up the remainder of our sample. A concern may be that these large, diversified institutions are effectively holding 'the market' as their portfolio, and the results we find just indicate benchmarking to the 'market', with the precise contents of the blockholder's portfolio largely irrelevant. In Table VII, we interact the performance measures with *Top 3*

Blockholder status. Top 3 status equals one if the largest blockholder is one of the 3 largest institutional blockholders, based on the number of blocks held by them, in a year.

We find evidence of benchmarking to the largest blockholder's portfolio both in Top 3 institutions and the remaining institutions. If anything, Top 3 blockholders benchmark CEOs more closely to their portfolios than non-Top 3 blockholders. A non-Top 3 blockholder rewards a CEO with an extra \$19,726 for every extra percentage point by which they beat the blockholder's portfolio (column (1)) or \$8,450 with the natural logarithm specification (column (2)). In dollar terms, \$1,000 of outperformance is rewarded with an extra \$110 in CEO compensation (column (3)), although this point estimate is not statistically significant. When we examine the firms for which the largest blockholder is a Top 3 blockholder, we find heightened pay-performance sensitivities. A CEO of a *Top 3 Blockholder* receives an additional \$30,565 for every extra percentage point by which they beat the blockholder's portfolio (column (1)). This is statistically larger than the pay-performance sensitivity of a non Top 3 institution. The point estimate of the economic effect for the log specification, \$13,913, is larger for the Top 3 blockholder firm, but the difference is not statistically significant. The dollar-dollar specification indicates no difference in sensitivities between non-Top 3 and Top 3 blockholders.

Our main suite of results show that a firm's largest blockholder uses its portfolio as a benchmark to determine CEO pay, in line with the predictions of our model. However, our model is silent concerning a situation in which there are multiple large institutions that control large stakes in the firm. Edmans and Manso (2010) suggest that the presence of other blockholders has an unclear effect on the decision of a particular blockholder to govern. Crane, Koch, and Michenaud (2015) and Volkova (2016) argue that the presence of several blocks in a company will have an ambiguous effect on corporate policies. We thus examine the influence that other blockholders have on benchmarking CEO compensation to the largest blockholder's portfolio firms in Table VIII. Columns (1)-(3) compare the sensitivity of CEO compensation to the largest blockholder's portfolio performance in a situation in which there is only a single blockholder. In Columns (4)-(6), we consider firms where there are at least two blockholders. The results are somewhat mixed. Columns (1) and (2) indicate that firms with a single blockholder are benchmarked more closely to the largest blockholder than firms with multiple blockholders. However, when we run the dollar-dollar specification the results are reversed. In that specification, there is no statistically significant evidence of benchmarking to the portfolio for single blockholder firms, but clear benchmarking to the largest blockholder's portfolio for multiple blockholder firms (column (6)). These results may suggest that the presence of multiple blockholders complicates the process through which each blockholder in a firm influences compensation.

In Table IX, we perform some robustness checks. First, we include firms with non-December fiscal years in the calculation of industry and portfolio returns (although our sample observations of CEO compensation still only include December year-end firms to be consistent with the previous literature). As shown in columns (1)-(3), we find little difference once the additional firms are added to the construction of the benchmarks compared to our baseline results from Table II. Outperformance relative to the largest blockholder's portfolio is still statistically significant in all specifications, whereas *Own Return* and *Excess over Industry* are not, with the exception of industry benchmarking in the dollar-dollar specification (column (3)), which we also observe in Table II.

In addition, we broaden our sample to include firms who met all of our criteria for inclusion in the sample, except that the largest institutional owner held less than five percent of the firm. Choosing blockholder status as the threshold for importance is arbitrary. There is no theoretical basis for the commonly used five percent threshold, even though most countries (including the United States) mandate public disclosure at this level (see Edmans and Holderness (2017)). We obtain an extra 1,900 observations by allowing the largest institutional owner to hold less than a block stake. Again, the results are basically unchanged. Benchmarking to the portfolio is significantly related to the CEO's compensation, own return itself and outperformance over industry are not. The economic magnitudes are little changed from those reported in the baseline specification.

5 Conclusion

We examine whether CEO pay is sensitive to a blockholder's portfolio performance, even after controlling for own firm and industry performances. We start with a simple analytical framework in which an informed principal rationally benchmarks a manager against firms in her portfolio rather than to all firms. Since blockholders observe additional information about the skills of managers within their portfolios, they have more precise forecasts of co-owned firms' profits. Therefore, assessing CEO performance relative to co-owned firms allows a blockholder to write lower-risk contracts for a risk-averse CEO.

