ELSEVIER

Journal of Banking & Finance 20 (1996) 1135–1159

Journal of BANKING & FINANCE

Executive ownership, corporate value, and executive compensation: A unifying framework

Kee H. Chung *, Stephen W. Pruitt

Department of Finance, Insurance, and Real Estate, Fogelman College of Business and Economics, University of Memphis, Memphis, TN 38152, USA

Received 15 February 1995; accepted 15 June 1995

Abstract

This study presents an *integrated* investigation into the factors affecting executive ownership, the market value of the firm, and executive compensation by explicitly incorporating the simultaneity of the process determining these variables into the empirical estimation. Overall, the results of the study support the notion that a firm's market value, executive stock ownership, and executive compensation are *jointly determined.* Further, the findings suggest that executive stock ownership and executive compensation may serve as a type of bond by which top executives are induced to act in the best interests of shareholders. The study also finds that a firm's q ratio and an executive's job-specific experience (as well as firm size) are important determinants of executive compensation. This result is generally consistent with the view that the firm optimally establishes its managerial compensation plan in response to both its operating environment and the specific personal characteristics of its chief executive(s).

JEL classification: G3

Keywords: Executive ownership; Tobin's q; Executive compensation

* Corresponding author.

SSDI 0378-4266(95)00039-9

1. Introduction

Recently, a number of studies have suggested that certain firm characteristics and ownership structure are related. For example, Demsetz and Lehn (1985) and Brickley and Dark (1987) find that the variation in ownership structure is explained, in part, by variation in firm characteristics such as size, location, and operating risk. Demsetz (1983) and Demsetz and Lehn (1985) suggest that a given ownership concentration may be interpreted as the firm's optimal response to its operating environment. On the other hand, Morck et al. (1988) and McConnell and Servaes (1990) view the value of the firm (proxied by Tobin's q) as a function of ownership structure and investigate the effect of equity ownership by corporate insiders (i.e., officers and directors) on corporate value.

While these studies have made important contributions to furthering our understanding of corporate governance structure, the scope of these studies is limited in that they do not fully explore the *simultaneous* nature of the process determining ownership structure and corporate value. Although there are many reasons to believe that ownership structure and certain firm characteristics are *jointly determined* through various market forces, previous studies ignore the interactive nature of the process determining these variables. For instance, Morck et al. (1988) and McConnell and Servaes (1990) treat managerial ownership as an exogenous variable in their examination of the relationship between ownership structure and corporate value. Similarly, Demsetz and Lehn (1985) implicitly assume that different firm characteristics lead to differing ownership structures, but not vice versa.

In addition, although there exists an abundant empirical literature examining the factors affecting executive compensation, most previous studies have focused on relatively narrow aspects of the executive compensation process, i.e., testing the relative importance of firm size, accounting profitability, or stock market performance in an effort to shed light upon the targets and objectives of corporate managers. Additional insights into corporate governance structure would be obtained, we believe, if the executive compensation structure were examined from a broader perspective in which various elements of the managerial theory of the firm (e.g., Jensen and Meckling, 1976; Demsetz, 1983; Fama and Jensen, 1983) and the theory of hierarchy (e.g., Calvo and Wellisz, 1979; Rosen, 1982) are considered. [1]

[1] In any discussion of executive compensation, it is desirable to distinguish between two independent dimensions of a firm's compensation policy: the *level* and the *functional form* (see, e.g., Baker et al., 1988). On the one hand, the level of compensation determines the quality of the executives the firm can attract. In order to attract an executive, the firm must offer at least his/her opportunity cost, which is determined in the managerial labor market. On the other hand, the functional form defines the relation between compensation and performance. In short, the level of compensation determines *who* the firm can attract, while the functional form defines how an executive's compensation is related to his/her performance, *once the executive is hired.* The primary focus of this paper is the investigation of the determinants of the *level* of executive compensation. For a discussion of *functional form*, see Murphy (1985).

In this study, we present an integrated investigation of the factors affecting executive ownership, firm value, and executive compensation by explicitly incorporating the simultaneity of the process determining these variables into an empirical estimation. For instance, instead of assuming a unidirectional causality between ownership structure and corporate value (e.g., the former affects the latter), this study endogenizes ownership structure in analyzing its effect on corporate value. In addition, we examine how various firm- and executive-specific characteristics affect executive compensation, and thereby expand our understanding of executive compensation policies.

Overall, our empirical results support the notion that the firm's intangible assets (and, thus, the market value of the firm), executive stock ownership, and executive compensation are *jointly determined* and that the latter two are important means by which executives are induced or bonded to act in the best interest of shareholders. We also find that the firm's intangible assets, size, and an executive's job-specific experience are important determinants of executive compensation. These results are generally consistent with the view that the firm optimally establishes its managerial compensation plan in response to its operating environment and the characteristics of its chief executive.

