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## The Optimal and Actual Use of EVA versus Earnings in Actual Compensation

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# The Optimal and Actual Use of EVA versus Earnings in Executive Compensation<sup>1</sup>

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# The Optimal and Actual Use of EVA versus Earnings in Executive Compensation

## Abstract

Proponents of EVA and related “shareholder value” measures intend to replace earnings and to supplement stock returns by including their own measures in managerial compensation schemes. Stern Stewart’s EVA appears to be the most widely recognized measure. However, there are not very many firms have explicitly adopted such schemes. One obvious reason, which we account for explicitly, is that they are not appropriate for all firms. An additional, less obvious fact, is that firms can directly or even indirectly mimic EVA measures. Firms such as Clorox and O.M. Scott use their own performance measures, which are arguably variants of EVA.

In this paper, we use publicly available estimates of firm level EVA and examine whether firms pay according to it regardless of their explicit policies. This research approach captures the fact mentioned above, that firms can do home-made EVA performance evaluation.. We adapt the technique of Garvey and Milbourn (2000) to model the optimal weight placed on EVA at the firm level. There is enormous cross-sectional heterogeneity in the estimated “value-added” of EVA for various firms. With our estimates of optimal weights, we verify empirically that compensation paid to the top five executives in over 2,000 firms is highly consistent with our optimal compensation arrangements.

# 1 Introduction

With the emergence of the “shareholder value maximization” mantra held dear by nearly every publicly-traded corporation, many consultancy practices come forward with various proprietary measures of economic performance. These measures are touted for their role in implementing more efficient compensation schemes. Arguably, Stern Stewart is the most prominent player in this domain with their EVA<sup>®</sup>, shorthand for Economic Value Added.<sup>1</sup> EVA is a periodic measure calculated as after-tax operating profits less a charge for capital employed, where the charge is based on the cost of capital (or WACC) times the level of capital employed.

The underlying premise of EVA is that if managers focus their efforts on maximizing earnings, subsequent earnings growth may come at the expense of the balance sheet. That is, managers may overinvest in costly capital if they are only concerned with the profit and loss statement. To counter such asset inefficiencies, Stern Stewart (see Ehbar (1998)) argues that firms should replace earnings as the objective in their managerial compensation schemes with EVA.

While EVA is intuitively appealing, and is certainly consistent with basic project appraisal techniques taught in any corporate finance course (such as NPV analysis), it has not formally been adopted by many firms. Recent studies by Wallace (1997), Hogan and Lewis (1999) and Kleinman (1999) uncover roughly 70 US firms that have formally adopted EVA (or a close substitute, such as Residual Income or Economic Profit). An immediate question is why have so few firms have embraced EVA?

One obvious reason for the relative scarcity in EVA adoptions is that EVA might not be right for every firm. For instance, calculating the components of EVA within a firm is never straightforward, and these difficulties may vary in the cross-section of firms. Consider a multi-product company that wants to calculate EVA for each of its product. If some assets are shared (such as an assembly line), allocating a usage charge by product may be difficult for either lack of relevant data or because it is too politically costly in that it creates inefficient “turf battles”. Thus, it is possible that costs of implementing EVA effectively outweigh the benefits.

An additional reason that many firms forgo implementing an EVA compensation plan is that it may simply be an ineffective measure of a manager’s actions for some firms. Alternatively, its information content may just be unknown. In a companion paper (Garvey and Milbourn (2000)), we confront this possibility directly by acknowledging that *a priori*, the “signal” content of EVA

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<sup>1</sup>For the other players and their respective measures, see Myers (1997).

and earnings, respectively, in terms of a manager’s marginal contribution may be unknown to senior management and is definitely unknown to researchers. We develop a formal empirical method that uses correlations between these two measures and the firm’s stock price to ascertain the signal content of each measure. This allows us to empirically derive the optimal compensation weights that EVA should receive relative to earnings. Interestingly, in more than half of the cases (out of 2,096 observations), EVA provides no additional information vis-a-vis earnings and hence, it receives zero weight in the optimal compensation scheme.<sup>2</sup>

If firms for which we assign no value to EVA share our assessment, it seems reasonable that they have not adopted EVA formally. On the other hand, out of the 590 firm-years, we identify 273 that *should* find value in adopting EVA. With only the handful of firms that had formally adopted EVA (less than 70), our empirical approach in the companion paper in fact had reasonable success in predicting these EVA adoptions as a function of our assessment of EVA’s value to these firms.

However, what about the other firms from this large subsample of firms for which EVA is estimated to be of value? Why have they not formally adopted EVA? In this paper, we take an alternative approach in explaining these non-adopters. Might their compensation schemes pay *as if* they had adopted EVA? That is, do these firms use a homemade version of EVA? There are certainly examples of such firms. Clorox computes its own measure that closely resembles EVA (see Davis (1996)), and OM Scott imposes a charge against earnings for working capital employed (see Baker and Wruck (1994)). Many other firms use basic capital budgeting principles in performance evaluation and since EVA is consistent with such principle, these firms may also pay according to EVA at least implicitly.

We begin the paper by developing the basic principles of the theory and empirical method provided by Garvey and Milbourn (2000). We model a firm seeking to design an optimal compensation contract when the manager makes two effort choices. While managerial actions are not directly observable, several performance measures are. There are two performance measures, shorthand for EVA and earnings, which provide a noisy estimate of the manager’s choice on one of these actions. Introducing noise in performance measures is standard in such models, however, we also allow for the realistic possibility that the two different measures differ in their signal content. That is, while they both contain noise, they may also *miss* some portion of the manager’s effort, and this “signal

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<sup>2</sup>The only constraint we put on the compensation scheme is linearity. We defer to Holmstrom and Milgrom (1987) for the relative generality of this approach.

content” may vary across the two measures.

A third performance measure, which is an estimate of the second managerial action, is observed by capital market participants but is not contractible. This measure, along with the two measures described above, are used in setting the firm’s stock price in equilibrium. What our empirical method does is to use the relationship between the EVA and earnings performance measures, respectively, and the firm’s stock price as a way to learn about the unknown signal content of each. This allows us to derive the weights that should be placed on EVA relative earnings in an optimal compensation arrangement. We then take this empirical method to the data.

