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Founders versus non-founders in large companies: financial incentives and the call for regulation

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Abstract This paper is intended to question some of the premises in the ever increasing calls to regulate executive pay. We focus on founders, and extend Shleifer and Vishny's (1989, *Journal of Political Economy, 94*, 461–488) manager-specific investments model by explicitly modeling managerial effort and pay performance sensitivity. Tests of this model on a data set of large companies, controlling for the endogeneity of managerial compensation, indicate that founders tend to be less responsive to performance incentives and generally more entrenched. At the same time, founders' led firms are more valuable, supporting our predictions. This suggests that for founders, regulation of compensation may not be very effective.

Keywords Founder · Management compensation

JEL Classifications G32 · G34

1 Introduction

There is considerable research on the relationship of firm value and managerial compensation in large firms. Examples include Demsetz and Lehn (1985), Morck et al.

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(1988b), McConnell and Servaes (1990), Hermalin and Weisbach (1991), Hubbard and Palia (1995), Kole (1995), Loderer and Martin (1997), Himmelberg et al. (1999), Holderness et al. (1999), and Palia (2001). The findings, however, vary. Some researchers fail to find any relationship between compensation and firm value; some show a positive correlation; and others find an increasing and then decreasing relationship.

These ambiguities, as well as the uproar following some of the most recent corporate scandals, have resulted in calls for regulation of executive pay. Some support for possible regulation is provided by work such as Joskow et al. (1993) which suggests that executive pay is lower for regulated firms. In the case of electric utilities, best represented in the Joskow et al. (1993) sample, the discount can reach 30–50% of the pay in unregulated industries, all else equal.[1]

The popular and business press is replete with references to seemingly excessive executive pay. For example, the Wall Street Journal carries an article the editorial page, (August 8, 2001) entitled "Outrageous CEO pay: A Primer." Other articles include praise for regulations addressing corporate governance and calls for tighter control on executive pay. For example, Donkin (Financial Times, 9/29/05) quotes Mark Reid, an expert on executive compensation regarding the new set of regulatory reforms in the UK (Higgs reforms):

> Higgs reforms are leading to greater professionalism in the work of remuneration committees and a more detailed understanding of executive performance measures among shareholder bodies, where governance is emerging as a specialist discipline divorced from fund management.

The New York Times in an opinion piece by Jeff Madrick on the eve of President Bush's second term (January 20, 2005) states: "Some, usually at the law and business schools, are making economically sound cases for new rules and regulations. Whoever is president in the next 4 years can use some fresh advice." In another editorial, The New York Times (August 9, 2002) hailed regulations which will "downsize the imperial CEO."

In a book entitled "Pay without Performance" Bebchuk and Fried (2004) discuss the wave of new stock exchange regulations regarding board independence. They suggest (2004, 27) that even with the new reforms, which are beneficial "… the safest strategy for directors wishing to keep their board seats will be to avoid challenging CEO compensation" and that "fundamental reforms are needed." Bebchuk and Fried (2004, 195) also suggest that new regulations regarding compensation committees procedures "may mitigate problems arising from carelessness and insufficient attention, however, they do not address those arising from directors' incentives and tendencies to use their discretion in ways that favor executives."

The current study does not address the issue of optimal regulation, but suggests when and for whom any regulation affecting executive compensation may be effective. In particular, most researchers implicitly assume that managers are essentially very similar. We seek to test this proposition by contrasting founders with non-founders.

[1] Interest in this issue goes back to Carroll and Ciscel (1982).

That is, we look at the differential relationship between firm value and managerial compensation for founders and for non-founder CEOs.

The difference between founders and non-founders has only begun to attract some attention in finance, although the general management literature has often addressed such matters. Some of the frequent issues addressed are the differences between founder and non-founder managers; the different types of founders and how they create businesses; and the dynamics of founder succession (see, for example, Carland et al. 1984; Brockhaus and Horwitz 1986; Begley 1995; Rubenson and Gupta 1996; Alsos and Kolvereid 1998; Roth and Stewart 2000; Villalonga and Amit 2004).

One principal issue has been whether founders, or entrepreneurs, can be effective managers. The effectiveness of founders versus hired managers in family-run firms is also hotly debated on Wall Street; founders tend to be viewed with suspicion, but they are also credited with higher market valuation and better management (Stein 2001).

Both arguments have merit. A good example is Occidental Petroleum. The company had been successful for many years. Then, while still under the stewardship of the original founder, Armand Hammer, Occidental Petroleum developed significant problems.

We analyze founders from an executive compensation perspective, examining two opposing perspectives on financial incentives needed to motivate founders. One view perceives founders as people who have a brilliant idea, and labor tirelessly in order to create a valuable company. They own a large stake in the company and thus need no additional pay incentives to align their efforts with shareholder interests—but they may be hard to remove from office because of their asset-specific capital, leading to entrenchment. The alternative view argues that founders do not maximize firm value, but rather consume excessive managerial perquisites and attempt to entrench themselves at the expense of shareholders, for example, Johnson et al. (1985).

We build a simple model to illustrate our positive view of founders. We use the framework of Shleifer and Vishny (1989) in which an entrepreneur (whom we call a founder) makes manager-specific investments that render the founder valuable to shareholders and costly to replace. Shleifer and Vishny (1989) do not focus on managerial effort choice and the manager's optimal pay-performance sensitivity, but we extend their model to incorporate these features.

Shleifer and Vishny (henceforth SV) show that founders will be entrenched. We retain the entrenchment feature, and show that although founders may be good for a firm, they are less responsive to changes in their pay-performance sensitivity than non-founders.

The essence of our story is that while founders may be entrenched because of their superior firm-specific abilities, they endogenously end up working harder, so their firms are more profitable. We use a sample of large companies to test the model's empirical propositions. In examining the response of founders and non-founders to incentive pay, we address the broader questions of whether incentive structures are different for founders and non-founders; whether founders are more or less entrenched than non-founders and whether firms led by founders are more or less valuable than those led by non-founders.

A few studies have addressed related issues. Morck et al. (1988b) analyze the relationship between managerial compensation and firm value for a sample of Fortune 500

firms in 1980. They regress Tobin's Q on a founder dummy variable, which is found to be negative and statistically significant for older firms and positive for younger firms. Morck et al. (1998) examine different macroeconomic and profitability variables, and find that the greater the share of family-controlled wealth, the slower the economic growth in a country; and economic growth is positively correlated with the percentage of GDP owned by "entrepreneur billionaires" (according to *Forbes* magazine definitions). Burkart et al. (2003) consider the interaction of the legal system with a founder's succession decision and with the proportion of the founder's shares that would be floated in the open market. Their analysis focuses on the trade-off between concentrated ownership and legal protection.

In a related paper, Villalonga and Amit (2004) find that founder led firms perform better than other firms, and in particular, better than family led firms, supporting the first part of our discussion. Similar findings are in papers by Fahlenbrach (2006) and Adams et al. (2003). Adams et al. (2003) go further and endogenize CEO status. They suggest that CEOs depart after a period of good performance, and therefore, even after adjusting for the effect of performance on CEO status, they still find a positive impact of CEO's on performance. Perez-Gonzalez (2001) finds that founders' heirs tend to hurt firm performance.

Palia (2001) examines the impact of a CEO's pay-performance sensitivity on firm value without examining the differences between founder and non-founder-led firms. Our study thus has a very different focus. However, we also differ from Palia (2001) in several other ways. First, we examine firms during the 1990s, while Palia focuses on the 1980s. Perry and Zenner (2001) and others have shown that compensation in the 1980s was significantly different from that in the 1990s. Second, we use the sensitivity of total compensation, while Palia uses the sensitivity of shares and options granted during the current year, ignoring the sensitivity of options outstanding as well as salary and bonus.

Third, we use OLS regressions (while controlling for industry and year dummies), which capture cross-sectional relationships, while Palia uses firm-level fixed-effects that capture the time series relationship. Zhou (2001) shows that fixed-effects estimators have low power as they capture only time series within-firm variation. Given that CEO pay-performance sensitivity does not exhibit great time series variation, Zhou (2001) suggests that by the methods the results would be biased against finding a relationship even if there were one. Accordingly, he suggests one should use OLS.

Our research extends the literature on pay-performance sensitivity and on family firms in several ways and hopefully contributes to the discussion of the usefulness of regulation affecting executive pay. First, we extend the Shleifer and Vishny (1989) model to include effort. Second, in our empirical work, we confirm the finding that firms led by original founders have both higher market values and CEOs who are generally more entrenched than firms led by non-founders.

The differential impact of founder and non-founder-led firms on the relationship between firm value and managerial compensation is the unique prediction of our model. This prediction is verified in our data. We find in founder-led firms no statistically significant relationship between CEO pay-performance sensitivity and firm value. In non-founder-led firms, there is an inverted U-shape relationship between CEO's pay-performance sensitivity and firm value. In estimating our regressions, our

study controls for the endogeneity of managerial compensation (see Demsetz and Lehn 1985; Himmelberg et al. 1999; and Palia 2001), and we test for the appropriate use of instrumental variables (using the Hansen–Sargan test). Palia (2001) does not find any relationship between managerial compensation and firm performance for all managers. This paper finds such a result only for founders, while finding a contrasting result for non-founders, namely, an inverted-U shaped relationship. Such a result for non-founder managers is consistent with those found by Morck et al. (1988a) and McConnell and Servaes (1990), among others. Our results suggest that founders may be different than non-founders in a behavioral sense, and thus there are different implications for regulation of executive compensation in founder-led and non-founder led firms.

The paper is organized as follows. In Sect. 2 we present a simple model of founder behavior. Section 3 describes our estimation methodology and variable proxies, whereas Sect. 4 describes the data. In Sect. 5 we explain our results and Sect. 6 concludes.