We test the main prediction that CEO pay should be benchmarked to a blockholder's portfolio by estimating pay-performance sensitivities. Our prediction holds under different theoretical assumptions concerning the impact of managerial effort on firm profit and manager utility. Different assumptions suggest different empirical tests of pay-performance sensitivities ($-%, %-%, $-$ incentives). In all specifications, CEOs' pay is sensitive to the degree to which their firms outperform the portfolio of their largest blockholder. Once we account for performance relative to the blockholder's portfolio, there is no residual relationship between CEO pay and own stock performance. In addition, the effect we find is stronger than the sensitivity to outperformance over own industry performance.

The evidence for benchmarking CEO pay to the largest blockholder's portfolio performance is particularly pronounced when the firm is a larger portion of the blockholder's portfolio and when the blockholder is experienced as a blockholder or as the largest blockholder. We find that blockholders benchmark CEOs most strongly to firms in different industries. In addition, we find that our results are not driven by a few large blockholders that dominate the sample, and that smaller blockholders also appear to be important in influencing a CEO's compensation.

Our results on the comparison with single blockholder firms and multiple blockholder firms are somewhat mixed. This suggests that blockholders' relative power or disagreement between blockholders can also affect compensation policies. The process through which each blockholder in a firm influences compensation—especially when those blockholders differ in objectives—is an important topic for future research.

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Table I Summary Statistics

Total compensation, its components, and CEO tenure come from ExecuComp (1992-2016). Firm and blockholder characteristics from Compustat and Thomson Reuters 13F data are for the year preceding the compensation data. All returns, from CRSP common stock data, are contemporaneous 12-month compounded. *Own Return* is the return of the firm the CEO manages; *Industry Return* is the value-weighted average return of all other firms within the same three-digit SIC category; *Excess over Industry* is *Own Return* less *Industry Return*. *Top 5 Institutional Ownership Ratio* is ownership by the 5 largest institutions divided by total institutional ownership (Hartzell and Starks (2003)). *Portfolio Return* is the weighted average return of the largest blockholder's portfolio (in which we use the dollar value of the institution's equity stake in each firm as the weight to compute the weighted average return), excluding the firm itself. We also split the portfolio into same three-digit SIC firms and all other firms. *Excess over Portfolio* equals *Own Return* less *Portfolio Return*. Own return, industry return, and portfolio return volatilities are the annualized standard deviation of monthly returns over the past 3 years. *Equity Stake* equals shares held by the largest blockholder divided by the firm's total shares outstanding. *Portfolio Weight* is the dollar value of the largest blockholder's stake divided by the dollar value of her portfolio. *Block Stakes* is the number of blocks in the portfolio of the largest blockholder. *Prior years as blockholder* equals the number of years in which the largest blockholder had held at least one block in any firm. *Experienced as Blockholder* (*Experienced as largest blockholder*) equals one if the largest blockholder had held blockholder (largest blockholder) status in at least five consecutive years, in any firm(s), in the past. *Top 3 Blockholder* equals one if the largest blockholder is among top 3 institutional blockholders, based on the number of blocks held by them, in a year. We convert all nominal variables (compensation, market values, and returns) to 2014 dollar terms using the GDP deflator.