Estimates of firm level earnings and EVA is collected for the time period 1978-1997. These data are then merged with the Compustat ExecuComp database, which provides detailed compensation data for the top five executives named in the proxy statements. We first estimate the optimal relative weights that should be placed on EVA and earnings in the compensation contract. As stated earlier, many of the firms should optimally put zero weight on EVA. In order to compare our results to others in the compensation literature, we also calculate the relative weights that would be placed on EVA and earnings by simply comparing the ratio of variances of these two measures. This approach has been used in Lambert and Larcker (1987) and Yermack (1995). Our estimates of the optimal weights show a correlation of 0.202 or less with the ratio of variances. Importantly, all of our results are qualitatively unaffected by using either a 1978-1997 or 1986-1997 time period.

With the compensation data in hand, we then seek to explain the total compensation paid to firm executives. We proceed first with some simple regressions. For the firms that our theory predicts should not use EVA, earnings are significantly related to total compensation, while EVA is insignificant. On the other hand, firms for which we show EVA has value, earnings are insignificant in explaining total compensation, while EVA is positively related to total compensation and statistically significant. As a means of comparison, the simple ratio of variances is insignificant in both subsamples.

In a more refined test of the model, we allow the coefficients on EVA and Earnings to vary continuously by incorporating interaction terms between our estimates of the optimal weights and each of these measures. Consistent with the results above, both earnings and EVA are significant in explaining total compensation is consistent with the theory. Again, the simple ratio of variances performs badly.

In summary, our paper has documented that firms do appear to pay their executives in a manner consistent with optimal compensation. Moreover, while few firms have formally adopted

EVA, many of them pay as if they have adopted it. We find this encouraging given the large proportion of firms for which EVA appears to add value to a compensation arrangement written solely on earnings. As can be seen in the regression results, we still have a lot to learn about how compensation contracts are written at firms given that most of our explanatory power comes from including lagged compensation into the regression analysis. Future research will inevitably bring us a better understanding.

The rest of the paper is organized as follows. Section 2 develops the model and characterizes the problem we explore. Section 3 provides our empirical results. Section 4 concludes.

## 2 Model Setup

In this section, we develop a model of managerial compensation design. Our goal is to determine the weight that a new performance measure such as EVA should receive, when a company already has access to accounting earnings and to stock prices. As is standard, we require all measures to be used optimally. Less standard is our ability to express the results in terms of observable quantities.

We model an unlevered firm with risk-neutral shareholders, run by a risk-averse manager. Fundamental firm value is determined by both the manager's effort choices random elements beyond the manager's control. We assume that there are two dimensions of managerial effort, denoted  $a_c$  and  $a_f$ . The action  $a_c$  can be captured by EVA and by earnings, while the action  $a_f$  is not revealed by such backward-looking, accounting-based measures. This action will be captured by another performance measure, which is then revealed through stock prices. We introduce these two types of effort in order to distinguish between two uses of the stock price. First, it represents a direct measure of  $a_f$ , and second, it can provide additional information about the competing accounting measures of  $a_c$ . The firm's terminal value is given by

$$X_c + X_f = (a_c + \theta_c) + (a_f + \theta_f),$$

where  $a_i \in [0, \infty)$ , for  $i \in \{c, f\}$ , are the manager's (unobservable) effort choices across  $a_c$  and  $a_f$ , and  $\theta_i$  is noise, with  $\theta_i \sim N(0, \sigma_i^2)$  for  $i \in \{c, f\}$ . The terms  $\theta_c$  and  $\theta_f$  are independent shocks to the manager's efforts, with variances  $\sigma_c^2$  and  $\sigma_f^2$ , respectively and means normalized to zero. Observe that we have set the marginal and average productivity of the manager's two action choices both equal to one. This is just a normalization as we will allow the cost of the different types of effort, and therefore their value marginal products, to vary arbitrarily.

The manager has utility that is separable in wealth and effort, and has a reservation utility level normalized to zero. We assume that the manager has negative exponential utility over wealth, with a coefficient of risk-aversion given by  $r$ . Further, the general cost of effort is given by  $C(a_c, a_f)$ . Risk neutral shareholders design the manager's compensation contract to maximize their wealth, subject to the participation and incentive compatibility constraints. Given the unobservability of both effort decisions, shareholders must rely on performance-based compensation arrangements. Hampering these efforts in our model is the assumption that the underlying value of the firm ( $X_c + X_f$ ) is *not* directly observable. Rather, there exists a set of observable performance measures which offer noisy, yet informative estimates of the individual components of firm value.

## 2.1 Available Performance Measures and the Stock Price

We assume that there are two competing (accounting) measures of  $X_c$ ,  $Y_1$  and  $Y_2$ , and one measure of  $X_f$  given by  $Y_f$ . The two accounting performance measures are observable and verifiable and are given by

$$\begin{aligned} Y_1 &= \lambda_1 X_c + \varepsilon_1 \\ Y_2 &= \lambda_2 X_c + \varepsilon_2, \end{aligned}$$

where  $\varepsilon_1 \sim N(0, \omega_1^2)$  and  $\varepsilon_2 \sim N(0, \omega_2^2)$ . For generality, we allow these errors to have a (possibly) non-zero covariance given by  $Cov(\varepsilon_1, \varepsilon_2) = \rho_{\varepsilon_1 \varepsilon_2} \omega_1 \omega_2$ .

The parameters  $\lambda_1$  and  $\lambda_2$  are positive, deterministic scalars that represent the proportion of the manager's contribution to firm value through  $a_c$  is successfully captured by the performance measure. The motivation for this specification is as follows. It is apparent that in the performance specification of  $Y_j = \lambda_j X_c + \varepsilon_j$ , "false" value creation is potentially registered in either measure by the error term  $\varepsilon_j$ . Naturally, these errors could differ across performance measures. Similarly, the potentially nonequal  $\lambda_j$ 's capture the fact that our performance measures might also fail to register value-increases that have in fact occurred. That is, these measures can, and most likely do, have differential "signal content" as well. Thus, we model a situation where performance measures are freely available for contracting purposes, yet their value in this regard may be uncertain.

The above formulation is in part an attempt to capture the implicit logic behind the " $R^2$  debate". If all practitioners agreed on the properties of alternative performance measures, there would be no reason to argue about which is most closely related to stock prices. One would simply demonstrate that EVA (or a related "shareholder value" measure) is consistent with basic valuation

principles while accounting earnings are not. However, actual performance measurement involves both noise and judgement. As Stern Stewart and other practitioners have implicitly recognized, the theoretical argument in favor of EVA or related measures needs buttressing by empirical evidence, such as the relationship between the performance measure and stock prices. Our model indicates exactly what kind of evidence is needed and how it should be used.