2 Model

We develop a simple model for founders' effort choice based on the Shleifer and Vishny (1989) (SV) model, which focuses on investment choices. We adapt their discussion of incumbents to include founders, while introducing the founder's choice of effort in order to derive managerial pay-performance sensitivity. Our model attempts to reconcile the idea that founders are hard-working pioneers, with the idea that they might also be entrenched and difficult to fire, which is the crux of the SV argument. We characterize a founder as a person with the "best idea," whose value added depends on the match between the firm and the founder's special skills. As SV note, any other manager will probably be at a disadvantage because she has less expertise in running the special assets of the firm.[2]

Formally, we assume that the founder F, makes an investment I_F in the first or the founding period of the life of the firm. The firm value V, under the founder is expressed in Eq. 1 (also Eq. 1 in SV):

$$V = \alpha_F B(I_F) - pI_F \tag{1}$$

where α_F represents the unit of managerial productivity; B is the profit per unit of managerial production; I_F is the investment the firm chooses to make and p is the cost of investment. We view α as a production function. It would make no difference in the SV model, but it is important here. The advantage of the founder in this investment is captured in α, the ability to run the firm. Similar to SV, we assume that $\alpha_F > \alpha_A$, where A denotes the next best alternative manager the market can offer. SV focuses on the investment choice in the initial period, but we focus on the decisions taken in

[2] While this paper is focused on founders, the model can apply to any good manager. It explains how entrenchment, good performance and PPS can co-exist. Empirically, future work may want to address the question of how one identifies other classes of "good managers." Our empirical work suggests that founders can indeed be included in this class.

period 2, after the investment is made. All the SV results apply in our framework, too. In particular, the manager will choose an entrenching investment.

Managerial compensation in SV is a function of the manager's added value—i.e., the profit under the founder versus the profit under a new manager, A, who is allowed to make an additional investment I_A, at a cost of pI_A. Thus, the founding manager's wages w are defined as follows:[3]

$$w = f[\alpha_F B(I_F) - \{\alpha_A B(I_F + I_A) - pI_A\}] \tag{2}$$

So far, the model duplicates SV. Our contribution is to consider the manager's action in period 2. In other words, if founders make capital investment at the initial phases of the firm's life, then in period 2 we will observe them investing effort toward production. Note that the entire expression in braces { } is fixed when the effort choice is made, allowing us to focus on the manager's optimal pay-performance sensitivity.

Following SV, we expect the manager to be entrenched. The only change is that we view α as a "production function" with effort as input. Given that B has been determined prior to period 2, we can view it as a constant multiplying managerial production level.

Similar to Holmstrom (1979, 1982, 1999), we assume that a manager does not like to expend effort. Hence, in period 2, if everything were known with certainty, she would maximize

$$w + \theta\{\alpha_F B(I_F) - pI_F - w\} - g(e) \tag{3}$$

The first two terms are the manager's salary and gains from stock holdings, and the third term represents the cost of effort.

The advantage of the founder is expressed as

$$\partial\alpha_F/\partial\, e\big|_{e^*} > \partial\alpha_A/\partial\, e\big|_{e^*} \forall e^* \tag{4}$$

That is, the founder can achieve a higher level of production for every incremental effort everywhere. Equation 4 thus assumes that founders are "good" managers and are more productive than other non-founders. However, this argument might also be true for *other* "good" managers who have better observable characteristics such as education (as in Chevalier and Ellison 1999; Palia 2000), or some other unobservable style characteristic (as in Bertrand and Schoar 2003).

This is an easy way to model the advantage of the founder, but as a numerical example will show, this specific functional form is not necessary to derive our results. SV (and some researchers who followed, like Edlin and Stiglitz 1995) show that the manager will indeed invest too much in period 1 in order to preserve her position. This is of course true for us too, as in period 1 our model is identical to the SV model.

However, it is somewhat difficult to test this implication of the SV model empirically, because comparison of optimal and actual level of investment presents difficult measurement issues. We do test the SV entrenchment hypothesis, although with one

[3] Equation 2 is similar to Eq. 5 in SV.

important distinction: even a manager who undertakes an entrenching investment may still be responsive to incentives. Our model suggests this may not be the case.

The formulation so far assumes certainty. While most of the features that matter can be captured in a model like this, one may argue that under certainty, shareholders can use a forcing contract. More realistic framework takes uncertainty into account in the objective function:

$$\mathrm{E}(\mathrm{U}\{\mathrm{w}+\theta[[(\alpha(\mathrm{e})+\varepsilon]\mathrm{B}-\mathrm{pI}-\mathrm{w}]\})-\mathrm{g}(\mathrm{e}) \tag{3a}$$

where U is a utility function, and ε is a random element with an expected value of zero. To simplify somewhat the solution, we assume that w (but not the entire compensation) is independent of effort; that is, wages are based on the expected value of α, determined prior to the effort choice. We could include an endogenous α, but that would make the presentation cumbersome. We model the effort incentive by the choice of θ.

The manager's maximization problem is resolved in the standard fashion. Let us denote by C the total compensation (the terms in braces). Maximization yields the equation:

$$\theta\{\mathrm{E}(\partial \mathrm{U}/\partial \mathrm{C}))(\partial \alpha_{\mathrm{F}}/\partial \mathrm{e})\}\mathrm{B}=\mathrm{g}'(\mathrm{e}) \tag{5}$$

Gibbons and Murphy (1992) solve such equations explicitly by assuming a specific form of U. This is important in their framework because they characterize the time path of pay-performance sensitivity (PPS). Our focus is different, so we can proceed with the general solution, essentially assuming that the optimal compensation would be a salary plus a performance-related payment.[4] We note that θ is basically the PPS.

To fully characterize the solution, we add some reasonable assumptions on the function g (see, for example, Holmstrom 1979, 1982, 1999). These assumptions are: $g'(e) \geq 0$ (more managerial effort results in higher disutility to the manager), and $g''(e) > 0$ (higher effort becomes more costly at an increasing rate). In addition, given that α can be viewed as a production function, we have $\alpha'(e) \geq 0$ and $\alpha''(e) < 0$ (diminishing marginal returns). These characterizations, and the assumptions of diminishing marginal utility of wealth, allow us to assert that a solution exists. We can re-write Eq. 5 as follows, where *E(MU)* denotes the expected marginal utility:

$$\mathrm{PPS}\ \mathrm{E}\{(\mathrm{MU}(\partial \alpha_{\mathrm{F}}/\partial \mathrm{e})\}\mathrm{B}=\mathrm{g}'(\mathrm{e}) \tag{5a}$$

We can now easily show:

Lemma 1 *For given effort preferences and utility function* [*that is, the same g*(*e*)], *and for a given pay-performance sensitivity, founders* [*as characterized by Eqs.* 3 *and* 4] *will exert more effort than non-founders.*

[4] We are basically assuming that the participation constraint is not binding, that is, the manager shares some of the gains. If the participation constraint is binding, the results will hold weakly.

Proof Assume that a non-founder optimizes at a level e*. For that level, given the conditions in lemma 1 for a founder, the left hand side of Eq. 5 is greater than the right hand side of Eq. 5. Given the properties of α, g and U, the founder will increase effort to arrive at the optimum. □

The intuition is clear. The founder works more efficiently, and thus exerts more effort for a given set of incentives.

In some sense, the lemma stacks the cards against founders—in general; we may expect them to be less effort-averse. If they are indeed less effort-averse, the results will of course be stronger. This characterization helps us focus on what founders do—they have a better idea, and, for a given set of personal traits, ought to pursue it more vigorously.

This lemma sets the stage for our model. That is, founders work harder (in equilibrium), and thus may not require extra incentives. To see this, assume that an exogenous shift in the manager's PPS occurs (this can happen if the manager receives more shares, or if there is some shift in a response rate to wage changes). An exogenous increase in PPS mimics a cross-sectional analysis. Given the properties of the functions in question, it is easy to see that for any manager, higher PPS will lead to added effort—increasing the left- hand side of Eq. 5 should lead to increased effort (we omit this obvious proof). We thus have:

Result 1 An exogenous increase in PPS will (weakly) increase the effort expended by all managers.

This is of course a quite intuitive. Yet, this simple setting lets us make some predictions regarding the impact of changes in incentives on founders. Note that changes in incentives trigger a two-step process; First, managers will change the amount of effort they put in. Because we cannot observe these changes in effort directly, the empirical cross-sectional predictions are not that obvious—increased effort may or may not give founders an advantage over non-founders, depending on the structure of the production functions and on the current level of effort input. We try to distinguish some cases below.

Proposition 1 *In general, a founder will be less affected by changes in PPS than non-founders. Specifically*;

(a) *Assuming the same g(e) function for all agents, and a limit on the effort that can be exerted, cross-sectionally, we would expect to observe less of an impact of changes in PPS on output for founders than for non-founders.*
(b) *On average, founders, under reasonable assumptions, may be less responsive to changes in PPS.*

Proof Proving part (a) of the proposition is straightforward. If there is a maximum level of effort that is common to all agents, then, as founders have exerted more effort, it is likely that more of them reach that limit. Hence the cross-sectional prediction is clear. For part (b), we need to further specify the functions in question. The general idea is that founders tend to be a further along on the effort level, and that increased effort is costlier and less productive for them. We show this in an example because none of these functions is directly observable. □

Table 1 Example

Founders		Non-founders	
Marginal cost of effort	Marginal reward	Marginal cost of effort	Marginal reward
1	20	1	10.0
3	19	3	9.5
5	18	5	9.0
7	17	7	8.5
9	16	9	8.0
11	15	11	7.5
13	14	13	7.0
15	13	15	6.5
17	12	17	6.0

Let the disutility of effort be $g(e) = e^2$. This is a simple function with an increasing disutility to effort that increases at an increasing rate, which is often used in production models. Since this functional form is not bounded, it implies that one can increase effort without limits. This of course is not true. Thus we impose

$$g(e) = e^2 \quad \text{for all } e < e^*$$
$$g(e) = \infty \quad \text{for } e = e^*$$

where e* is some high level of effort (say, 24 h a day).

Assume that the marginal productivity of founders $\alpha'(e)$ is discrete and diminishing. That is, as shown in Table 1, for the first unit of effort, founders' production is 200 units. Output declines to 190 units for the second unit, 180 for the third unit, and so forth. The PPS is simply a 10% share; that is, for the first unit managers receive 20, for the second unit 19, and so forth. For non-founders we have a similar situation, except that they produce only 50% as much as the founders. Non-founders produce 100 units if they expend one unit of effort (and then they receive 10, a 10% share of production). The second unit yields 95 units; their marginal compensation is 9.5, and so forth. Table 1 summarizes the optimal choices of effort for founders and for non-founders.

Initially, founders expend 7 units of effort (at a marginal cost of 13 and a marginal reward of 14) and produce more, while non-founders will expend only 4 units of effort and produce less. Assume now that we increase the share of the manager (PPS) by 13%. The founders will still expend only 7 units of effort, since their share of the next marginal unit (which "costs" 15) is still only 14.7. Therefore, no change in effort or production will be observed. For non- founders, the return on the next unit will now be 9.04, so they will put in another unit of effort. We will thus observe an increase of 25% in effort and 80 (about 22%) in production on their part.