Panel A: CEO Characteristics	N	Mean	SD	Q1	Median	Q3
Total Compensation ($ million)	14,282	5.49	5.64	1.78	3.58	7.15
Salary ($ million)	14,282	0.87	0.40	0.59	0.82	1.08
Bonus ($ million)	14,282	0.51	1.21	0	0	0.57
Option Grants ($ million)	14,282	1.56	3.19	0	0.45	1.75
Stock Grants ($ million)	14,282	1.46	2.64	0	0.16	1.88
All Other Compensation ($ million)	14,282	1.08	1.95	0.05	0.39	1.33
Tenure (years)	14,282	7.86	7.10	3	6	10
Panel B: Firm Characteristics	N	Mean	SD	Q1	Median	Q3
Market Value of Equity ($ billion)	14,282	7.77	21.78	0.73	1.94	5.77
Own Return (%)	14,282	13.52	42.24	-10.85	9.69	31.74
Industry Return (%)	14,282	10.23	27.31	-5.23	10.16	26.01
Excess over Industry (%)	14,282	3.29	35.44	-13.85	0	15.71
Own Return Volatility (%)	14,282	38.18	20.15	24.42	33.36	46.47
Industry Return Volatility (%)	14,282	25.55	13.44	16.75	22.78	30.94
Total Institutional Ownership (%)	14,282	69.98	17.41	58.63	72.08	83.48
Top 5 Institutional Ownership Ratio (%)	14,282	42.98	11.62	34.96	40.92	48.41
Number of Blockholders	14,282	2.62	1.38	2	2	3
Panel C: Characteristics of Firm's Largest Blockholder	N	Mean	SD	Q1	Median	Q3
Portfolio Return (%)	14,282	9.08	17.84	-0.45	10.13	20.26
Excess over Portfolio (%)	14,282	4.44	38.50	-17.67	0.41	20.53
Portfolio Return (Different Industry) (%)	14,274	9.07	17.96	-0.47	10.05	20.27
Portfolio Return (Same Industry) (%)	12,271	10.72	31.52	-6.20	9.77	26.34
Portfolio Return Volatility (%)	14,282	16.11	5.86	10.96	16.17	19.96
Equity Stake (%)	14,282	9.96	5.05	7.19	9.01	11.53
Portfolio Size ($ billion)	14,282	197.45	248.77	13.03	83.81	294.09
Portfolio Weight (%)	14,282	2.04	6.96	0.07	0.30	1.28
Firms in Portfolio	14,282	1017.02	741.37	305	971	1,609
Firms in Portfolio (Different Industry)	14,282	992.26	723.90	297	954	1,576
Block Stakes	14,282	287.69	376.35	23	104	383
Prior Years as Blockholder	14,282	11.62	6.37	6	10	16
Experienced as Blockholder	14,282	0.93	0.26	1	1	1
Experienced as Largest Blockholder	14,282	0.88	0.33	1	1	1
Top 3 Blockholder	14,282	0.39	0.49	0	0	1

Table II Baseline Results

We regress total CEO compensation (TDC1; in millions of dollars) on *Own return*, *Excess over industry*, and *Excess over portfolio* from 1992 to 2016. In columns (1) and (2) the three performance measures are percent returns. In columns (3) and (4), the dependent variable is the natural logarithm of TDC1, and the performance measures are percent returns. In columns (5) and (6) the performance measures are dollar returns (percent returns multiplied by market value of equity, at the beginning of the year). To allow for heterogeneity in pay-performance sensitivities with firm size, we also include the interactions between performance variables and firm size (measured by the market value of equity at the beginning of the year). In all specifications we condition on, but do not report estimates for, own return, industry return, and portfolio return volatilities, the natural logarithm of CEO tenure, the top 5 institutional ownership ratio, the number of blockholders, block stakes, portfolio weight, the number of prior years as blockholder, and the natural logarithm of the market value of equity at the beginning of the year. We use fixed effects for year, industry, firm, and blockholder. *t*-statistics appear in parentheses using standard errors adjusted for within-firm clustering. *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively. We report the economic effects as follows: we calculate the change in predicted compensation for each firm from its actual characteristics to its characteristics with a (i) one percentage point increase in *Own Return*, (ii) one percentage point increase in *Excess over Industry*, and (iii) one percentage point increase in *Excess over Portfolio*. We then average the changes in predicted compensation over all firms. In columns (5) and (6), we report the economic effects as the dollar change in TDC1 for a $1,000 increase in firm value.

	$-%	$-%	%-%	%-%	$-$	$-$
	(1)	(2)	(3)	(4)	(5)	(6)
Own Return	1.037***	-0.880	0.248***	0.0701	0.0574**	-0.0103
	(5.99)	(-1.50)	(9.87)	(0.71)	(2.41)	(-0.36)
Excess over Industry	0.0739	0.118	0.0152	0.0144	0.116***	0.0810*
	(0.43)	(0.62)	(0.59)	(0.50)	(2.89)	(1.77)
Excess over Portfolio		1.906***		0.175*		0.108***
		(3.24)		(1.81)		(3.20)
Own Return x Firm Size(*10^{-3})	11.9	-3.4	-0.14	-1.32	-0.314**	-0.0747
	(0.90)	(-0.19)	(-0.14)	(-0.94)	(-2.14)	(-0.60)
Excess over Industry x Firm Size(*10^{-3})	40.5*	29.4	2.43	1.64	-0.498**	-0.388
	(1.65)	(1.16)	(1.38)	(0.89)	(-2.45)	(-1.57)
Excess over Portfolio x Firm Size(*10^{-3})		24.7		1.69		-0.369**
		(1.43)		(1.17)		(-2.35)
Obs.	16,498	14,282	16,479	14,266	16,498	14,282
Adjusted R^2	0.658	0.662	0.759	0.762	0.655	0.66
Economic Effects ($)						
Own Return	11,277	-9,061	11,616	2,188	55	-10.9
Excess over Industry	3,811	3,462	2,980	2,139	113	78
Excess over Portfolio		20,979		9,861		105