For the case of earnings, it is well-known that earnings changes have a substantially lower variance than do stock returns, even after removing market effects from the stock returns. But if earnings had a  $\lambda$  value of one, then they would be *more* volatile than stock returns due to the noise term  $\varepsilon$ . While this can be explained away by assuming that this effect stems solely from variations in future value ( $Y_f$ ) or simple stock price noise, it is equally likely that earnings reports suppress *information*, as well as noise. A similar argument can be made for EVA. First, changes in EVA are far less volatile than abnormal stock returns in Biddle et al's (1997) sample, as well as in our sample. Second, EVA's adjustments to reported earnings are unlikely to undo all of the conservativeness in accounting earnings. Finally, and perhaps most important, the equity cost of capital used in Stern Stewart's capital charge is estimated with a great deal of noise.<sup>3</sup> In response, Stern Stewart appear to advocate smoothing the capital charge across firms and over time, as evidenced by the following excerpt:

Coca-Cola, (a prominent Stern Stewart client), uses 12% as its single cost of capital worldwide, expressed in dollars. Why 12%? Because it's 1% a month.<sup>4</sup>

Our formulation resembles that used by Sloan (1993) in allowing accounting numbers to be related to fundamental value by a multiplicative constant. However, his approach critically relied on the extreme assumption that abnormal stock returns are a *noiseless* measure of  $X_c$ . The unfortunate implication is that accounting variables should not be used at all in an optimal contract. We allow for a more realistic setting in which *all* measures are noisy and, in which we don't know all of the relevant attributes of the available performance measures of  $a_c$ .

In addition to the two current value performance measures, there is a measure of  $a_f$  given by

$$Y_f = X_f + \varepsilon_f,$$

where  $\varepsilon_f \sim N(0, \omega_f^2)$ . We assume that  $Y_f$  is observed by capital market investors and hence, revealed through the stock price. In equilibrium, the stock price ( $P$ ) is set by competitive, risk-neutral traders who observe  $Y_1$ ,  $Y_2$  and  $Y_f$ , and understand the statistical properties of each measure.

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<sup>3</sup>See Fama and French (1997) for an examination of the time-variation in industry costs of capital.

<sup>4</sup>See Ehbar (1999).

The measure  $Y_f$  could very well represent information that is privately observed by some capital market investors. However, it should be noted that our analysis could readily accommodate the assumption that the firm's shareholders (who design the manager's wage contract) could also observe  $Y_f$ . In fact, they could also observe the  $\lambda_1$  and  $\lambda_2$  parameters. What is implicit in our analysis is that the shareholders design a contract using the two accounting measures and stock price, and treat  $Y_f$  as noncontractible. Our contribution builds on the reality that as empirical researches, *we* cannot observe  $\lambda_1$ ,  $\lambda_2$ , or  $Y_f$ .

Given this information structure, the stock price is

$$P = E(X_c + X_f \mid Y_1, Y_2, Y_f) + \phi,$$

where  $\phi \sim N(0, \sigma_\phi^2)$  captures the possibility that market prices have additional errors that are independent of fundamentals.<sup>5</sup> Note that since expected returns are zero, any non-zero returns are abnormal returns reflecting innovations in the measures  $Y_1$ ,  $Y_2$ ,  $Y_f$  or the error term  $\phi$ .

## 2.2 Optimal Contracts

For incentive contracting purposes, the firm's shareholders are interested in the manager's contributions to firm value through  $a_c$  and  $a_f$ . If  $\lambda_1$  and  $\lambda_2$  were known, the stock price would be used only to infer the manager's long-term effort  $a_f$ . The reason is that the stock price's estimate of  $a_c$  is based only on measures  $Y_1$  and  $Y_2$ , which can already be used directly for contracting purposes. In this case, the stock price is only a useful surrogate for the manager's choice of  $a_f$ . In this case, we would transform the reported  $Y_i$  measures to

$$\Psi_i = \frac{Y_i}{\lambda_i},$$

for  $i \in \{1, 2\}$ . Restricting the set of feasible wage contracts to be linear, we can then write an optimal contract directly on the transformed performance measures by solving for

$$w(Y_1, Y_2, P_f) = W + w_1 \Psi_1 + w_2 \Psi_2 + \alpha [P - E[P \mid Y_1, Y_2]],$$

where  $W$  represents the fixed wage. The term  $P - E[P \mid Y_1, Y_2]$  is the "filtered price" of Kim and Suh(1993) and captures the unique information in stock prices which in our model reflects the noncontractible variable  $Y_f$ .<sup>6</sup>

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<sup>5</sup>For simplicity, we are ignoring the fact that the manager's pay comes out of the stock price. Inclusion of this does not qualitatively alter the results, although the algebra becomes increasingly tedious.

<sup>6</sup>We will only consider linear compensation contracts. See Holmstrom and Milgrom (1987) for justification of this approach.

Naturally, the absolute weights in this wage contract depend on the manager's cost of effort function and on his risk-aversion coefficient. However, as we know from Banker and Datar (1989) for the case where the manager has a single effort decision (here  $a_c$ ), the optimal *relative* weights on the two accounting measures  $Y_1$  and  $Y_2$  are independent of these considerations. Their result carries over to our multi-task setting since we assume that both  $Y_1$  and  $Y_2$  are noisy measures of the same action on the part of the manager.<sup>7</sup> The essence of the Banker-Datar result is that the weights on the two accounting measures are chosen to minimize the variance of providing the manager with a given level of effort incentive. Since both  $\Psi_1$  and  $\Psi_2$  have unit sensitivity to effort  $a_c$ , it is optimal to place a weight  $b$  on the new measure in order to minimize  $Var(d\Psi_1 + (1-d)\Psi_2)$ . It follows directly from the definition of the variance of such a sum that it is minimized by choosing:

$$d^* = \frac{Var(\Psi_2) - Cov(\Psi_1, \Psi_2)}{Var(\Psi_2) + Var(\Psi_1) - 2Cov(\Psi_1, \Psi_2)}. \quad (1)$$

### 2.3 The Use of Shareholder Value Measures when $\lambda$ is Unobservable

The expression for  $d^*$  is intuitive but is not directly testable, because we do *not* observe the additional information  $\lambda_1$  and  $\lambda_2$  necessary to construct the measures  $\Psi_1$  and  $\Psi_2$  in the first place. In this section, we develop our formal framework for using stock market information to elicit estimates of each performance measure's signal content, and then characterize the optimal weight to be placed on each measure in terms of observables.