The remainder of the study is organized as follows. Section 2 develops hypotheses concerning the interrelationships among firm value, executive ownership, and executive compensation. Section 3 describes the data sources upon which our empirical tests are based. Section 4 presents the empirical analysis and discusses important implications of the results. The study ends with a brief summary and concluding remarks.

2. Executive ownership, firm value, and executive compensation

2.1. Hypotheses

In this section, we first present alternative conjectures on how the market value of a firm, executive ownership, and executive compensation are interrelated. In addition, we discuss other firm- and executive-specific characteristics which may also tend to be empirically correlated with each of these variables.

2.1.1. Executive stock ownership and firm value

Generally, the greater an executive's ownership stake in a firm, the stronger will be his/her incentives to efficiently manage assets-in-place and to spot potentially profitable opportunities. This is true since the executive bears direct financial consequences of his/her decisions. However, as with all aspects of human endeavor, differences in managerial skill exist over broad ranges of both type and quality and these managerial traits may be expected to vary cross-sectionally as a result of a number of firm-, industry-, and manager-specific factors.

Regardless of how defined, truly superior managers possess unusually keen leadership, managerial, and/or entrepreneurial skills capable of elevating the market values of their firms above the 'normal' levels achieved by their less able peers. Not surprisingly, such managerial talents are reflected in share prices largely as *intangible assets* whose values can easily and quickly evaporate (or, in the case of a previous absence, appear) as a result of poor (good) managerial decisions and/or either voluntary or involuntary changes in management. [2] Given the likely greater sensitivity of intangible managerial assets, relative to the value of the firm's physical assets-in-place, to both managerial efforts and changes in the firm's management team, firms with greater levels of managerial intangibles (i.e., 'better' management) may attempt to 'bond' the performance and/or loyalty of their top executives by providing them with greater levels of ownership.

Quite apart from the variation in ownership levels resulting from cross-sectional differences in executive quality, an additional variation in ownership levels is likely to exist due to differences in business environment and industry (see, e.g., Demsetz and Lehn, 1985). For example, the levels of both a firm's intangible assets and executive ownership are almost certainly a positive function of industry entry barriers and/or corporate monopoly power. Hence, the level of intangible assets is expected to be determined not only by managerial quality but also by industry characteristics. Whereas the discussion above suggests that, *for any given firm*, alternative management teams may be 'bonded' with differing ownerships due to differences in managerial quality, the present discussion suggests that, *holding managerial quality constant*, firms in different industries may necessitate differing levels of executive ownership in order to maximize the wealth of shareholders. As before, the *relative* presence (or absence) of potentially fleeting intangible assets plays a crucial role in the analysis. For example, Murdoch (1991) documents richer incentive compensation plans and/or larger managerial stockholding in firms with a higher intensity of research and development activities. Similarly, firms with greater growth opportunities may also be expected to exhibit higher executive ownership levels since the added 'bond' produced by the increased ownership provides enhanced incentives to correctly manage these more intangible (and, thus, more risky) assets.

Given that the value of a firm's managerially- and non-managerially-created intangible assets as well as the value of its physical tangible assets are reflected in its market value, whereas the value of tangible assets alone is proxied by the replacement cost of the firm's assets, it is clear that the *size-adjusted relative magnitude* of a firm's managerially- and non-managerially-created intangible assets can be measured by the ratio of a firm's market value to the replacement

[2] Empirical results suggest that a significant portion of the market value of equity is accounted for by intangible assets for many firms. See, e.g., Kester (1986) and Pindyck (1988).

cost of its assets – that is, Tobin's q. [3] Accordingly, both of the scenarios discussed above lead directly to the following testable hypothesis:

H1: *Executive ownership is a positive function of Tobin's q.*

Not surprisingly, it is also possible to hypothesize similar relationships but with *a reversed* causality. Consider, for example, the likely effects of increased levels of executive ownership on managerial efficiency. It is reasonable to expect that higher levels of ownership may spur executives toward the better management of assets-in-place and also provide the enhanced incentives necessary to ensure the generation of riskier intangible assets. These considerations lead to the following hypothesis:

H2: *Tobin's q is a positive function of executive ownership.*

Thus, higher levels of executive stock ownership may be viewed as providing managers with the necessary incentives to achieve higher levels of managerial efficiency and greater firm value. While this hypothesis also predicts a positive correlation between Tobin's q and executive ownership, the direction of causality runs, in this case, from the latter to the former.