Table III Components of CEO Compensation

We regress the components of CEO pay, in millions of dollars, on *Own Return*, *Excess over industry*, and *Excess over portfolio*. Each panel includes three specifications: (1) CEO compensation with percent returns; (2) the natural logarithm of CEO compensation with percent returns; and (3) CEO compensation with dollar returns. All regressions include the same control variables, including return-firm size interactions, and fixed effects as in Table II. *t*-statistics appear in parentheses using standard errors adjusted for within-firm clustering. *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively. We report the economic effects of the performance measures in the same manner as in Table II.

	Salary			Bonus			Option Grants			Stock Grants		
	$-%	%-%	$-$	$-%	%-%	$-$	$-%	%-%	$-$	$-%	%-%	$-$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Own Return	-0.00899	0.0459	0.00164	-0.0583	0.00651	0.00950	-1.737***	-0.228	-0.0705***	0.409	0.0582	0.0329**
	(-0.29)	(1.03)	(0.91)	(-0.44)	(0.03)	(1.53)	(-3.63)	(-1.15)	(-3.88)	(1.36)	(0.21)	(2.02)
Excess over Industry	0.0145	0.00936	-0.000516	-0.0734	-0.0431	0.00869	0.219*	0.0539	0.0477	-0.0267	0.105	0.0159
	(1.50)	(0.66)	(-0.35)	(-1.53)	(-0.61)	(0.91)	(1.66)	(1.02)	(1.10)	(-0.31)	(1.48)	(0.72)
Excess over Portfolio	0.0207	-0.0292	-0.000323	0.348***	0.470*	0.0252**	2.020***	0.375*	0.0938***	-0.208	0.0236	-0.0298
	(0.70)	(-0.70)	(-0.14)	(2.64)	(1.91)	(2.42)	(4.12)	(1.95)	(3.72)	(-0.70)	(0.09)	(-1.45)
Obs.	14,282	14,210	14,282	14,282	6,650	14,282	14,282	8,667	14,282	14,282	7,537	14,282
Adjusted R^2	0.82	0.654	0.82	0.522	0.645	0.522	0.451	0.693	0.45	0.548	0.715	0.548
Economic Effects ($)												
Own Return	-94	380	1.53	-387	151	8.80	-20,707	-8,526	-69.6	6,553	2,294	33.0
Excess over Industry	171	36	-0.46	-629	-26	8.05	2,339	1,941	45.2	840	5,213	15.9
Excess over Portfolio	139	-221	-0.34	4,008	3,863	24.66	23,331	12,056	91.7	-4,231	1,975	-29.6

Table IV Portfolio Weight

We split our sample into observations based on the weight of the firm in the largest blockholder's portfolio. For each largest blockholder each year, we obtain its median portfolio weight among the firms in our sample. We perform our regression analysis for firms where the largest blockholder's stake in the firm is below the median, and for firms where the blockholder's stake is equal to or greater than the median, separately. Each panel includes three specifications: (1) CEO compensation with percent returns; (2) the natural logarithm of CEO compensation with percent returns; and (3) CEO compensation with dollar returns. All regressions include the same conditioning variables, including return-firm size interactions, and fixed effects as in Table II. *t*-statistics appear in parentheses using standard errors adjusted for within-firm clustering. *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively. We report the economic effects of the performance measures in the same manner as in Table II.