This example illustrates the general idea that in a cross-sectional study, we may find that founders are less responsive to incentives. To put the idea in terms of strategy, we would say that founders are working very hard already, and that no additional incentives, unless they are extreme, can result in higher efforts and production. Our model thus incorporates the SV prediction that managers will make entrenching invest-

ments. However, unless effort is modeled, one might assume that managers who have made entrenching investments will still be very responsive to PPS. We show that this may not be the case. It is noted that SV's entrenchment argument arises from the specificity of a firm's assets to its managers' skills, we add another building block- because of the superior talent and the nature of their incentives, founders may be less sensitive to changes in PPS. This latter phenomenon is often interpreted as entrenchment, but it is of course different than the entrenchment in SV. If, as our model suggests, founders are indeed different than non-founders, then the effect of regulation of the pay structure may have much less of an impact on founders than on non-founders. We test our model's view in the empirical section.

3 Empirical analysis

Our tests attempt to reveal the dynamics of founder versus non-founder-led firms.

3.1 Estimation methodology

Our estimation methodology is based generally on Palia (2001). Consistent with Morck et al. (1988b), McConnell and Servaes (1990), and Shin and Stulz (1998), among others, we take Tobin's Q as our proxy for firm value. We specify a firm value equation for Q, and then use instruments to solve for the endogeneity of the managerial compensation package.

Firm value

$$Q_{it} = \beta_0 + \beta_1 \mathrm{PPS}_{it} + \beta_2 \mathrm{PPS}_{it}^2 + \beta_3 C_{it} + \delta_{1t} + \mu_{1t} + \varepsilon_{1it} \tag{6}$$

Founder compensation

$$\mathrm{PPS}_{it} = \theta_0 + \theta_1 Z_{1it} + \theta C_{it} + \delta_{2t} + \mu_{2t} + \varepsilon_{2it} \tag{7a}$$

Non-founder compensation

$$\mathrm{PPS}_{it} = \lambda_0 + \lambda_1 Z_{2it} + \lambda C_{it} + \delta_{3t} + \mu_{3t} + \varepsilon_{3it} \tag{7b}$$

The dependent variable in Eq. 7a and b is the CEO's pay-performance sensitivity for which we use four different definitions. Firm value is given by Q_{it}, where t is a time subscript, C_{it} are the observable firm characteristics; β_1, β_2, and β_3 are the regression coefficients; δ_{1t}, δ_{2t}, and δ_{3t} are the year dummies, and μ_{1t}, μ_{2t}, and μ_{3t} the industry dummies. ε_{1t}, ε_{2t}, and ε_{3t} are the error terms, which are thought to be correlated with PPS_{it} because CEO's compensation is endogenous and related to observable firm characteristics (see Himmelberg et al. 1999). Therefore we use an instrumental variables technique.

In Eq. 7a and b PPS_{it} is endogenous and related to observable firm characteristics and to the exogenous instrumental variables Z_{1it}. Palia (2001) shows that PPS_{it} is

strongly related to the instrumental variables chosen here. Our two-stage least squares (2SLS) estimation model satisfies the rank and order conditions for model identification (see Greene 1997). To ensure that our error term ε_{1i} is uncorrelated with our instrumental variables we conduct a Hansen–Sargan test for the validity of instruments. The null hypothesis is that the instruments are valid instruments—that is, uncorrelated with the error (see Chapter 17 in Gujarati 2003). Under the null, the test statistic is distributed as chi-squared in the number of over-identifying restrictions. Rejection of the null casts a doubt on the validity of the instruments.

We hence analyze a 2SLS solution for the firm value Q_{it} (Eq. 6) by estimating Eq. 7a with different transformations of the instrumental variables Z_{1it} and C_{it} to obtain the fitted values of PPS_{it} and PPS^2_{it}. We can use different transformations of these original instrumental variables to create additional instruments to obtain consistent 2SLS estimators (see Wooldridge 2002). These fitted values are then used to substitute for PPS_{it} and PPS^2_{it} in the firm value equation. We follow a similar procedure to estimate Eq. 7b.

3.2 Proxies

We use a variety of proxies for the specific variables in the Eqs. 6, 7a, and b. The variables are defined in Table 2.

Tobin's Q ratio (Q_{it}): The empirical corporate finance literature uses Tobin's Q ratio to proxy for firm value-added, where Q_{it} is defined as the ratio of the market value of the firm to the replacement value of the firm's assets.[5] As in Smith and Watts (1992), and Shin and Stulz (1998), we calculate Q_{it} as the ratio of the market value of equity (Compustat data24 times data25), minus the book value of equity (data60), plus the book value of assets (data6), to the book value of assets.

CEO pay-performance sensitivity (PPS_{it}): To check that our results are not biased because of our choice of the sensitivity of CEO compensation to firm performance (PPS), we use four measures of PPS. This considerably extends Palia (2001). Our first proxy is *Options*, defined as the sensitivity of options granted this year, and unexercised and outstanding from previous years. To calculate the sensitivity of options, we use the proportion of shares granted times the Black-Scholes (1973) hedge ratio (i.e., the sensitivity of CEO options to changes in firm value). The sensitivity of options to shareholders' value follows Yermack (1995) and Palia (2001), and uses the Black-Scholes (1973) option valuation model, which allows for continuously paid dividends (Murphy 1985). The CEO pay-performance sensitivity due to options is given by N_t (soptgrnt) divided by the total shares outstanding, times $e^{-dt}\phi(D^*)$; where N_t is the number of options in year t at exercise price X; $\phi(\cdot)$ is the cumulative standard normal distribution function; $D^* = [\ln(S/X)(r-d+\sigma^2/2)T]/\sigma T^{0.5}$; S is the year-end stock price, and d is the dividend yield . We assume that each option has a 10-year maturity for T (as in Houston and James 1995). We estimate σ as the standard deviation

[5] Other studies estimate production functions whose residual (total factor productivity) is used as a proxy for firm value (for example, Kim and Maksimovic 1990; Palia and Lichtenberg 1999).

Table 2 Variable definitions

Variable	*Name*	Definition
Performance		
Tobin's Q ratio	*Q*	(Market value equity-book value of equity)/total assets
Return on assets	*ROA*	Operating income over assets
Market value of equity	*MV*	Year end price times total shares outstanding (in million $)
Other firm characteristics		
Collateral	*Collat*	Ratio of the sum of inventory, and net property, plant and equipment to total assets
Size	*Lasset*	Natural log of assets (asset in million $)
Size	*Lsale*	Natural log of sales (sales in million $)
Leverage ratio	*Leverage*	Total debt over total assets
Stock risk	*Variance*	Variance of daily stock return during the year
Firm age	*Firm_age*	Years the firm is included in CRSP
R&D expenses	*RD*	R&D expenses over assets
CEO compensation (*in dollar value*)		
Salary	*Salary*	CEO's yearly salary (in thousand $)
Bonus	*Bonus*	CEO's yearly bonus (in thousand $)
Stockholdings	*Stockhold*	Year-end stock price times CEO's share ownership (in thousand $)
New option granted during the year	*Opt_Grant*	Black-Scholes value of CEO new option grants (in thousand $)
options outstanding from previous years	*Opt_Out*	Total value of CEO's outstanding exercisable and unexercisable option grants (in thousand $)
CEO's pay-performance sensitivity (*PPS*)		
Sensitivity of cash	*Cash*	Value change in CEO's salary and bonus for $1 change in market value of equity
Sensitivity of total options	*Options*	Value change in CEO's total option grants for $1 change in market value of equity
Sensitivity of stock	*Shares*	Value change in CEO's stockholdings for $1 change in market value of equity
Sensitivity of equity	*Equity*	Value change in CEO's equity holdings for $1 change in market value of equity
Total sensitivity	*Total*	Value change in CEO's total compensation for $1 change in market value of equity
CEO entrenchment characteristics		
Tenure	*Tenure*	Number of years as CEO
Age	*Age*	CEO age in years
Blockholdings	*Block*	Total ownership of 5% large shareholders
Board size	*Bsize*	Total number of board of directors
Independent outside directors to inside and gray directors	*Outsiders*	Ratio of the number of independent outsiders to total number of insiders and gray directors
CEO involved in nominating directors	*Nominating*	Dummy = 1, if CEO is a member of nominating committee or there is no separating nominating committee; 0, otherwise
Number of annual board meetings	*Nmeeting*	Number of board meetings held in a year
Governance index	*GI*	Gompers, Ishii and Metrick's index for external governance
Dual-class board	*Dual*	Dummy = 1 if there is a dual-class corporate board; 0, otherwise

of stock returns in the previous 12-month period, and take the interest rate on the constant-maturity 10-year Treasury bond in year t as the relevant risk-free rate r.

Valuation of options granted during the year is straightforward because Execucomp explicitly gives their exercise price. The value of outstanding options that were granted previously but not exercised is not easy to determine, because proxy statements do not report detailed exercise prices. We follow Core and Guay (1999) to approximate the average exercise prices of outstanding unexercised options. The estimated exercise price of the outstanding options is assumed to be the difference between the fiscal year-end stock price and the ratio of the value of exercisable (inmonex) and unexercisable (inmonun) options to the corresponding number of options (uexnumex, uexnumex, respectively). The sensitivity of CEO's total option grants *Options* is then calculated as the sum of the sensitivities of the options outstanding and the newly awarded options each multiplied by the corresponding proportion of shares represented by option grants.

The second proxy is the CEO's pay-performance sensitivity *Shares*, defined as the value of the change in the CEO's stockholdings (shrown) for $1 change in the market value of equity. The third proxy is the CEO's pay-performance sensitivity *Equity*, defined as the value of the change in the CEO's options and stockholdings for $1 change in the market value of equity. The fourth proxy is the CEO's total pay-performance sensitivity, *Total*, defined as the value of the change in the CEO's salary and bonus, options, and stockholdings for $1 change in the market value of equity. Using all four measures for the CEO's pay-performance sensitivity ensures that our results are not dependent on any one definition.

Control variables (C_{it}): Many researchers include variables to control for firm characteristics in the firm value equation. We include as control variables research and development expenses, capital structure, and size. Intangible assets or soft capital may affect firm value and might not be captured by current Q values. Morck et al. (1988b), and McConnell and Servaes (1990) find research and development expenses to be positively related to Tobin's Q. We express the variable *RD* as the ratio of research and development expenses (data46) to total assets. When Compustat does not report research and development expenses we assume the amount to be zero. We control for firm capital structure (*Leverage*) by including the ratio of total book value of debt to book value of assets (as in Morck et al. 1988b, and Berger et al. 1997, among others: the sum of short-term debt (data9) plus long-term debt (data34) to book value of assets (data6).