We make the standard assumption that market participants know the parameters of the firm's contracting problem, including the  $\lambda_i$ , and so can infer equilibrium effort decisions and expected firm value. Clearly, the  $\lambda$  values are critical information for traders both to compute expected terminal values and also to update these expectations based on the realizations of the  $Y$  signals. Since all random variables are normally distributed, we can write the price as a linear regression of terminal firm value on the available signals:

$$P = E(X_c + X_f \mid Y_1, Y_2, Y_f) + \phi = K + b_1(Y_1 - E(Y_1)) + b_2(Y_2 - E(Y_2)) + b_f(Y_f - E(Y_f)) + \phi$$

where  $K$  is a constant incorporating expected effort decisions and  $E(Y_i) = \lambda_i E(a_c)$ , for  $i = 1, 2$ . In an ideal world, the direct way to estimate the values of  $\lambda_1$  or  $\lambda_2$  would be to regress  $Y_1$  or  $Y_2$  on the price in order to reveal each measure's sensitivity to fundamental value. Unfortunately,

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<sup>7</sup>See Feltham and Xie (1994) for a characterization of the more general case where measures capture multiple aspects of effort.

matters are not as simple as that because the price does not directly reveal the fundamental  $X_c$ . This section shows how to extract the necessary information from the stock price.

The first problem is that the signals  $Y_1$  and  $Y_2$  are correlated, because they share the common "fundamental" component  $X_c$  and also because their "noise" components  $\varepsilon_1$  and  $\varepsilon_2$  may be correlated. Minimizing the sum of squared errors  $(X_c + X_f - P)^2$  and solving for the regression coefficients of interest yields:

$$\begin{aligned} b_1 &= \frac{Cov(Y_1, X)Var(Y_2) - Cov(Y_1, Y_2)Cov(Y_2, X)}{Var(Y_1)Var(Y_2) - (Cov(Y_1, Y_2))^2} = \frac{\lambda_1\sigma_c^2\omega_2^2 - \lambda_2\sigma_c^2Cov(\varepsilon_1, \varepsilon_2)}{Var(Y_1)Var(Y_2) - (Cov(Y_1, Y_2))^2} \\ b_2 &= \frac{Cov(Y_2, X)Var(Y_1) - Cov(Y_1, Y_2)Cov(Y_1, X)}{Var(Y_1)Var(Y_2) - (Cov(Y_1, Y_2))^2} = \frac{\lambda_2\sigma_c^2\omega_1^2 - \lambda_1\sigma_c^2Cov(\varepsilon_1, \varepsilon_2)}{Var(Y_1)Var(Y_2) - (Cov(Y_1, Y_2))^2} \end{aligned}$$

Suppose we now use the simple regression  $Y = k_i + \chi_i Y_i + \epsilon_i$ , so that

$$\chi_i = \frac{Cov(Y_i, P)}{Var(P)} \quad (2)$$

is our "raw" estimate of  $\lambda_i$ . Given our expression for  $P$  and the fact that  $Y_f$  and  $\phi$  are both orthogonal to  $Y_1$  and  $Y_2$ , we can write

$$Cov(Y_1, P) = b_1 Var(Y_1) + b_2 Cov(Y_1, Y_2)$$

Using our expressions for  $b_1$  and  $b_2$  we can express the two terms on the right-hand side as:

$$\begin{aligned} b_1 Var(Y_1) &= \frac{Var(Y_1)[Cov(Y_1, X)Var(Y_2) - Cov(Y_1, Y_2)Cov(Y_2, X)]}{Var(Y_1)Var(Y_2) - (Cov(Y_1, Y_2))^2} \\ b_2 Cov(Y_1, Y_2) &= \frac{Cov(Y_1, Y_2)[Cov(Y_2, X)Var(Y_1) - Cov(Y_1, Y_2)Cov(Y_1, X)]}{Var(Y_1)Var(Y_2) - (Cov(Y_1, Y_2))^2} \end{aligned}$$

Noting that the second term in  $b_1 Var(Y_1)$  and the first term in  $b_2 Cov(Y_1, Y_2)$  sum to zero and taking out the common term  $Cov(Y_1, X)$  from the remaining two terms in the denominator, we can now write:

$$\begin{aligned} Cov(Y_1, P) &= b_1 Var(Y_1) + b_2 Cov(Y_1, Y_2) = \frac{Cov(Y_1, X) (Var(Y_1)Var(Y_2) - [Cov(Y_1, Y_2)]^2)}{Var(Y_1)Var(Y_2) - (Cov(Y_1, Y_2))^2} \\ &= Cov(Y_1, X) = \lambda_1 \sigma_c^2 \end{aligned}$$

We can now write the coefficient from the simple regression of  $Y_i$  on  $P$  as:

$$\chi_i = \frac{Cov(Y_i, P)}{Var(P)} = \frac{\lambda_i \sigma_c^2}{Var(P)} \quad (3)$$

While the non-zero covariance between the accounting measures  $Y_i$  no longer appears,  $\chi_i$  still understates the true  $\lambda_i$  because  $Var(P) > \sigma_c^2$ . This is apparent given that the stock price depends not just on  $X_c$  (as captured by  $Y_1$  and  $Y_2$ ), but also on  $X_f$  (revealed through  $Y_f$ ) and additional noise, given by the variance of  $\phi$ . Sloan (1993) undertook an analysis similar to that above but assumed that the variance of abnormal stock returns were in fact equal to  $\sigma_c^2$  (which is the variance of  $X_c$ ). Under that strict assumption,  $\chi$  offered an unbiased estimate of  $\lambda$ . As pointed out by Lambert (1993), this assumption is unrealistic and in fact undercuts the entire exercise since it immediately implies that the abnormal return should be the only performance measure used.