	Low Portfolio Weight			High Portfolio Weight		
	$-%	%-%	$-$	$-%	%-%	$-$
	(1)	(2)	(3)	(4)	(5)	(6)
Own Return	0.152	0.318*	0.275	-1.322	-0.0432	-0.0263
	(0.21)	(1.82)	(1.31)	(-1.00)	(-0.23)	(-0.74)
Excess over Industry	0.00777	-0.00785	0.531**	0.0548	0.00409	0.0763
	(0.03)	(-0.16)	(2.32)	(0.13)	(0.08)	(1.49)
Excess over Portfolio	0.452	-0.0772	0.0436	3.009**	0.314*	0.127***
	(0.62)	(-0.45)	(0.14)	(2.38)	(1.73)	(3.36)
Obs.	6,273	6,260	6,273	6,831	6,829	6,831
Adjusted R^2	0.634	0.712	0.635	0.635	0.748	0.633
Economic Effects ($)						
Own Return	3,516	10,046	267	-15,242	-7,374	-27
Excess over Industry	4,493	3,221	487	4,855	3,957	72
Excess over Portfolio	3,968	-3,422	30	33,894	28,797	121

Table V Blockholder Experience

We split our sample based on *Experienced as blockholder* (Panel A) and *Experienced as largest blockholder* (Panel B). We report three specifications: (1) CEO compensation with percent returns; (2) the natural logarithm of CEO compensation with percent returns; and (3) CEO compensation with dollar returns. All regressions include the same conditioning variables, including return-firm size interactions, and fixed effects as in Table II. t-statistics appear in parentheses using standard errors adjusted for within-firm clustering. *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively. We report the economic effects of the performance measures in the same manner as in Table II.

	Panel A. Blockholder Experience						Panel B. Largest Blockholder Experience					
	Inexperienced			Experienced			Inexperienced			Experienced		
	$-%	%-%	$-$	$-%	%-%	$-$	$-%	%-%	$-$	$-%	%-%	$-$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Own Return	3.883	0.523	-0.328	-0.768	0.0593	-0.0119	-0.0898	0.0717	0.115	-0.459	0.0912	-0.0165
	(0.85)	(0.44)	(-0.57)	(-1.18)	(0.56)	(-0.41)	(-0.04)	(0.14)	(0.49)	(-0.69)	(0.83)	(-0.57)
Excess over Industry	-1.189	-0.201	0.202	0.119	0.0249	0.0800	-0.604	0.0204	0.177	0.136	0.0188	0.0794
	(-0.53)	(-0.44)	(0.33)	(0.60)	(0.84)	(1.65)	(-0.48)	(0.09)	(0.59)	(0.67)	(0.61)	(1.60)
Excess over Portfolio	-2.376	-0.271	0.448	1.812***	0.180*	0.109***	0.914	0.0612	-0.0688	1.488**	0.154	0.118***
	(-0.59)	(-0.25)	(0.67)	(2.80)	(1.74)	(3.20)	(0.33)	(0.12)	(-0.38)	(2.26)	(1.44)	(3.47)
Obs.	1,014	1,013	1,014	13,268	13,253	13,268	1,748	1,746	1,748	12,534	12,520	12,534
Adjusted R^2	0.78	0.775	0.781	0.67	0.765	0.668	0.743	0.766	0.743	0.666	0.764	0.665
Economic Effects ($)												
Own Return	46,072	1,374,520	-303.5	-8,075	1,764	-12.6	8,227	11,534	121.8	-5,189	3,311	-17.1
Excess over Industry	-9,842	-504,383	196.5	3,626	2,418	77	-3,574	1,980	168	3,356	2,042	76
Excess over Portfolio	-29,524	-730,936	412	20,084	10,448	106.3	3,955	2,221	-68.2	17,497	9,734	115.1

Table VI Blockholder Portfolio Firms in Same and Different Industries

We split the largest blockholder's portfolio into firms in the same industry, and firms in different industries, as the firm under consideration. We then compute two measures of *Excess over Portfolio*. In Panel A, we split the largest blockholder's portfolio based on the three-digit SIC grouping which we also apply for *Excess over Industry*. In Panels B and C, we split the largest blockholder's portfolio based on the text-based industry classification (TNIC) of Hoberg and Phillips (2016). We use their TNIC-3 dataset that only includes firms having pairwise similarities with a given firm that are above a threshold as required based on the coarseness of the three-digit SIC. We treat firms with a similarity score in the dataset as being in the same industry. In all panels, firms in the largest blockholder's portfolio are weighted by portfolio shares. In Panel B, we compute *Excess over Industry* using the market value of equity to weight firms in the same industry. In panel C, we compute *Excess over Industry* using the similarity scores to weight firms in the same industry. Each panel includes three specifications: (1) CEO compensation with percent returns; (2) the natural logarithm of CEO compensation with percent returns; and (3) CEO compensation with dollar returns. All regressions include the same conditioning variables, including return-firm size interactions, and fixed effects as in Table II, except that in panels B and C we do not include industry fixed effects and return volatilities are measured over the past one year (due to the shorter sample period as Hoberg and Phillips dataset covers the period 1996-2015). t-statistics appear in parentheses using standard errors adjusted for within-firm clustering. *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively. We report the economic effects of the performance measures in the same manner as in Table II.