Morck et al. (1988b), McConnell and Servaes (1990), Smith and Watts (1992), among others, find firm size to be related to firm value. Importantly, Coles et al. (2003) show that the results are different when one controls for size using the natural logarithm of sales or the natural logarithm of assets. Accordingly, we make sure our results hold for both these size proxies. The variable *Lasset* is the natural logarithm of assets (data6), and *Lsales* is the natural logarithm of sales (data12).

CEO characteristics and firm volatility (Z_{1it}, Z_{2it}): Palia (2001) finds that CEO characteristics (such as tenure and age) and firm stock return volatility strongly correlate with changes in the CEO's compensation. Murphy (1986), and Barro and Barro (1990) find that managers with different years of experience have different

pay-performance sensitivities. We proxy for CEO tenure (*Tenure*) by the number of years the CEO has been chief executive officer in the firm.[6]

Gibbons and Murphy (1992) suggest younger executives are willing to take more costly unobservable actions because of career concerns. In maximizing the total incentives from explicit pay-performance incentives and implicit career concerns, they suggest that, holding CEO tenure constant, compensation should increase as the CEO ages. Career advancement provides fewer incentives as an executive is near retirement, so higher compensation has to be offered. The variable *Age*, is the age of the CEO in years.[7]

Principal-agent models suggest a trade-off between managerial incentives and managerial risk-aversion predicting that the higher a firm's volatility the lower the CEO's pay-performance sensitivity. In an interesting paper, Holderness et al. (1999) find that managerial ownership stakes have increased from 1935 to 1995, while stock volatility has fallen over the same period. They suggest that shareholders might have preferred smaller stakes for managers in 1935, because in that year firms had higher volatility than in 1995. Demsetz and Lehn (1985), however, suggest that the higher the volatility, the greater the degree of managerial discretion, and thus the higher the pay-performance sensitivity. Accordingly, we include a variable *Variance*, defined as the standard deviation of the firm's stock returns in each year. *Variance* allows us to control for the differences in the convexity of a manager's compensation (see, for example, Agarwal and Mandelker 1987; Defusco et al. 1990; Guay 1999; Rajgopal and Shevlin 2002).

4 Data descriptions

We begin with 972 firms that have 1992–2000 CEO compensation data in the Execucomp database. In this sample of firms, we read the proxy statements in each firm year to identify firms headed by original founders. This yields a subsample of 230 original founder-led firms.[8] For non-founder matched firms, we pick another Execucomp firm in that year (not led by original founders or succeeding family members of founders) that is closest in asset size and has the same four-digit SIC code. If there is no such a firm, we go to three-digit SIC codes and in some cases two-digit SIC codes. Each firm's yearly stock return is calculated from the Center for Research in Security Prices (CRSP) daily stock return file; and all other firm-specific data such as research and development expenses, annual dividend paid, and total assets are from Standard & Poor's Compustat. We obtain the 1992–2000 interest rates on 10-year constant-maturity Treasury bonds from the 2001 Economic Report of the President. The final sample consists of matched pairs of 230 firms, resulting in 1271 matched-pair observations.

[6] We calculate *Tenure* by data year (year) minus the year the executive became CEO (becameceo).

[7] Data for CEO age in ExecuComp are not complete, so we collect the information from annual proxy statements.

[8] By picking a sample of founders, our study suffers from a survivorship bias. But studies that examine founders and find that they do not maximize shareholder-wealth (for example Johnson et al. 1985) also suffer from this bias. However, such an argument serves as a caveat for our paper and other studies.

Table 3 Descriptive statistics for full sample of 230 founders and matched firms* during the period 1992–2000

Variable	Mean	Median	Std Dev
Q	2.88	2.12	2.43
ROA	0.15	0.16	0.15
MV	2268.97	497.82	14182.69
Collat	0.42	0.40	0.25
Lasset	5.79	5.67	1.35
Lsale	5.83	5.82	1.61
Leverage	0.17	0.12	0.18
Variance	0.32	0.25	0.27
Firm_age	12.03	8	12.97
RD	0.06	0.003	0.09
Salary	415.05	350.00	258.84
Bonus	343.51	150.47	1944.60
Stockhold	2267.98	497.78	14179.82
Opt_Grant	1719.37	260.50	14064.85
Opt_Out	11355.78	1091	88568
Cash	0.0002	0.0001	0.01
Options	0.01	0.01	0.01
Shares	0.07	0.02	0.11
Equity	0.08	0.04	0.11
Total	0.09	0.04	0.11
Tenure	9.87	8	8.63
Age	53.35	53	9.32
Block	10.06	6	11.80
Bsize	7.90	7	2.57
Outsiders	1.87	1.40	1.66
Nominating	0.81	1	0.40
Nmeeting	6.60	6	2.96
GI	7.79	7.50	2.55
Dual	0.07	0	0.26

* Firm matched each year in the same industry by total asset size

The sample characteristics of the firms and CEOs are presented in Table 3. The firms have an average Tobin's *Q* of 2.88 and a median of 2.12, suggesting that these firms are profitable, with valuable investment opportunity sets. Firms have an average ROA (market value of equity) of 15% ($2.3 billion) and median ROA of 16.4% ($0.5 billion). The median salary earned by the CEOs is $350,000; median bonus is $150.470. CEOs earn on average $2.268 million from their shareholdings although the median value is a much lower $0.5 million.

The average value from options granted is $1.72 million with a median value $0.26 million. The average value of options granted but not exercised is $11.36 million with a median value $1.09 million. Clearly the value of options outstanding is substantial, so Palia's (2001) analysis ignores an important component of CEO's compensation.

We use these values to compute the sensitivities of CEO compensation to firm performance. Following Jensen and Murphy (1990b), we calculate the sensitivity of salary and bonus (*Cash*) as the ratio of the change in the yearly salary and bonus to the yearly change in the market value of equity. CEOs have an average sensitivity of salary and bonus of 0.0002, and a median sensitivity of 0.0001. CEOs have an average and median sensitivity of options granted and outstanding of 0.01. The mean sensitivity

of shares is 0.07, with a median 0.02. The mean sensitivity of equity (options and shares) is 0.08 and the median sensitivity is 0.04. The total average sensitivity of CEO compensation is 0.09, with a median total sensitivity of 0.04.

The average number of years the CEO has been chief executive officer is 9.87, and the average age of the CEO is 53.35 years. On average 10.06% of firm stock is held by large blockholders. Firms have on average 7.9 directors, with an average ratio of outsider directors to insider and gray directors of 1.87.[9] The CEO serves on average 0.81 times on the nominating committee; the board of directors meets on average 6.6 times a year.

Our sample has an average Gompers et al. (2003) Governance Index of shareholder rights of 7.8, right in the middle of their range. Our firms have on average 0.07 dual-class boards with a median value of 0, suggesting not many of them have such a board structure.

The sample firms have an average 42% of their assets in tangible assets such as inventory and property, plant, and equipment. The firms have an average logarithm of firm asset size of 5.79, and an average logarithm of firm sales of 5.83. The average debt to assets ratio in the sample is 0.17, with a median of 0.12. The firms exhibit an average annual stock return variance of 32%. They are 12.03 years old, and their mean ratio of research and development to assets is 0.06.

5 Empirical results

The differences we found between founders and non-founders are described in three separate sub-sections. First we examine the differences in firm performance, firm characteristics, and CEO compensation. Then we examine whether founder CEOs are more entrenched than non-founders. Finally, we present two-stage least squares regressions for differences in pay-performance relationships between founders and non-founders.

5.1 Differences in firm performance, firm characteristics and CEO compensation

Comparisons of the performance of founder and non-founder firms test the prediction of our model that founder-led firms do better. We provide Student *t*-statistics for differences in means, and present Wilcoxon Rank *z*-statistics for differences in medians to ensure that outliers do not affect these results. The results of this analysis are given in Table 4.

The average Tobin's Q in founder firms is 3.13 (median 2.36) significantly higher than the Tobin's Q of 2.63 (1.92) for non-founder firms. Firms led by founders are more profitable in terms of ROA than non-founder led firms as well; this result holds for both means and medians. Using the cruder measure of the market value of equity of the firm, once again we find that founder firms are more valuable than non-founder firms. All three measures indicate founder-led firms are more profitable and more valuable than non-founder firms, supporting the model's predictions. These results are

[9] The directors who are not officers but have business relationships with the firm are defined as gray.

Table 4 Statistics for difference in firm characteristics between founders and non-founders

Variable[a]	Non-founders		Founders		Test for differences in	
	Mean	Median	Mean	Median	Mean[b]	Median[c]
Performance						
Q	2.63	1.92	3.13	2.36	−5.50[d]	−7.36[d]
ROA	0.14	0.15	0.16	0.18	−5.70[d]	−5.68[d]
MV	1953.11	421.71	2580.90	572.85	−1.24	−5.29[d]
Other characteristics						
Collat	0.42	0.40	0.42	0.40	0.69	−0.23
Lasset	5.80	5.70	5.79	5.64	0.41	0.47
Lsale	5.85	5.88	5.80	5.74	1.76[f]	1.97[e]
Variance	0.31	0.23	0.33	0.27	−2.25[e]	−4.39[d]
Firm_age	14.00	10.00	10.12	7.00	8.55[d]	6.28[d]
RD	0.06	0.01	0.05	0	2.47[e]	0.82

[a] Variables are defined in Table 2. [b] Student *t*-statistics for differences in means between paired data. [c] Wilcoxon Rank test *z*-statistics for location examine whether the median difference is zero. [d,e,f] Statistically significant at 1%, 5%, and 10% level, respectively

broadly consistent with Villalonga and Amit (2004), Fahlenbrach (2006), and Adams et al. (2003).[10]

We find no difference between the two sets of firms in the proportion of collateralizable assets. As these are two matched samples, obviously there is no difference in the logarithm of assets measure, and no significant difference in the logarithm of sales. The founder firms are younger and have a higher variance of returns than the non-founder firms, and these results are statistically significant. There are no differences in research and development expenses for the two sets of firms.

In Table 5, we compare differences in CEO's compensation between founders and non-founders. There are no statistically significant differences in the mean levels of salary and bonus for founders and non-founders; in terms of median levels, non-founders earn a statistically significant higher salary and bonus than founders. Consistent with our priors, founders own a much higher share in the firm. Although on average founders are granted more options than non-founders, the median values show the reverse, suggesting that a few founders are driving this result. A similar relationship is found for unexercised outstanding options. Given the skewness in these variables, we focus on the median values for the calculated sensitivities.