Naturally, since we don't observe  $\lambda_i$ , our estimate of  $\chi_i = \frac{Cov(Y_i, P)}{Var(P)}$  remains less than ideal. Moreover, we should state clearly that we do not claim to solve the above errors-in-variables problem and obtain unbiased estimates of the  $\lambda_i$ . When the errors  $(\varepsilon_1, \varepsilon_2)$  in our accounting performance measures are correlated ( $\rho_{\varepsilon_1 \varepsilon_2} \neq 0$ ), we are unable to completely decompose the variance of the stock price into the components that reflect  $a_c$ ,  $a_f$ , and noise. Fortunately, as we now show, we do not need to solve the errors-in-variables problem to obtain an unbiased measure of the relative optimal weights on our accounting performance measures. The reason is simply that the degree of underestimation is *equivalent* across both performance measures. Specifically, we denote

$$g \equiv \frac{Var(P)}{\sigma_c^2} > 1,$$

which offers us an estimate of  $\lambda_i$ , denoted  $\hat{\lambda}_i$ ,

$$\hat{\lambda}_i = g\chi_i, \quad (4)$$

for  $i \in \{1, 2\}$ , that carries the same constant  $g$  in both  $\hat{\lambda}_1$  and  $\hat{\lambda}_2$ . This allows us to express the optimal Banker and Datar (1989) relative weights (given by (??)) completely in terms of observable magnitudes. We start with the expression

$$d^* = \frac{Var(\Psi_2) - Cov(\Psi_1, \Psi_2)}{Var(\Psi_2) + Var(\Psi_1) - 2Cov(\Psi_1, \Psi_2)}$$

And then note that

$$Var(\Psi_i) = \frac{Var(Y_i)}{\lambda_i^2} = \frac{Var(Y_i)}{g^2 \chi_i^2} = \frac{Var(Y_i)}{g^2 [\rho_{P, Y_i} \frac{SD(Y_i)}{SD(P)}]^2} = \frac{1}{g^2 Var(P) \rho_{P, Y_i}^2}$$

$$Cov(\Psi_1, \Psi_2) = \frac{Cov(Y_1, Y_2)}{\lambda_1 \lambda_2} = \frac{\rho_{Y_1, Y_2} SD(Y_1) SD(Y_2)}{g^2 \chi_1 \chi_2} = \frac{\rho_{Y_1, Y_2}}{g^2 Var(P) \rho_{P, Y_1} \rho_{P, Y_2}}$$

where  $\rho$  denotes the simple correlation coefficient. Substituting these expressions into our expression for  $b^*$  and cancelling terms yields:

$$d^* = \frac{\frac{1}{\rho_{PY_2}^2} - \frac{\rho_{Y_1 Y_2}}{\rho_{PY_1} \rho_{PY_2}}}{\frac{1}{\rho_{PY_2}^2} + \frac{1}{\rho_{PY_1}^2} - 2 \frac{\rho_{Y_1 Y_2}}{\rho_{PY_1} \rho_{PY_2}}} = \frac{\rho_{P, Y_1}^2 - \rho_{Y_1, Y_2} \rho_{P, Y_1} \rho_{P, Y_2}}{\rho_{P, Y_1}^2 + \rho_{P, Y_2}^2 - 2 \rho_{Y_1, Y_2} \rho_{P, Y_1} \rho_{P, Y_2}}$$

While the above expression is entirely in terms of observables, it is not yet directly testable. The weight  $b^*$  can be estimated from data, but it applies to the unobserved measures  $\Psi_1$  and  $\Psi_2$ . To solve for the optimal weights on the observed measures  $Y_1$  and  $Y_2$ , we begin by noting that the optimal *relative* weight on  $Y_1$  versus  $Y_2$  is

$$\frac{d^*}{1 - b^*} \frac{\lambda_2}{\lambda_1} \quad (5)$$

The theory implies that  $Cov(Y_i, P) = \lambda_i Var(X_c)$ , so we can write:

$$\frac{\lambda_2}{\lambda_1} = \frac{Cov(Y_2, P)}{Cov(Y_1, P)} = \frac{\rho_{Y_2 P} \sigma_{Y_2} \sigma_P}{\rho_{Y_1 P} \sigma_{Y_1} \sigma_P} = \frac{\rho_{Y_2 P} \sigma_{Y_2}}{\rho_{Y_1 P} \sigma_{Y_1}} \quad (6)$$

We also now know that

$$\frac{d^*}{1 - d^*} = \frac{\rho_{Y_1 P} (\rho_{Y_1 P} - \rho_{Y_1 Y_2} \rho_{Y_2 P})}{\rho_{Y_2 P} (\rho_{Y_2 P} - \rho_{Y_1 Y_2} \rho_{Y_1 P})} \quad (7)$$

We can now write for the optimal relative weight on the two raw measures,

$$\frac{d^*}{1 - d^*} \frac{\lambda_2}{\lambda_1} = \frac{SD(Y_2) (\rho_{Y_1 P} - \rho_{Y_1 Y_2} \rho_{Y_2 P})}{SD(Y_1) (\rho_{Y_2 P} - \rho_{Y_1 Y_2} \rho_{Y_1 P})} \quad (8)$$

and the optimal contract uses weights  $\gamma^* Y_1 + (1 - \gamma^*) Y_2$  where:

$$\gamma^* = \frac{SD(Y_2) (\rho_{Y_1 P} - \rho_{Y_1 Y_2} \rho_{Y_2 P})}{SD(Y_2) (\rho_{Y_1 P} - \rho_{Y_1 Y_2} \rho_{Y_2 P}) + SD(Y_1) (\rho_{Y_2 P} - \rho_{Y_1 Y_2} \rho_{Y_1 P})}$$

## 2.4 Testable Implications

The results are now stated entirely in terms of observables. The optimal weight  $\gamma^*$  can be computed from the variance-covariance matrix of innovations in earnings, EVA, and stock values. These weights can then be compared to those obtained by regressing compensation on these same measures. It is important to recognize that the theory only restricts the relative sensitivity of compensation to EVA and to earnings. Without information on the manager's risk-aversion and the

marginal value product of  $a_c$  versus  $a_f$ , the model is silent on either the absolute weight placed on accounting measures, or the weight of earnings relative to stock returns. To gauge the importance of differential value-relevance, we also use a crude measure of  $\gamma_{naive}^* = SD(Y_2)/[SD(Y_1) + SD(Y_2)]$ . This corresponds to the common practice of empirical researchers of using only the raw volatility of the competing performance measures (e.g., Yermack, 1995; Garen, 1994)

### 3 Empirical Tests

#### 3.1 Raw data and derived measures

To compute the optimal weights, we use data from the years 1986-97. Our longest possible time-period starts in 1978 and our results are similar with this longer time-series. We use the shorter series to reduce the chance of an underlying structural break, and to match more closely to the compensation data which only begin in 1992. To derive our prior expectations for the weight placed on alternative performance measures, we use standard accounting and stock price data from Standard and Poors' Compustat and CRSP. These data are augmented with estimates of Economic Value Added secured from the Stern Stewart Performance 1000. It is worth noting at this point that we use the *publicly reported* EVA numbers from Stern Stewart to capture the value of shareholder value measures.