	Panel A: Three-digit SIC			Panel B: TNIC Classification (Value-wtd industry returns)			Panel C: TNIC Classification (Similarity-wtd industry returns)		
	$-%	%-%	$-$	$-%	%-%	$-$	$-%	%-%	$-$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Own Return	-0.897	-0.0234	-0.00734	-0.907	-0.0465	0.0241	-0.779	-0.0343	0.0111
	(-1.17)	(-0.18)	(-0.26)	(-1.29)	(-0.37)	(0.86)	(-1.14)	(-0.28)	(0.37)
Excess over Industry	-0.229	-0.0166	0.112	0.285	0.0332	0.124**	0.347*	0.0782***	-0.00994
	(-0.74)	(-0.34)	(1.39)	(1.05)	(0.75)	(2.07)	(1.80)	(2.66)	(-0.28)
Excess over Portfolio (Different Industry)	1.721**	0.238*	0.0777**	1.584**	0.237*	0.0588	1.515**	0.224*	0.0949**
	(2.27)	(1.86)	(2.57)	(2.30)	(1.95)	(1.44)	(2.22)	(1.84)	(2.01)
Excess over Portfolio (Same Industry)	0.526*	0.0588	-0.00728	0.249	0.0217	-0.0548	0.185	-0.00714	0.0460*
	(1.95)	(1.37)	(-0.14)	(1.13)	(0.60)	(-1.04)	(0.89)	(-0.23)	(1.78)
Obs.	12,102	12,089	12,102	11,584	11,568	11,584	11,582	11,566	11,582
Adjusted R^2	0.662	0.76	0.659	0.665	0.76	0.662	0.665	0.76	0.662
Economic Effects ($)									
Own Return	-8,346	-2,067	-7.3	-7,792	-2,128	22.7	-6,439	-1,753	11.1
Excess over Industry	312	-1,535	107	6,320	5,196	117	3,816	3,180	-8.8
Excess over Portfolio (Different Industry)	18,503	12,409	75.5	16,183	10,789	56.5	15,394	10,552	90.1
Excess over Portfolio (Same Industry)	5,012	5,024	-6.2	764	-1,636	-49.6	3,118	535	45

Table VII Top 3 Blockholders

We regress TDC1 on *Own Return*, *Excess over Industry*, and *Excess over Portfolio*. We interact our return measures with a dummy variable, *Top 3 Blockholder*, that equals one if the largest blockholder is among the top 3 institutional blockholders, based on the number of blocks held by them, in a year. As in Table II, we use three specifications: (1) CEO compensation with percent returns; (2) the natural logarithm of CEO compensation with percent returns; and (3) CEO compensation with dollar returns. All regressions include the same conditioning variables, including return-firm size interactions, and fixed effects as in Table II. *t*-statistics appear in parentheses using standard errors adjusted for within-firm clustering. *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively. We report the economic effects of the performance measures in the same manner as in Table II.

	\$-% (1)	%-% (2)	\$-\$ (3)
Own Return	-0.963*	0.0606	0.00128
	(-1.66)	(0.61)	(0.03)
Own Return * Top 3 Blockholder	-0.471	-0.0340	-0.0139
	(-1.16)	(-0.53)	(-0.26)
Excess over Industry	0.299	0.0240	0.104
	(1.27)	(0.68)	(1.41)
Excess over Industry * Top 3 Blockholder	-0.574	-0.0333	-0.0587
	(-1.57)	(-0.58)	(-0.60)
Excess over Portfolio	1.699***	0.167*	0.114
	(2.85)	(1.71)	(1.51)
Excess over Portfolio * Top 3 Blockholder	1.276**	0.0860	-0.000957
	(2.44)	(1.07)	(-0.01)
Obs.	14,282	14,266	14,282
Adjusted R^2	0.663	0.762	0.66
Economic Effects (\$)			
Own Return (Top 3 Blockholder=0)	-10,735	2,005	-1.02
Own Return (Top 3 Blockholder=1)	-13,816	-39	-12.7
Excess over Industry (Top 3 Blockholder=0)	7,769	4,651	101.3
Excess over Industry (Top 3 Blockholder=1)	-1,519	89	43.4
Excess over Portfolio (Top 3 Blockholder=0)	19,726	8,450	110.5
Excess over Portfolio (Top 3 Blockholder=1)	30,565	13,913	110.2