Salary and bonus sensitivity (*Cash*) is slightly higher for non-founders than founders. Non- founders receive significantly more options, although the economic difference is slight. However, founders hold significantly more shares than for

[10] While we and other mentioned papers focus on founding CEOs, Anderson and Reeb (2003) compare firm performance for family firms versus other firms in the S&P 500, and find that family firms perform better than other firms. Our results are generally consistent with theirs. In examining managerial incentive contracts, our methodology is quite different from that in Anderson and Reeb (2003). Most of their analysis is based on regressions that do not use any instrumental variable technique, implicitly assuming that managerial compensation is not endogenized (contrary to Demsetz and Lehn 1985). Anderson and Reeb (2003) in Appendix A do test the robustness of their model using instrumental variables. However, their instruments are different, and they focus on family firms rather than founders.

Table 5 Statistics for difference in CEO compensation between founders and non-founders

Variable[a]	Non-founders		Founders		Test for differences in	
	Mean	Median	Mean	Median	Mean[b]	Median[c]
Salary	410.04	357.26	419.96	350.00	−1.46	2.05[e]
Bonus	288.74	173.30	397.19	136.74	−1.34	3.13[d]
Stockhold	1949.84	421.64	2582.96	573.90	2.68[d]	−5.39[d]
Opt_Grant	1166.96	338	2256.53	118	−1.77[f]	5.31[d]
Opt_Out	6010.44	1403.50	16615.75	787	−2.87[d]	4.08[d]
Cash	0.001	0.0001	0.00	0.00	0.96	1.72[e]
Options	0.01	0.01	0.01	0.01	3.51[d]	3.98[d]
Shares	0.02	0.00	0.13	0.09	−29.20[d]	−32.86[d]
Equity	0.03	0.02	0.14	0.10	−29.03[d]	−29.22[d]
Total	0.03	0.02	0.14	0.10	−25.21[d]	−30.81[d]

[a] Variables are defined in Table 2. [b] Student *t*-statistics for differences in means between paired data. [c] Wilcoxon Rank test *z*-statistics for location examine whether the median difference is zero. [d,e,f] Statistically significant at 1%, 5%, and 10% level, respectively

non-founders. Overall, without looking at possible entrenchment, these results suggest that founder CEOs may have more incentives than non-founder CEOs to maximize shareholder wealth because their pay is much sensitive to performance than non-founder' pay.

5.2 Are founder CEOs more or less entrenched than non-founder CEOs?

We show that founder CEOs have a much higher stock ownership than non-founder CEOs. Higher share ownership has been taken to suggest that managers are entrenched.[11] We also use a variety of measures to examine differences in managerial entrenchment. The results of this analysis are given in Table 6.

Founders have been CEOs for much longer than non-founders, but there is no difference in their ages. Shleifer and Vishny (1986), Hartzell and Starks (2003), and others, suggest that large blockholders can monitor management, thereby assisting in constraining CEO power and ability to stay in office. We find that founder firms feature large blockholders much less often. As literature often argues that leverage helps constrain managers, a higher leverage ratio could suggest a lower degree of entrenchment. But we find founder-led firms have significantly less leverage than firms headed by non-founder CEOs.[12]

We also find that founder-led firms have a significantly higher proportion of insiders on their board than non-founder firms, suggesting that founders might have more control of the board. Founders also involve in nominating directors more often than

[11] Research does not prescribe a cut-off point in share ownership where managerial entrenchment occurs. For example, Morck et al. (1988b) suggest entrenchment at 5–25%, while McConnell and Servaes (1990) suggest entrenchment at levels greater than 40%. Accordingly, we do not use a cut-off point.

[12] This finding is consistent with other research on family controlled firms such as Mishra and McConaughy (1999).

Table 6 Statistics for difference in CEO entrenchment between founders and non-founders

Variable[a]	Non-founders		Founders		Test for differences in	
	Mean	Median	Mean	Median	Mean[b]	Median[c]
CEO characteristics						
Tenure	5.94	5.94	13.74	11	−25.57[d]	−24.92[d]
Age	53.33	53	53.37	53	−1.15	−0.49
Large shareholders						
Block	10.76	6.00	9.35	6.00	3.10[d]	1.64[f]
Leverage						
Leverage	0.18	0.15	0.15	0.08	4.90[d]	5.05[f]
Board characteristics						
Bsize	8.38	8	7.49	7	8.02[d]	8.51[d]
Outsiders	2.22	1.67	1.57	1.20	8.09[d]	8.63[d]
Nominating	0.71	1	0.89	1	−10.10[d]	−9.96[d]
Nmeeting	6.92	6	6.28	6	4.39[d]	6.17[d]
Anti-takeover provisions:						
GI	8.34	8	7.26	7	10.38[d]	9.45[d]
Dual	0.06	0	0.08	0	−1.25	−1.64[f]

[a] Variables are defined in Table 2. [b] Student *t*-statistics for differences in means between paired data. [c] Wilcoxon Rank test *z*-statistics for location examine whether the median difference is zero. [d,e,f] Statistically significant at 1%, 5%, and 10% level, respectively

non-founders. Founder-led firms tend to have smaller boards along with higher proportions in insiders. These boards meet less often than non-founder-led firm boards, suggesting less monitoring by the board, all else equal.

Differences in anti-takeover provisions between founders and non-founders suggest that founders have a slightly more dual class boards, although the Gompers et al. (2003) Governance Index of shareholder rights (*GI*) shows both sets of firms in the middle of their range (governance index levels $\leq$5 defined as shareholder friendly and democratic, and levels $\geq$14 as management friendly or dictatorships).

Overall, the preponderance of evidence although not all, seems to support the idea that founders are entrenched. We note that we cannot directly test the notion of entrenching investment, thus have no direct prediction regarding the SV (1989) model.

5.3 2SLS regressions for differences in pay-performance sensitivity

Our model predicts that founders should be less responsive to changes in their pay-performance sensitivities than non-founders. The 2SLS regression controls for the endogenous nature of CEO's compensation and for inclusion of the usual control variables. We also include year and industry dummies, which are not reported in the tables. We run separate regressions for both founders and non-founders using all four described measures of compensation. We include a quadratic term for each compensation variable, in case of non-linearity (see Morck et al. 1988b; McConnell and Servaes 1990).

The first measure of compensation sensitivity is the sensitivity of CEO's total options (*Options*). The second measure is the sensitivity of CEO's shareholdings (*Shares*). The third measure is the CEO's equity sensitivity (*Equity*), defined as the value change in the CEO's options and stockholdings for $1 change in firm value. The fourth measure is the CEO's total pay-performance sensitivity (*Total*) defined as the value change in the CEO's salary and bonus, options, and stockholdings for $1 change in firm value. By using all four measures for the CEO's pay-performance sensitivity, we ensure that our results are not dependent on any one definition. Coles et al. (2003) show that one obtains different results when one controls for size using the natural logarithm of assets (*Lasset*) or the natural logarithm of sales. Accordingly, we make sure that our results are robust to using both these size proxies.

The results of the analysis are given in Table 7 (*Lasset*) and Table 8 (*Lsale*).

We first examine the impact of *Options* on firm performance for founders in Table 7, finding no significant relationship. We cannot reject by an *F*-test the hypothesis that the coefficients on the compensation terms (both linear and quadratic) are jointly equal to zero. In the case of non-founders, there is a statistically significant relationship between *Options* and firm performance for both the linear and quadratic coefficients. An *F*-test of the hypothesis that these coefficients are jointly equal to zero is strongly rejected. These results suggest that the performance of founder-led firms is not responsive to CEO option incentives, but the performance of non-founder-led firms is very sensitive to CEO option incentives. There is no statistically significant relationship between founders' shares and firm performance. We cannot reject by an *F*-test the hypothesis that the coefficients on the compensation terms (both linear and quadratic) are jointly equal to zero. In the case of non-founders, there is a statistically significant relationship between *Shares* and firm performance for both linear and quadratic parameter coefficients, confirmed by an *F*-test. These results suggest that their shareholding do not make founders responsive to firm performance, while the shareholdings of non-founders have strong impact on firm performance. The Hansen–Sargan test cannot reject the null of zero correlation between the full set of instruments and the error term of the firm performance equation.

In the fifth and sixth columns we examine the equity sensitivity of the CEO to firm performance. We find no statistically significant relationship between founders' *Equity* and firm performance. An *F*-test of the hypothesis that the coefficients on the compensation terms (both linear and quadratic) are jointly equal to zero cannot be rejected. In the case of non-founders, there is a statistically significant relationship between *Equity* and firm performance for both the linear and quadratic coefficients, confirmed by an *F*-test. The Hansen–Sargan test suggests zero correlation between the instruments and the error term of the firm performance equation.

To calculate the CEO's total pay sensitivity to firm performance (*Total*), we include the sensitivity of salary and bonus as well (which creates a somewhat noisy variable because of its lack of variability with firm performance). Once again, we find no statistically significant relationship between *Total* and firm performance for founders, confirmed by an *F*-test. In the case of non-founders, there is a statistically significant relationship between *Total* and firm performance for both the linear and quadratic parameter coefficients, confirmed by an *F*-test.