*Table 1* provides basic descriptive statistics of our sample. Abnormal stock returns are estimated assuming a beta of one and using the NYSE value-weighted index as the market portfolio as in Biddle et al (1997). Results are essentially identical using firm-specific betas from CRSP. We have 6251 observations to compute the optimal weights, representing the universe of firms which appear in the Stern Stewart Performance 1000 list as well as CRSP and COMPUSTAT for at least six years of our sample period. We use six years to produce at least five years per firm of unanticipated changes in both stock values and accounting performance measures to compute our optimal weights. Unanticipated changes are computed using the residuals from an AR1 regression, scaled by lagged market value of equity as in Biddle et al (1997).

As is common with panel data on large companies, the first seven rows of *Table 1* indicate some large outliers in accounting performance measures and stock returns as well as size. To reduce the effects of such extreme observations, we first removed all firms with less than five years of data.<sup>8</sup> We then winsorize all our values at the 1% tails before performing our statistical analyses. That

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<sup>8</sup>Our results are similar if we increase the required number of years to ten, or reduce them to four.

is, if an observation falls outside the 1% confidence interval at either tail, we set it equal to the upper or lower bound of that interval.

The next six rows of *Table 1* summarize our optimal weights and the data which underlie them. To compute the correlations that underlie our calculation of the value-added by EVA, we use abnormal stock returns and innovations in EVA and earnings. We follow Biddle et al (1997) in dividing our accounting measures by lagged market value of equity as this provides consistent scaling with stock returns. Finally, we use an AR1 specification to identify innovations in the accounting numbers, similar to Biddle et al (1997). As expected, our results are similar but noisier if we use simple first differences to proxy for unexpected changes in earnings or EVA.

Standard contract theory requires that performance measures be tailored to each firm's specific circumstances. Thus, the weight  $\gamma^*$  is computed using firm-specific statistical correlations. With at most 12 years of data on each firm, we will inevitably have noisy measures of the relevant correlations and variances. We can extend the series to 19 years for a subsample of firms, but this heightens the prospect of an underlying structural break. Our results are similar with our full sample.

As in Biddle et al (1997) and Garvey and Milbourn (2000), earnings innovations tend to be more highly correlated with returns than are innovations in EVA. Also, the two measures tend to be highly correlated with one another, but this source of multicollinearity is explicitly accounted for in the theory. Both accounting measures have approximately the same amount volatility and are in turn approximately five times less volatile than either raw or abnormal stock returns.. The next row of *Table 1* summarizes our firm-specific estimates of the optimal weight placed on EVA relative to earnings,  $\gamma^*$ , using data from 1986-97. To compute these numbers we follow the theory exactly except for the following cases. If EVA innovations are negatively related to abnormal returns, this implies that  $\lambda_{EVA}$  is actually negative and we set its optimal weight at zero. There are 186 such cases. If on the other hand earnings innovations are negatively and EVA innovations are positively related to abnormal returns, we set the weight on EVA at one. There are 36 such cases. Even when both measures are positively related to abnormal returns, it is possible for the optimal weight on EVA to be below zero or greater than one if the two are sufficiently highly correlated. For example if EVA is highly positively related to earnings but has little correlation with stock returns, then according to optimal compensation theory EVA should be effectively used as an index and receive a negative weight. While strictly consistent with the theory, we do not permit either measure to receive negative weight because both are intended to be measures of performance rather than

indices.<sup>9</sup> The result is that just over half of our optimal weights on EVA are zero, and the upper quartile begins at just over 44% weight on EVA. Consistent with the pattern of firms that have explicitly adopted EVA examined in Garvey and Milbourn (2000), EVA is highly valuable in many but not by any means in all cases. 11% of our sample are predicted by the theory to place a weight of one on EVA and a weight of zero on earnings.

The last three rows of *Table 1* summarize our compensation measures from Standard and Poors ExecuComp. Both Salary and Bonus average around 3/5 of a million dollars and bonuses are far more variable than salary. Total compensation is computed by Execu-Comp using the Black-Scholes value of options granted plus any grants of stock. Consistent with the growing importance of stock options in executive compensation documented by Hall and Liebman (1998), salary plus bonus represents just over a third of total compensation, and accounts for less than one-sixth of the variability in total compensation. We therefore focus on total compensation as our primary measure of incentives. In using the value of such compensation as a measure of managers' rewards, we do not account for the fact that options and shares continue to be sensitive to stock price performance in years after the grant date (until the manager sells the security). This is appropriate as our focus is on how firms make use of the unique information conveyed by earnings and shareholder value measures exemplified by EVA. For example, an option granted in 1993 will contain some sensitivity to earnings in 1994, but only insofar as earnings are correlated with stock returns.

### 3.2 Simple Correlations

*Table 2.1* gives a preliminary indication of how pay is related to our alternative performance measures. We use simple first differences of EVA and earnings, scaled by lagged market value of equity as our accounting performance measures, and percent changes in pay and compensation for our incentive rewards. Consistent with past studies, we find that cash compensation is more strongly related to accounting performance measures than is total compensation. In essence, accounting performance measured as either EVA or earnings are a stronger determinant of salary and bonus payouts than they are of option and stock grants. Such grants are more strongly related to past stock performance, and overall they are harder to predict than salary and bonus payments. One reason may simply be measurement error in valuing options with Black-Scholes (see, e.g. Huddart

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<sup>9</sup>For example, it is difficult to imagine EVA being marketed as an index. The "story" would have to be that high earnings are the primary indication of good performance, but if the manager also had a high value of EVA this would indicate that he just "got lucky" and should receive *less* of a reward!

(1994)). Despite this, we focus on total compensation because incentives should not be determined by any single component of compensation.

*Table 2.2* provides background evidence on our optimal weights. It is reassuring to see that they are relatively stable over time in that there is a high correlation between weights using shorter (1986-97) and longer (1978-97) windows. In part, this is simply because we only have more than 12 years of data available for a subsample of our firms. The last rows and columns of *Table 2.1* establish that our weights are not simply picking up size, leverage, or market-to-book effects. Industry effects may be present in our weights but we have not explored this systematically except by allowing the errors in the regressions which follow to be correlated within but not across 3-digit SIC code industries. Our theory is valuable even if industry effects are present because we can say *which* industries should rely relatively more on EVA. This represents a significant advance on simply documenting the presence of industry effects without any compelling a priori theory.