Table VIII Number of Blockholders

We split our sample based on whether there is a single blockholder in a firm or multiple blockholders and regress total CEO pay on *Own Return*, *Excess over Industry*, and *Excess over Portfolio* for each subsample. We use the largest blockholder's portfolio return for *Excess over Portfolio*. We use three specifications: (1) CEO compensation with percent returns; (2) the natural logarithm of CEO compensation with percent returns; and (3) CEO compensation with dollar returns. All regressions include the same conditioning variables, including return-firm size interactions, and fixed effects as in Table II, except that we condition on the number of institutional owners of the firm, not the number of blockholders. t-statistics appear in parentheses using standard errors adjusted for within-firm clustering. *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively. We report the economic effects of the performance measures in the same manner as in Table II.

	Single Blockholder			Multiple Blockholders		
	$-%	%-%	$-$	$-%	%-%	$-$
	(1)	(2)	(3)	(4)	(5)	(6)
Own Return	-2.444	-0.336	-0.0306	0.160	0.256**	0.00278
	(-1.25)	(-1.18)	(-0.58)	(0.24)	(2.16)	(0.05)
Excess over Industry	0.271	0.0865	0.115	-0.159	-0.0138	0.0358
	(0.41)	(0.99)	(1.59)	(-0.69)	(-0.41)	(0.56)
Excess over Portfolio	3.198*	0.500*	0.0783	0.980	0.00543	0.159***
	(1.67)	(1.77)	(1.47)	(1.40)	(0.05)	(2.65)
Obs.	3,534	3,528	3,534	10,748	10,738	10,748
Adjusted R^2	0.703	0.805	0.705	0.669	0.764	0.668
Economic Effects ($)						
Own Return	-25,542	-24,037	-30.9	1,737	11,383	2.4
Excess over Industry	4,002	4,086	104.5	1,763	1,182	36.6
Excess over Portfolio	35,123	35,483	76.7	12,180	1,444	155

Table IX Firms with Non-December Fiscal Years and Largest Institutional Owners

In columns (1)-(3), we include non-December fiscal year firms when we compute the industry and largest blockholder's portfolio returns. In columns (4)-(6), we use the portfolio returns of all firms' largest institutional owners, even those with an equity stake below 5%. Each panel includes three specifications: (1) CEO compensation with percent returns; (2) the natural logarithm of CEO compensation with percent returns; and (3) CEO compensation with dollar returns. All regressions include the same conditioning variables, including return-firm size interactions, and fixed effects as in Table II except that, in the last three columns, we condition on the number of institutional owners of the firm, not the number of blockholders. *t*-statistics appear in parentheses using standard errors adjusted for within-firm clustering. *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively. We report the economic effects of the performance measures in the same manner as in Table II.

	Including Non-December Firms			Largest Institutional Owners		
	$-%	%-%	$-$	$-%	%-%	$-$
	(1)	(2)	(3)	(4)	(5)	(6)
Own Return	-0.990*	0.0505	-0.0198	-0.730	0.0565	-0.00330
	(-1.69)	(0.53)	(-0.67)	(-1.25)	(0.59)	(-0.17)
Excess over Industry	0.179	0.0276	0.0925*	0.120	0.00696	0.0329
	(0.94)	(0.96)	(1.89)	(0.66)	(0.27)	(1.32)
Excess over Portfolio	1.968***	0.184**	0.115***	1.765***	0.199**	0.0876***
	(3.33)	(1.97)	(3.29)	(3.07)	(2.14)	(3.93)
Obs.	14,282	14,266	14,282	16,213	16,190	16,213
Adjusted R^2	0.662	0.762	0.661	0.663	0.771	0.661
Economic Effects ($)						
Own Return	-10,341	1,137	-19.9	-7,046	2,134	-3.4
Excess over Industry	4,254	3,092	89.2	1,120	159	31.4
Excess over Portfolio	21,748	10,269	111.4	20,301	10,728	85.6