Table 7 2SLS regressions of Tobin's Q for founders and non-founders – size defined as log(assets)

	Founder	Non-founder	Difference	Founder	Non-founder	Difference	Founder	Non-founder	Difference	Founder	Non-founder	Difference
Options	308.23	590.46[c]	−282.23									
	(1.4)	(2.47)	(−0.87)									
Options^2	−906.97	−15456.99[c]	14550.02									
	(−0.18)	(−2.02)	(1.59)									
Shares				−29.08	36.33[d]	65.41[c]						
				(−1.3)	(1.72)	(−2.13)						
Shares^2				17.50	−374.49[c]	392.9[c]						
				(0.4)	(−2.3)	(2.32)						
Equity							−30.22	39.24[c]	−69.46[c]			
							(−1.24)	(2.05)	(−2.24)			
Equity^2							1.34	−331.01[c]	332.35[c]			
							(0.02)	(−2.42)	(2.18)			
Total										−30.23	48.69	−78.92[c]
										(−1.17)	(1.6)	(−1.98)
Total^2										22.33	−439.51[d]	461.84[c]
										(0.46)	(−1.92)	(1.97)
Leverage	−5.47[b]	−1.80[d]	−3.67[c]	−5.81[b]	−2.05[b]	−3.76[d]	−5.74[b]	−2.14[b]	−3.60[d]	−5.65[b]	−1.80[d]	−3.84[d]
	(−4.05)	(−1.88)	(−2.21)	(−3.02)	(−2.63)	(−1.81)	(−3.04)	(−2.9)	(−1.77)	(−2.89)	(−1.8)	(−1.75)
RD	−3.81	1.56	−5.37	−5.63	2.82[c]	−8.45	−6.61	2.76[b]	−9.37	−4.65	2.61	−7.26
	(−1.35)	(0.86)	(−1.60)	(−0.94)	(2.01)	(−1.37)	(−1.0)	(2.05)	(−1.39)	(−0.75)	(1.45)	(−1.12)
Lgaset	0.22	−0.31	−0.53	−0.38	−0.34[b]	−0.04	−0.44	−0.28[d]	−0.16	−0.38	−0.40[d]	0.02
	(1.30)	(−0.84)	(1.31)	(−1.14)	(−2.37)	(−0.13)	(−1.20)	(−1.95)	(−0.40)	(−0.98)	(−1.85)	(0.05)
F−test for the restriction CEO *PPS*[a] and *PPS*^{2} are jointly equal to 0 (*p*-value)	(0.97)	(0.05)		(0.43)	(0.02)		(0.65)	(0.02)		(0.42)	(0.06)	

Table 7 continued

	Founder	Non-founder	Difference	Founder	Non-founder	Difference	Founder	Non-founder	Difference	Founder	Non-founder	Difference
Hansen–Sargan test (p-value)	(0.16)	(0.32)		(0.69)	(0.20)		(0.53)	(0.22)		(0.84)	(0.22)	
Adj. R^2	0.19	0.21		0.18	0.19		0.19	0.19		0.19	0.18	

The definitions of each variable are given in Table 2. All the t-statistics are given in parentheses and computed from heteroskedasticity-robust standard errors. [a] PPS is CEO's pay-performance sensitivity, which represents *Options*, *Shares*, *Equity* and *Total* for relevant specification. The instruments used to obtain the fitted values of CEO's pay-performance sensitivity and pay-performance sensitivity^2 include: age, tenure, age × tenure, age^2, and variance. Year and industry dummies are included in each regression. Hansen–Sargan test is a heteroskedasticity-consistent test of overidentifying restrictions. The joint null hypothesis is that all instruments are valid, i.e., uncorrelated with the error term. A rejection of the null hypothesis casts doubt on the validity of the instruments. [b,c,d] Statistically significant at 1%, 5%, and 10% level, respectively

Table 8 2SLS regressions of Tobin's Q for founders and non-founders – size defined as log(sales)

	Founder	Non-founder	Difference	Founder	Non-founder	Difference	Founder	Non-founder	Difference	Founder	Non-founder	Difference
Options	346.74	588.92[c]	−242.18									
	(1.45)	(2.54)	(−0.73)									
$Options^2$	−1395.53	−15420.87[c]	14025.34									
	(−0.27)	(−2.14)	(1.58)									
Shares				−32.41	36.28[d]	−68.69[c]						
				(−1.32)	(1.76)	(−2.14)						
$Shares^2$				17.44	−365.02[c]	382.47[c]						
				(0.37)	(−2.31)	(2.32)						
Equity							−30.84	38.51[c]	−69.35[c]			
							(−1.19)	(2.04)	(−2.16)			
$Equity^2$							−0.14	−321.45[c]	321.31[d]			
							(0.00)	(−2.41)	(1.68)			
Total										−34.65	48.72	−83.37[c]
										(−1.19)	(1.62)	(−1.99)
$Total^2$										23.28	−434.36[d]	457.64[c]
										(0.44)	(−1.94)	(1.99)
Leverage	−5.55[b]	−1.92[c]	−3.63[c]	−6.37[b]	−2.20[b]	−4.17[d]	−6.11[b]	−2.28[b]	−3.83	−6.24[b]	−1.96[c]	−4.29
	(−3.85)	(−2.01)	(−2.10)	(−2.73)	(−2.92)	(−1.70)	(−2.73)	(−3.17)	(−1.63)	(−2.55)	(−2.01)	(−1.63)
RD	−3.79	1.46	−5.25	−7.05	2.63[d]	−9.68	−7.33	2.62[d]	−9.95	−6.17	2.39	−8.56
	(−1.29)	(0.76)	(−1.50)	(−1.03)	(1.86)	(−1.39)	(−1.01)	(1.91)	(−1.35)	(−0.86)	(1.29)	(−1.16)
Lgs	0.25	−0.19	0.44	−0.34	−0.23[c]	−0.11	−0.34	−0.19[d]	−0.15	−0.35	−0.28[d]	−0.07
	(1.4)	(−0.68)	(1.32)	(−1.26)	(−2.12)	(−0.39)	(−1.23)	(−1.71)	(−0.51)	(−1.11)	(−1.73)	(−0.19)
F−test for the restriction CEO PPS^a and PPS^2 are jointly equal to 0 (*p*−value)	(0.97)	(0.05)		(0.43)	(0.02)		(0.67)	(0.02)		(0.42)	(0.06)	

Table 8 continued

	Founder	Non-founder	Difference	Founder	Non-founder	Difference	Founder	Non-founder	Difference	Founder	Non-founder	Difference
Hansen–Sargan test (p-value)	(0.17)	(0.32)		(0.79)	(0.20)		(0.64)	(0.23)		(0.88)	(0.23)	
Adj. R^2	0.19	0.20		0.18	0.19		0.19	0.19		0.19	0.18	

The definitions of each variable are given in Table 2. All the t-statistics are given in parentheses and computed from heteroskedasticity-robust standard errors. [a] PPS is CEO's pay-performance sensitivity which represents *Options*, *Shares*, *Equity* and *Total* for relevant specification. The instruments used to obtain the fitted values of CEO's pay-performance sensitivity and pay-performance sensitivity^2 include: age, tenure, age × tenure, age^2, and variance. Year and industry dummies are included in each regression. Hansen–Sargan test is a heteroskedasticity-consistent test of overidentifying restrictions. The joint null hypothesis is that all instruments are valid, i.e., uncorrelated with the error term. A rejection of the null hypothesis casts doubt on the validity of the instruments. [b,c,d] Statistically significant at 1%, 5%, and 10% level, respectively

Overall, the results of Table 7 consistently show that for founders firm performance is not significantly related to CEO pay-performance sensitivity, while for non-founders performance is significant related to CEO pay-performance sensitivity, providing evidence for the Proposition in our model that less of an impact of changes in PPS on output for founders than for non-founders.

In Table 8, we examine whether our results are robust to a different definition of firm size as the natural logarithm of sales (*Lsale*). The basic results on the linear and quadratic compensation terms remain statistically significant for non-founders and statistically insignificant for founders. In all specifications, the Hansen–Sargan test finds zero correlation between our instruments and the error term. This confirms our primary finding of a statistically insignificant pay-performance relationship for founders and a statistically significant pay performance relationship for non-founders. Finally we perform (unreported) sensitivity analysis to ensure that the results are not driven by the higher level of founders' share of ownership, but represent truly marginal sensitivity. These tests confirm our findings.[13] Table 9 and Table 10 present the first stage regression results.

6 Conclusions

This paper examines the differences between founder-led and non-founder-led firms in the context of the current debate regarding the regulation of executive pay. First we extend the Shleifer and Vishny's (1989) manager-specific investments framework. In our model setting, because founders are more productive, they will expend more effort than non-founders. In the process, founders will become less responsive to pay-performance incentives.

In a sample of large companies, we find that firms led by original founders are more valuable than firms led by non-founders, which agrees with a host of other recent papers. By a variety of measures we also show that these original founders are generally more entrenched than their counterparts in non-founder-led firms, although we cannot directly test the entrenching investment idea. The differential regression analysis of pay-performance sensitivity shows a statistically significant relationship between CEO pay performance-sensitivity and firm value for non-founder-led firms, and an insignificant relationship for founder-led firms, supporting our prediction that founders will be less responsive to incentives.

[13] It is possible that the insignificant result for founders is due to their substantially high level of ownership relative to their non-founder counterparts. Thus, founders are not responsive to additional pay-performance sensitivity probably because they experience diminishing returns to incentives, rather than because they are working harder, as our model suggests. In order to ensure our results are not driven by this argument, we re-run our test on a sub-sample of founders and non-founders with similar ownership structure. We pick a sub-sample in which the CEO ownership difference between founders and their matched non-founders must be below 3%. Results are qualitatively similar (namely, the founder's compensation does not significantly correlate with firm performance in contrast to non-founders' compensation). These results also hold when we vary the ownership difference between founders and non-founders to below 5%. We conclude that founders are consistently not responsive to increased incentive pay whether or not they already have substantial equity position than non-founders. These results by sub-sample are not reported in the paper and are available from the authors on request.

Table 9 First-stage OLS for validity of instruments – size defined as log(assets)

	Option	*Option*^{2}	*Shares*	*Shares*^{2}	*Equity*	*Equity*^{2}	*Total*	*Total*^{2}
Panel A: Founders								
Intercept	−0.01	0.00003	0.52	0.19	0.48	0.18	0.53	0.20
	(−1.42)	(0.08)	(6.09)	(4.29)	(5.42)	(4.08)	(6.21)	(4.35)
Age	0.001[a]	3.2E−05[b]	−0.01[a]	−0.01[a]	−0.01[a]	−0.004[a]	−0.01[a]	−0.01[a]
	(3.98)	(2.33)	(−3.48)	(−2.77)	(−3.06)	(−2.61)	(−3.40)	(−2.73)
Age^2	−1.5E−05[a]	−4.2E−07[a]	0.0001[a]	4.5E−05[a]	0.0001[a]	4.4E−05[b]	1.1E−04[a]	4.5E−05[a]
	(−4.59)	(−3.11)	(3.27)	(2.55)	(2.97)	(2.47)	(3.16)	(2.52)
Tenure	−0.001[a]	−0.00004[a]	0.01[b]	0.002	0.01[b]	0.003[c]	0.01[c]	0.002
	(−2.52)	(−2.77)	(2.08)	(1.48)	(2.34)	(1.67)	(1.83)	(1.43)
Age × *Tenure*	1.4E−05[a]	6.3E−07[a]	−9.8E−05[c]	−3.4E−05	−0.0001[b]	−4.0E−05	−8.8E−05	−3.5E−05
	(2.74)	(2.87)	(−1.83)	(−1.36)	(−2.08)	(−1.55)	(−1.62)	(−1.33)
Variance	0.001	−0.00004	−0.002	−0.01	−0.001	−0.01	−0.001	−0.01
	(0.40)	(−0.50)	(−0.11)	(−1.49)	(−0.04)	(−1.40)	(−0.08)	(−1.34)
Leverage	0.01[a]	0.0003[b]	−0.09[a]	−0.02	−0.07[a]	−0.01	−0.08[a]	−0.01
	(2.52)	(2.22)	(−3.32)	(−0.82)	(−2.74)	(−0.72)	(−2.84)	(−0.57)
RD	0.01	0.0003	−0.26[a]	−0.09[a]	−0.23[a]	−0.09[a]	−0.24[a]	−0.09[a]
	(1.55)	(0.78)	(−5.43)	(−4.31)	(−4.79)	(−4.15)	(−4.78)	(−4.36)
Lasset	−0.001[b]	−0.00004[a]	−0.02[a]	−0.01[a]	−0.02[a]	−0.01[a]	−0.02[a]	−0.01[a]
	(−2.11)	(−2.54)	(−5.59)	(−2.88)	(−4.80)	(−2.76)	(−5.56)	(−3.17)
Adj. R^2	0.17	0.10	0.37	0.32	0.34	0.31	0.35	0.31
Panel B: Non−founders								
Intercept	0.01	0.0002	0.26	0.05	0.26	0.05	0.27	0.06
	(0.61)	(0.25)	(3.89)	(2.74)	(3.97)	(2.69)	(3.69)	(2.97)
Age	7.6E−04	0.00003	−0.01[a]	−0.002[b]	−0.01[a]	−0.002[b]	−0.01[a]	−0.002[b]
	(1.47)	(1.24)	(−3.30)	(−2.45)	(−2.98)	(−2.31)	(−2.58)	(−2.45)
Age^2	−8.3E−06[c]	−3.25E−07	0.0001[a]	0.00002[b]	7.8E−05[a]	1.9E−05[b]	7.3E−05[a]	2.0E−05[b]
	(−1.77)	(−1.45)	(3.33)	(2.39)	(2.99)	(2.28)	(2.67)	(2.40)