### 3.3 Regression Results

*Table 3* presents some simple and illuminating tests of the theory, exploiting the fact that we estimate an optimal weight of zero on EVA ( $\gamma^* = 0$ ) for approximately half the firms in our sample. In all our regressions, the dependent variable is the log of total compensation. To isolate unexpected payments, we use the log of the previous year's total compensation as an explanatory variable. This is similar to using first differences except that we do not restrict expected compensation to equal last year's compensation (which would involve setting the coefficient on lag  $\ln(\text{total compensation})$  to -1). As observed by Anderson et al (1999), the coefficient turns out to be significantly different from negative one.

The first column restricts all firms to make the same use of EVA relative to earnings. Consistent with past research, we find that stock returns are positively related to total compensation. Our results are virtually identical if we use abnormal returns and we use raw returns to be consistent with the literature such as Jensen and Murphy (1990) and Aggrawal and Samwick (1999). In the full-sample, both earnings and EVA innovations have insignificant positive coefficients. In part, this is because the two are significantly correlated. For example, earnings are significant at the 5% level if we exclude EVA. As the next two columns demonstrate, however, another reason is that we have restricted the coefficients to be equal across firms.

The second column of results in *Table 3* uses only those firms for which the theory says all weight should be placed on earnings. Consistent with the theory, earnings now have a positive and

effect on compensation which is significant at the 1% level, while EVA reverses sign and remains insignificant. The last column of results restricts attention to those firms which in theory should use EVA. Earnings are no longer significant for this subsample while EVA has an effect that is positive at the 10% confidence level. Unfortunately, the large standard errors on the coefficient of EVA in the  $\gamma^* = 0$  subsample and on earnings in the  $\gamma^* > 0$  subsample mean that the estimated coefficients for EVA or earnings are not significantly different from one another across subsamples. Nonetheless, our theoretically optimal measures perform much better than the alternatives. For example, if we split the sample according to the median of the naive variance weights, the coefficients change in the wrong direction (EVA is less important and earnings are more important when  $\gamma_{Var}$  is greater than its median) although none of these are significant.

*Table 4* presents a more refined test of the theory by allowing the coefficients on EVA and earnings to vary continuously. To do this we interact earnings and EVA innovations with our theoretically optimal weights for the two measures. Analogous to the work Janakiraman et al (1992) on the relative performance evaluation hypothesis, we can distinguish a weak and a strong-form our theoretical expectations. A weak-form implication of the theory is that the interaction term should be positive in the case of EVA and negative in the case of earnings. The strong-form implication is that the interaction term on EVA should have a coefficient of one and that on earnings should have a coefficient of negative one.

The first column of results uses both interaction terms but excludes stock returns as an explanatory variable. This specification is incomplete because stock returns are expected to affect compensation. However, the estimated coefficients on EVA and on earnings from this regression correspond to the theoretical model because the model uses the filtered price, i.e., that part of the price that is orthogonal to our accounting measures. It is clear from a comparison of  $R^2$  with the previous set of regressions that most of the explanatory power comes from the lagged effect of total compensation rather than any performance measure. This simply reminds us that we still have much to learn about the determinants of pay, especially the granting of options (see, e.g., Yermack, 1995). Nonetheless, our theory receives support in all its implications for this regression. We can reject the hypothesis that either interaction term has a zero coefficient at the 1% level, and cannot reject the hypothesis that EVA interaction has a coefficient of one and that the earnings interaction has a coefficient of -1.

The next column shows that the results are similar but somewhat noisier if we include stock returns as an explanatory variable. This is to be expected because stock returns are not orthog-

onal to accounting measures. We can still reject the hypothesis that the coefficient on the EVA interaction is zero at the 10% level, but are unable to so reject the hypothesis of no effect for the earnings interaction. The point estimates are, however, still qualitatively close to and statistically indistinguishable from those predicted by the theory (1 for the EVA interaction and -1 for the earnings interaction).

The last two columns in *Table 4* provide some perspective on the results we have achieved. Here we use the naive variance weights  $\gamma_{Var}$  in place of the theoretically optimal weights  $\gamma^*$ . These weights have no ability to identify firms where EVA is relatively more important than earnings. It is also noteworthy, analogous to Aggrawal and Samwick’s (1999) findings on the use of stock returns that earnings innovations have a statistically significant effect on compensation only when we use our optimal weights to allow the effect to differ across firms.

*Table 5* is included for completeness and comparability to some of the past literature. Here we restrict attention to cash compensation and achieve far weaker results for the theory. This is to be expected in that while our estimates of the value of stock options in total compensation are undoubtedly noisy, they provide a better measure of incentives than does ignoring such compensation altogether. In this section, we develop a model of managerial compensation design. Our goal is to determine the marginal value of adding the EVA performance measure to an existing earnings-based compensation plan.<sup>10</sup> As is standard, we require all measures to be used optimally. Less standard is our ability to express the results in terms of observable quantities.

## 4 Concluding Remarks

Not surprisingly, given the prominence of shareholder value principles at public corporations, enormous practitioner interest in helping firms in this objective has emerged. However, the full value of EVA and related “shareholder value-based” performance measures remains to be learned. To date in fact, only a handful of firms have formally adopted and begun paying their executives based on such economically appealing measures. In this paper, we have sought to examine whether a much greater proportion of firms had actually begun paying as if they were using measures such as EVA. With a formal method in hand for identifying such firms, we found strong empirical evidence that firms did pay according to optimal compensation schemes that weighted EVA and earnings

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<sup>10</sup>It is important to note that our analysis is directly amenable to any pair-wise comparison of performance measures. We focus on only two accounting measures since we are interested in characterizing the battle over which accounting measure – EVA or earnings – is better for incentive compensation.

according to their marginal values in reflecting managerial actions.

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Table 1: Descriptive Statistics

Variable	Obs.	Mean	Median	SD	Min	Max
MV of Equity	6,251	7,806	3,143	15,211	120	339,539
Book Assets	6,251	11,646	3,229	21,762	147	304,142
Long-Term Debt	6,251	1,755	514	4,578	0	80,923
Earnings	6,251	385.7	156.0	829.2	-7,987	8,203
EVA	6,251	-37.42	0.783	534.8	-6,604	4,821
Raw Returns	6,251	0.239	0.184	0.364	-0.703	5.44
Abnormal Returns	6,251	0.177	0.266	0.255	-0.986	1.04
Corr(uearn, ab. Ret.)	549	0.336	0.400	0.355	-0.927	0.982
Corr (ueva, ab. Ret.)	549	0.123	0.125	0.354	-0.863	0.861
Corr (uearn, ueva)	549	0.403	0.495	0.432	-0.896	0.991
SD (uearn)	549	0.0405	0.0307	0.300	0.0051	0.225
SD (ueva)	549	0.0470	0.0348	0.391	0.0041	0.256
$\gamma^*$ (optimal weight ueva)	549	0.241	0.0	0.355	0.0	1.0
Salary	2,996	0.707	0.660	0.326	0	3.649
Bonus	2,996	0.758	0.506	1.022	0	11.79
Total Compensation	2,996	3.980	2.413	6.786	0.0032	202.2

Notes: All dollar figures are in millions. Ueva, and Uearn are residuals from regressing EVA and earnings, respectively, on last year's value, all scaled by market value of equity. Abnormal returns are computed as raw returns less the return on the value-weighted S&P 500 Index.