While earlier studies such as Morck et al. (1988) and McConnell and Servaes (1990) suggest that significant managerial ownership may have an adverse effect on Tobin's q over specified ownership ranges, the narrow definition of managerial ownership employed in this study makes it difficult to examine this issue in the present context. For example, the chief executive officers (CEOs) of more than 94 percent of the firms in our sample (98 percent for firms whose CEOs are neither the founders nor the founders' family successors) own less than five percent of the stock of their respective firms. Nonetheless, we perform a partial regression leverage plot (PRLP) analysis to address the possibility of a nonmonotonic relation between the q ratio and executive ownership in our preliminary data analysis. [4] Inspection of the PRLP, however, shows no sign whatsoever of a nonmonotonic relationship between the two variables. Hence the presumed monotonic relation between firm value and executive ownership employed in this study is not likely to present a serious misspecification problem in our empirical estimations.

Both hypotheses H1 and H2 implicitly assume the presence of agency conflicts between executives and shareholders and that the magnitude of these conflicts is

[3] It has been suggested that the best measure of managerial intangible assets might not be Tobin's q but, rather, the ratio of the market value of the firm to the *liquidation value* of the firm's assets. However, since a firm's liquidation and replacement values are likely to be very highly correlated, perhaps differing only by a scale factor, the use of Tobin's q in the empirical tests remains appropriate – particularly in light of the absence of a large, cross-sectional database of firm liquidation values.

[4] The PRLP is the plot between Tobin's q and CEO ownership after they are made orthogonal to the other explanatory variables. Hence, it reveals the relation between Tobin's q and executive ownership after the effects of other variables are controlled.

directly related to the level of the firm's intangible assets. If, however, managerial labor, product, and/or corporate control markets [see, e.g., Fama (1980), Hart (1983), and Jensen and Ruback (1983), respectively] perfectly align the interests of executives and shareholders, there would be no need for higher executive ownership levels for firms with greater intangible assets. Thus, while our a priori hypothesis is that none of these markets perfectly disciplines corporate executives who might otherwise act against the wishes of shareholders, and that the relative magnitude of the firm's intangible assets and executive ownership levels are likely to be positively correlated, the actual magnitude and direction of the relationship remains an open empirical question.

2.1.2. *Executive compensation and Tobin's q*

If a chief executive officer's (CEO's) entrepreneurial/managerial abilities and overall corporate compensation package are positively correlated, then it is reasonable to hypothesize a positive correlation between executive compensation and Tobin's q. As noted above (in the discussion concerning hypothesis H1), since the q ratio reflects, in part, the net present value of all future investments expected to yield rates of return in excess of the opportunity cost of capital, and since the identification and implementation of such profitable investment projects is a direct responsibility of top managers, it may be optimal for firms with greater future growth opportunities to attract persons possessing measurably greater entrepreneurial talents. Similarly, firms with high q levels resulting from the optimal management of assets-in-place would quite reasonably be expected to provide generous levels of executive compensation. Unlike the case of hypothesis H1, in which the firm may attempt to 'bond' a quality manager to the firm through higher levels of executive ownership, the present scenario suggests the attainment of the same goal via the alternative mechanism of higher executive salaries. Given that a CEO's entrepreneurial and/or managerial abilities are effectively reflected in Tobin's q, this argument suggests the following hypothesis:

H3: *CEO compensation is a positive function of Tobin's q.*

As with hypotheses H1 and H2, the present discussion also implicitly assumes the presence of agency conflicts between executives and shareholders. However, since the extent to which imperfections in the markets for managerial labor and/or corporate control alienate the interests of executives and shareholders has not been unambiguously determined, the actual relationship between CEO compensation and the level of firm-specific and managerially-created intangible assets remains unknown.

2.2. *Model specification*

To capture the simultaneous nature of the relationships among executive ownership, intangible firm assets (proxied by Tobin's q), and executive compensa-

tion, and to reduce the possibility of model misspecification due to the absence of other important explanatory variables, the following structural model is employed as a general representation of the relationships among these variables:

$$\text{CEO ownership} = f(\text{Tobin's } q, X_1, Y_1), \tag{1}$$

$$\text{Tobin's } q = g(\text{CEO ownership}, X_2, Y_2), \tag{2}$$

$$\text{CEO compensation} = h(\text{Tobin's } q, X_3, Y_3), \tag{3}$$

where X_i and Y_i $(i = 1,2,3)$ are the vectors of firm- and executive-specific variables, respectively, which may be correlated with executive ownership, Tobin's q, and executive compensation. Clearly, this empirical specification is different from that employed previously by Morck et al. (1988) and McConnell and Servaes (1990). Whereas Morck et al. and McConnell and Servaes implicitly assume that there is a unidirectional causality between ownership structure and Tobin's q (with the former affecting the latter), the present analysis explicitly assumes that q and ownership structure may be *jointly determined*, and thus explicitly accounts for the simultaneous nature of the hypothesized processes in the empirical estimation. In what follows, we summarize our conjectures on the exogenous variables X_i and Y_i and discuss their potential directional relationships with executive ownership, Tobin's q, and executive compensation.