Table 9 continued

	Option	*Option*^{2}	*Shares*	*Shares*^{2}	*Equity*	*Equity*^{2}	*Total*	*Total*^{2}
Tenure	2.9E−04	−1.19E−06	0.004[c]	0.001	0.004[c]	0.001	0.003	0.001
	(0.54)	(−0.05)	(1.66)	(0.79)	(1.75)	(0.94)	(1.43)	(0.87)
Age × *Tenure*	1.7E−07	2.09E−07	−0.00004	−7.07E−06	−3.9E−05	−8.3E−06	−3.0E−05	−7.7E−06
	(0.02)	(0.45)	(−0.96)	(−0.60)	(−0.93)	(−0.67)	(−0.67)	(−0.60)
Variance	0.002	−1.51E−06	0.004	0.0003	0.01	0.001	−0.002	−0.0002
	(0.86)	(−0.02)	(1.06)	(0.38)	(1.25)	(0.52)	(−0.34)	(−0.22)
Leverage	−0.001	−7.40E−06	0.003	0.001	0.001	0.001	0.002	0.001
	(−0.44)	(−0.05)	(0.36)	(0.68)	(0.16)	(0.49)	(0.26)	(0.64)
RD	−0.002	−0.0001	−0.04[a]	−0.004[b]	−0.04[a]	−0.01[a]	−0.03[a]	−0.01[a]
	(−0.27)	(−0.40)	(−3.59)	(−2.36)	(−3.43)	(−2.79)	(−3.02)	(−2.67)
Lasset	−0.003	−0.0001[a]	−0.01[a]	−0.001[a]	−0.01[a]	−0.001[a]	−0.01[a]	−0.002[a]
	(−6.85)	(−6.61)	(−4.16)	(−2.62)	(−5.71)	(−3.10)	(−6.30)	(−3.22)
Adj. R^2	0.16	0.11	0.24	0.13	0.23	0.13	0.23	0.13

The definitions of each variable are given in Table 2. All *t*-statistics are given in parentheses and computed from heteroskedasticity-robust standard errors. Year and industry dummies are included in each regression. [a,b,c] Statistically significant at 1%, 5%, and 10% level, respectively

Table 10 First stage OLS for the validity of instruments with size defined as log(sales)

	Option	*Option*^{2}	*Shares*	*Shares*^{2}	*Equity*	*Equity*^{2}	*Total*	*Total*^{2}
Panel A: Founders								
Intercept	−0.01	0.00003	0.51	0.19	0.47	0.18	0.52	0.20
	(−1.39)	(0.07)	(5.89)	(4.20)	(5.29)	(4.01)	(6.01)	(4.25)
Age	0.001[a]	0.00003[b]	−0.01[a]	−0.01[a]	−0.01[a]	−0.01[a]	−0.01[a]	−0.01[a]
	(4.01)	(2.32)	(−3.63)	(−2.87)	(−3.24)	(−2.73)	(−3.56)	(−2.84)
Age2	−1.5E−05[a]	−4.2E−07[a]	0.0001[a]	4.7E−05[a]	0.0001[a]	4.6E−05[a]	0.0001[a]	4.7E−05[a]
	(−4.58)	(−3.06)	(3.41)	(2.64)	(3.12)	(2.57)	(3.30)	(2.63)
Tenure	−0.001[a]	−0.00004[a]	0.01[b]	0.002	0.01[b]	0.003[c]	0.01[c]	0.002
	(−2.55)	(−2.80)	(2.13)	(1.50)	(2.36)	(1.68)	(1.88)	(1.45)
Age × Tenure	1.4E−05[a]	6.3E−07[a]	−0.0001[c]	−3.5E−05	−0.0001[b]	−4.1E−05	−9.3E−05[c]	−3.6E−05
	(2.73)	(2.86)	(−1.89)	(−1.39)	(−2.12)	(−1.58)	(−1.69)	(−1.36)
Variance	0.001	−0.0001	−0.003	−0.01	−0.001	−0.01	−0.003	−0.01
	(0.27)	(−0.60)	(−0.21)	(−1.51)	(−0.10)	(−1.41)	(−0.17)	(−1.36)
Leverage	0.01[a]	0.0003[b]	−0.10[a]	−0.02	−0.08[a]	−0.02	−0.09[a]	−0.02
	(2.50)	(2.09)	(−3.74)	(−1.05)	(−3.16)	(−0.94)	(−3.29)	(−0.81)
RD	0.01	0.0002	−0.27[a]	−0.10[a]	−0.24[a]	−0.09[a]	−0.25[a]	−0.10[a]
	(1.35)	(0.59)	(−5.58)	(−4.46)	(−4.91)	(−4.30)	(−4.94)	(−4.50)
Lsale	−0.001[b]	−0.00004[a]	−0.01[a]	−0.004[a]	−0.01[a]	−0.004[b]	−0.01[a]	−0.004[a]
	(−2.41)	(−2.52)	(−4.34)	(−2.56)	(−3.55)	(−2.32)	(−4.35)	(−2.72)
Adj. R^2	0.15	0.10	0.36	0.31	0.33	0.31	0.35	0.31
Panel B: Non-founders								
Intercept	0.01	3.6E-05	0.24	0.05	0.25	0.05	0.25	0.06
	(0.38)	(0.05)	(3.68)	(2.65)	(3.68)	(2.58)	(3.44)	(2.86)
Age	0.001	3.2E-05	-0.01[a]	-0.002[b]	-0.01[a]	-0.002[b]	-0.01[a]	-0.002[a]
	(1.52)	(1.26)	(-3.32)	(-2.47)	(-2.98)	(-2.34)	(-2.66)	(-2.50)
Age^2	-8.5E-06[c]	-3.3E-07	0.0001[a]	0.00002[b]	7.9E-05[a]	1.9E-05[b]	7.7E-05[a]	2.1E-05[b]
	(-1.82)	(-1.47)	(3.35)	(2.42)	(3.00)	(2.31)	(2.75)	(2.45)

Table 10 continued

	Option	*Option*^{2}	*Shares*	*Shares*^{2}	*Equity*	*Equity*^{2}	*Total*	*Total*^{2}
Tenure	0.0002	−5.7E−06	0.004	0.001	0.004[c]	0.001	0.003	0.001
	(0.33)	(−0.22)	(1.64)	(0.77)	(1.70)	(0.91)	(1.30)	(0.79)
Age × *Tenure*	2.1E−06	2.9E−07	−0.00004	−6.7E−06	−3.5E−05	−7.7E−06	−2.3E−05	−6.5E−06
	(0.22)	(0.63)	(−0.93)	(−0.58)	(−0.85)	(−0.63)	(−0.52)	(−0.52)
Variance	0.001	−1.8E−05	0.01	0.001	0.01	0.001	0.001	0.0002
	(0.58)	(−0.25)	(1.23)	(0.48)	(1.29)	(0.59)	(0.28)	(0.30)
Leverage	−0.002	−0.00004	−0.0004	0.001	−0.003	0.0004	−0.002	0.001
	(−0.70)	(−0.27)	(−0.06)	(0.41)	(−0.33)	(0.19)	(−0.29)	(0.29)
RD	−0.005	−0.0002	−0.04[a]	−0.004[b]	−0.04[a]	−0.01[a]	−0.04	−0.01[a]
	(−0.75)	(−0.86)	(−3.66)	(−2.41)	(−3.71)	(−2.86)	(−3.43)	(−2.80)
Lsale	−0.002[a]	−0.0001[a]	−0.004[a]	−0.001[b]	−0.01[a]	−0.001[a]	−0.01[a]	−0.001[a]
	(−5.71)	(−5.51)	(−3.13)	(−2.02)	(−4.59)	(−2.53)	(−5.14)	(−2.74)
Adj. R^2	0.16	0.10	0.22	0.13	0.21	0.12	0.20	0.12

The definitions of each variable are given in Table 2. All t-statistics are given in parentheses and computed from heteroskedasticity-robust standard errors. Year and industry dummies are included in each regression. [a,b,c] Statistically significant at 1%, 5%, and 10% level, respectively

This supports the view that regulation of executive pay will have very different consequences for founders and non-founders. Our study uses a large data set, controlling for the endogeneity of managerial compensation with an instrumental variable approach. The results are robust to four measures of CEO's compensation and to proper evaluation of instruments.

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References

Adams, Renée B., Almeida, Heitor, & Ferreira, Daniel (2003). *Understanding the relationship between founder-CEOs and firm performance.* Working Paper: New York University.

Agarwal, Anup, & Mandelker, Gershon N. (1987). Managerial incentives and corporate investment and financing decisions. *Journal of Finance, 42*, 823–837.