Table 2.1: Simple Correlations Between Compensation, Performance Measures and Returns

	D Cash Compensation	D Total Compensation	D earn	D EVA	Raw Stock Return	Abnormal Stock Return
D Cash Compensation	1					
D Total Compensation	0.292	1				
D earn	0.346	0.0918	1			
D EVA	0.276	0.0841	0.625	1		
Raw Stock Return	0.303	0.164	0.197	0.147	1	
Abnormal Stock Return	0.342	0.176	0.252	0.155	0.897	1

Notes: Percentage changes in various measures of compensation and performance, prefixed by “D”. 2,087 observations remain after dropping all firms with only one observation per executive. Changes in EVA and Earnings are scaled by lagged market value of equity rather than their own lagged levels.

Table 2.2: Simple Correlations Between Weighting Schemes and Firm Characteristics

	$\gamma^*$	$\gamma_L^*$	$\gamma_{Var}$	$\gamma_{VarL}$	MV of Equity	Assets	Leverage	Tobin's q
$\gamma^*$	1							
$\gamma_L^*$	0.585	1						
$\gamma_{Var}$	0.202	0.122	1					
$\gamma_{VarL}$	0.173	0.166	0.789	1				
MV of Equity	0.024	-0.010	0.048	0.038	1			
Assets	0.021	0.046	0.026	0.012	0.496	1		
Leverage	0.010	0.054	-0.020	-0.024	0.033	0.378	1	
Tobin's q	0.042	0.023	0.132	0.137	0.294	-0.170	-0.454	1

Notes: Simple correlations with different weighting schemes for EVA versus Earnings ( $\gamma^*$ ).  $\gamma^*$  is the optimal weight computed with innovations from 1986-1997,  $\gamma_L^*$  is the optimal weight computed with innovations from 1978-1997,  $\gamma_{Var}$  is the naive volatility-based weight equal to  $\frac{Var(uearn)}{Var(uearnr)+Var(ueva)}$  using innovations from 1987-1997,  $\gamma_{VarL}$  is identical except that it uses innovations from 1978-1997. Leverage is the average ratio of long-term debt to total book assets averaged from 1986-1997 and Tobin's q is the ratio of the book value of debt plus the market value of equity to total book assets, also averaged over 1986-1997. 549 observations (one per firm).

Table 3: Determinants of Log Total Compensation for Firms that Theoretically Should and Should Not Use EVA

Explanatory variable	Full-sample	Firms with $\gamma^* = 0$	Firms with $\gamma^* > 0$
Constant	2.234 (10.33)	2.222 (8.17)	2.256 (6.77)
Lagged Ln(Total Comp)	0.723 (25.92)	0.723 (20.39)	0.722 (17.09)
Uearn	0.562 (1.68)	1.124 (2.56)	-0.973 (0.190)
Ueva	0.867 (0.261)	-0.455 (1.09)	0.849 (1.82)
Raw Return	0.365 (5.14)	0.412 (4.24)	0.290 (3.13)
Observations	2,096	1,185	911
Adjusted $R^2$	0.485	0.475	0.499

Notes: t-statistics based on robust standard errors allowing for heteroskedasticity and correlated errors within 3-digit SIC codes.

Table 4: The Effect of our Optimal Weights on the use of EVA and Earnings in Total Compensation

Explanatory variable	$\gamma^*$ weights excluding stock returns	$\gamma^*$ weights including stock returns	$\gamma_{Var}$ weights, excluding stock returns	$\gamma_{Var}$ weights including stock returns
Constant	2.267 (10.52)	2.236 (10.30)	2.269 (10.68)	??? (??)
Lagged Ln (Tot. Comp)	0.727 (25.95)	0.723 (25.81)	0.727 (26.19)	0.723 (25.93)
Uearn	1.763 (4.64)	0.984 (2.54)	0.895 (0.710)	-0.580 (0.045)
Ueva	-0.385 (0.967)	-0.280 (0.732)	0.618 (0.424)	0.742 (0.528)
Raw Stock Return		0.352 (4.97)		0.366 (5.13)
(Ueva)* $\gamma^*$	1.967 (2.24)	1.549 (1.80)		
(Uearn)* $\gamma^*$	-2.030 (2.18)	-1.43 (1.51)		
(Ueva)* $\gamma_{Var}$			-1.163 (0.359)	-1.404 (0.449)
(Uearn)* $\gamma_{Var}$			0.581 (0.246)	0.366 (0.510)
R <sup>2</sup> (pseudo-R <sup>2</sup> for logit)	0.476	0.487	0.474	0.485

Notes: Sample is 540 firms, weighted by the square root of the number of observations for each firm. Robust standard errors in parentheses. For the logit analysis we allow errors to be correlated within 4-digit industries but not across industries. \* indicates different from zero at 1%, \*\* at 5%, \*\*\* at 10%.

Table 5: Naive Regressions Using First Differences in Performance and in Cash Compensation

Explanatory variables	No interaction terms	Using optimal weights	Using variance weights
Constant	0.411 (6.37)	0.413 (6.45)	0.404 (6.23)
D earn	1.311 (5.82)	1.588 (5.97)	2.559 (3.03)
D eva	0.452 (2.41)	0.390 (1.75)	0.279 (0.348)
Raw Stock Return	0.243 (10.22)	0.238 (10.11)	0.241 (9.98)
(D eva)* $\gamma^*$		0.103 (0.231)	
(D earn)* $\gamma^*$		-0.769 (1.76)	
(D eva)* $\gamma_{Var}$			0.183 (0.101)
(D earn)* $\gamma_{Var}$			-2.414 (1.70)
Adjusted R <sup>2</sup>	0.172	0.175	0.175