Alsos, Gry A., & Kolvereid, Lars (1998). The business gestation process of novice, serial and parallel business founders. *Entrepreneurship, Theory and Practice, 22*, 101–114.

Anderson, Ronald C., & Reeb, David M. (2003). Founding family ownership and firm performance: Evidence from the S&P 500. *Journal of Finance, 58*, 1301–1328.

Barro, Jason R., & Barro, Robert J. (1990). Pay performance and turnover of bank CEOs. *Journal of Labor Economics, 8*, 448–481.

Bebchuk, Lucian A., & Fried, Jesse M. (2004). *Pay without performance*. Boston: Harvard University Press.

Begley, Thomas (1995). Using founder status, age of the firm, and company growth rate as the basis for distinguishing entrepreneurs from managers of smaller businesses. *Journal of Business Venturing, 10*, 249–263.

Berger, Philip G., Ofek, Eli, & Yermack, David L. (1997). Managerial Entrenchment and capital structure decisions. *Journal of Finance, 52*, 1411–1438.

Bertrand, Marianne, & Schoar, Antoinette S. (2003). Managing with style: The effect of managers on firm policies. *Quarterly Journal of Economics, 118*, 1169–1208.

Black, Fischer, & Scholes, Myron M. (1973). The Pricing of options and corporate liabilities. *Journal of Political Economy, 81*, 637–659.

Brockhaus, Robert H., & Horwitz, Pamela S. (1986). The psychology of the entrepreneur. In Donald L. Sexton & Raymond W. Smilor (Eds.), *The art and science of entrepreneurship*. Cambridge: Ballinger Publishing Company.

Burkart, Mike., Panunzi, Fausto, & Shleifer, Andrei (2003). Family firm. *Journal of Finance, 58*, 2167–2202.

Carland, James W., Hoy, Frank, Boulton, William R., & Carland, Jo Ann C. (1984). Differentiating entrepreneurs from small business owners: A conceptualization. *Academy of Management Review, 9*, 354–359.

Carroll, Thomas M., & Ciscel, David H. (1982). The effects of regulation on executive compensation. *Review of Economics and Statistics, 64*(August), 505–509.

Chevalier, Judith, & Ellison, Glenn (1999). Are some mutual fund managers better than others? Cross-sectional patterns in behavior and performance. *Journal of Finance, 54*, 875–899.

Coles, Jeffrey L., Meschke, Felix, & Lemmon, Michael L. (2003). *Structural models and endogeneity in corporate finance: The link between managerial ownership and corporate performance.* Working Paper. Tempe: Arizona State University.

Core, John E., & Guay, Wayne R. (1999). The use of equity grants to manage optimal equity incentive levels. *Journal of Accounting and Economics, 28*, 151–184.

Defusco, Richard A., Johnson, Robert R., & Zorn, Thomas S. (1990). The effect of executive stock option plans on stockholders and bondholders. *Journal of Finance, 45*, 617–627.

Demsetz, Harold, & Lehn, Kenneth (1985). The structure of corporate ownership: Causes and consequences. *Journal of Political Economy, 93*, 1155–1177.

Edlin, Aaron S., & Stiglitz, Joseph E. (1995). Discouraging rivals: Managerial rent-seeking and economic inefficiencies. *American Economic Review, 85*, 1301–1312.
Fahlenbrach, Rüdiger (2006). Founders-CEOs, investment decisions and stock market performance. Ohio State University Working Paper.
Garvey, Gerald T. (1997). Marketable incentive contracts and capital structure relevance. *Journal of Finance, 52*, 353–378.
Gibbons, Robert, & Murphy, Kevin J. (1992). Optimal incentive contracts in the presence of career concerns: Theory and evidence. *Journal of Political Economy, 88*, 468–505.
Gompers, Paul A., Ishii, Joy, & Metrick, Andrew A. (2003). Corporate governance and equity price. *The Quarterly Journal of Economics, 118*, 107–155.
Greene, William H. (1997). *Econometric analysis*. Upper Saddle River: Prentice Hall Publishers.
Guay, Wayne R. (1999). The Sensitivity of ceo wealth to equity risk: An analysis of the magnitude and determinants. *Journal of Financial Economics, 53*, 43–71.
Gujarati, Damodar N. (2003). *Basic econometrics*. New York: McGraw-Hill.
Hartzell, Jay C., & Starks, Laura T. (2003). Institutional Investors and Executive Compensation. *Journal of Finance, 54*, 2351–2374.
Hermalin, Benjamin E., & Weisbach, Michael S. (1991). The effects of board composition and direct incentives on firm performance. *Financial Management, 20*, 101–112.
Himmelberg, Charles P., Hubbard, Glenn R., & Palia, Darius (1999). Understanding the determinants of managerial ownership and the links between ownership and firm performance. *Journal of Financial Economics, 53*, 353–384.
Holderness, Clifford G., Kroszner, Randall S., & Sheehan, Dennis P. (1999). Were the good old days that good? Evolution of managerial stock ownership and corporate governance since the great depression. *Journal of Finance, 54*, 353–384.
Holmstrom, Bengt (1979). Moral hazard and observability. *Bell Journal of Economics, 10*, 74–91.
Holmstrom, Bengt (1982). Moral hazard in teams. *Bell Journal of Economics, 13*, 324–40.
Holmstrom, Bengt (1999). Managerial incentive problems: A dynamic perspective. *Review of Economic Studies, 66*, 169–182.
Houston, Joel F., & James, Christopher M. (1995). CEO compensation and bank risk: Is compensation in banking structured to promote risk taking? *Journal of Monetary Economics, 36*, 405–431.
Hubbard, Glenn R., & Palia, Darius (1995). Executive pay and performance: Evidence from the U.S. Banking industry. *Journal of Financial Economics, 39*, 105–130.
Jensen, Michael C., & Murphy, Kevin J. (1990b). Performance pay and top-management incentives. *The Journal of Political Economy, 98*, 225–264.
Johnson, W. Bruce, Magee, Robert P., Nagarajan, Nandu J., & Newman, Harry A. (1985). An analysis of the stock price reaction to sudden executive deaths: Implications for the managerial labor market. *Journal of Accounting and Economics, 7*, 151–174.
Joskow, Paul L., Rose, Nancy L., & Shepard, Andrea (1993). Regulatory constraints on ceo compensation *Brookings Papers on Economic Activity, Microeconomics, 1*, 1–72.
Kim, Moshe, & Maksimovic, Vojislav (1990). Debt and input misallocation. *Journal of Finance, 45*, 795–816.
Kole, Stacey R. (1995). Measuring managerial equity ownership: A comparison of sources of ownership data. *Journal of Corporate Finance, 1*, 413–435.
Loderer, Claudio F., & Martin, Kenneth (1997). Executive stock options and performance tracking faint traces. *Journal of Financial Economics, 45*, 223–255.
McConnell, John J., & Servaes, Henri (1990). Additional evidence on equity ownership and corporate value. *Journal of Financial Economics, 27*, 595–612.
Mishra, Chandra S., & McConaughy, Daniel L. (1999). Founding family control and capital structure: The risk of loss of control and aversion to debt. *Entrepreneurship, Theory and Practice, 23*, 53–64.
Morck, Randall K., Shleifer, Andrei, & Vishny, Robert W. (1988a). Characteristics of targets of hostile and friendly takeovers. In A. J. Auerbach (Ed.), *Corporate takeovers: Causes and consequences*. Chicago: University of Chicago Press.
Morck, Randall K., Shleifer, Andrei, & Vishny, Robert W. (1988b). Management ownership and market valuation. *Journal of Financial Economics, 20*, 293–315.
Morck, Randall K., Strangeland, David A., & Yeung, Bernard (1998). Inherited wealth corporate control and economic growth: The Canadian disease? NBER Working Paper 6814.

Murphy, Kevin J. (1985). Corporate performance and managerial remuneration: An empirical analysis. *Journal of Accounting Economics, 7*, 11–42.
Murphy, Kevin J. (1986). Incentives, learning, and compensation: A theoretical and empirical investigation of managerial labor contracts. *Rand Journal of Economics, 17*, 59–76.
Palia, Darius (2001). The endogeniety of managerial compensation in firm valuation: A solution. *Review of Financial Studies, 14*, 735–764.
Palia, Darius (2000). The impact of regulation on CEO labor markets. *RAND Journal of Economics*, 31, 165–179.
Palia, Darius, & Lichtenberg, Frank (1999). Managerial ownership and firm performance: A re-examination using productivity measurement. *Journal of Corporate Finance, 5*, 323–339.
Perez-Gonzalez, Francisco (2001). *Does inherited control hurt firm performance? Working Paper*. New York: Columbia University.
Perry, Tod, & Zenner, Marc (2001). Pay for performance? Government regulation and the structure of compensation contracts. *Journal of Financial Economics, 62*, 453–488.
Rajgopal, Shivaram, & Shevlin, Terry (2002). Empirical evidence on the relation between stock option compensation and risk taking. *Journal of Accounting and Economics, 33*, 145–171.
Roth, Philip L., & Stewart, Wayne H. (2000). *Risk taking propensity as a distinctive entrepreneurial characteristic: A meta-analytic review.* Mimeo. Clemson: Clemson University.
Rubenson, George C., & Gupta, Anil K. (1996). A contingency model of founder tenure. *Entrepreneurship Theory and Practice, 21*, 21–35.
Hyun-Han, Shin, & Stulz, René M. (1998). Are internal capital markets efficient? *Quarterly Journal of Economics, 113*, 531–552.
Shleifer, Andrei, & Vishny, Robert W. (1986). Large shareholders and corporate control. *Journal of Political Economy, 94*, 461–488.
Shleifer, Andrei, & Vishny, Robert W. (1989). Management entrenchment: The case of manager-specific investments. *Journal of Financial Economics, 25*, 123–139.
Smith, Clifford W., & Watts, Ross L. (1992). The investment opportunity set and corporate financing, dividend and compensation policies. *Journal of Financial Economics, 32*, 263–292.
Stein, Nicholas (2001). The age of the scion. *Fortune* (April): 121–128.
Villalonga, Belen, & Amit, Raphael (2004). *How do family ownership, management, and control affect firm value. Working Paper.* Cambridge: Harvard Business School.
Wooldridge, Jeffrey M. (2002). *Econometric analysis of cross section and panel data*. Cambridge: MIT Press.
Yermack, David (1995). Do corporations award CEO stock options effectively? *Journal of Financial Economics, 39*, 237–269.
Zhou, Xianming (2001). Understanding the Determinants of Managerial Ownership and the Link Between Ownership and Performance: Comment. *Journal of Financial Economics, 25*, 2015–2040.