2.2.1. Market value of equity (X_1, X_2)

Executives' wealth limitations and risk aversion would make it expensive and unlikely (due to under-diversification of their personal wealth) for CEOs to hold large proportions of large firms (see, e.g., Demsetz and Lehn, 1985). Hence, we posit that CEOs' proportional stock ownerships are inversely related to the market values of their firms' equity. In addition, Keim (1986) reports that the price–earnings ratio and the market-to-book equity ratio are generally higher for larger capitalization firms. Since our proxy for intangible assets (i.e., Tobin's q ratio) is strongly correlated with the market-to-book value ratio, we hypothesize that Tobin's q is a positive function of the market value of equity.

2.2.2. Asset size (X_3)

Calvo and Wellisz (1979) and Rosen (1982) develop models of labor allocation and wage-scale formation within hierarchical firms facing a competitive labor market. These authors argue that there exists a multiplicative productivity effect in a hierarchical organization, and that the firm's optimal response to such an effect will be to assign more productive workers to higher-level jobs and to offer these individuals wages higher than those which would be expected based upon their *average* efficiencies. Like water that seeks its own level, this argument implies that the ablest executives are predisposed to gravitate to the largest firms due to the higher average salaries paid by these companies.

In addition, firm size may be viewed as a composite proxy of an executive's

job complexity. Expansion of firm size tends to produce a more differentiated organizational structure along functional, vertical, and spatial dimensions. While increased structural differentiation enables an organization to enjoy the benefits of greater employee specialization, such gains come at the cost of requiring high levels of executive control and coordination. Since, as defined, job complexity measures the nature and magnitude of the *responsibility* vested in a job, it is logical to expect a positive relationship between the job complexity of an executive position and the compensation the executive receives. Given the likely high degree of correlation between firm size and job complexity, it is also likely that executive compensation and firm size may be significantly correlated as well.

Finally, although the above arguments are implicitly based upon the assumption of competitive pricing in managerial labor markets, it seems reasonable to assume that senior executives must have some influence over their compensation packages. In so far as large firms, through their market power, are able to earn greater monopoly profits than are small firms, executives of large firms may be able to compensate themselves more generously than executives of small firms. In this study, firm size is proxied by the book value of total assets.

2.2.3. Years as CEO (Y_1, Y_2, Y_3)

Ceteris paribus, the cumulative value of incentive compensation received in the form of stock options will be greater for those executives with a longer history of employment. Thus, it is reasonable to expect a positive correlation between executive ownership and the number of years as a chief executive officer. Such a relationship may also be due to an increase in 'loyalty' (with a commensurate increase in share holdings) as CEOs' tenure with their firms lengthens. Lastly, more experienced CEOs may receive greater levels of compensation.

If more experienced CEOs are better at managing assets-in-place and/or spotting potentially profitable growth opportunities, there would be a positive correlation between CEO tenure and the level of a firm's intangible assets (proxied, as above, by Tobin's q). However, it is equally plausible that CEOs with longer experience may tend to become more conservative with increasing age and thus be less prone to assume responsibility for risky, but highly profitable projects. According to this view, Tobin's q and CEO experience may in fact be negatively correlated. As such, the actual relationship between CEO experience and Tobin's q remains an open empirical question.

2.2.4. CEO age (Y_1, Y_3)

Eaton and Rosen (1983) suggest that a CEO's age may reflect his/her degree of risk aversion. As executives age, it is plausible that they may tend to reduce their levels of ownership in order to increase the diversification of their personal portfolios. This argument suggests an inverse relationship between executive stockholding and CEO age. On the other hand, the obvious correlation between CEO experience (discussed above) and CEO age clearly suggests an opposite

conclusion. Hence, again, the actual relationship between CEO age and stockholding is an empirical question.

The age of chief executives, as a proxy variable for general training levels and/or experience, may also be expected to affect their remuneration. Again, however, the direction of this relationship cannot a priori be determined with any degree of certainty. While a CEO with greater experience may well be expected to be compensated with a higher salary, older CEOs may also be less prone to 'job hopping' than their younger counterparts, and thus have less need for the enhanced corporate 'bond' provided by a higher salary. Indeed, the well-known phenomenon of 'compression' in both academic and business salaries may be a rational market mechanism resulting, at least partially, from the higher transactions costs likely to accrue to older, more experienced workers as a result of a given job change.

2.2.5. *Founder-CEO (Y_1, Y_2)*

Holmes and Schmitz (1988a,b) define entrepreneurial ability as the capacity to 'spot' or 'create' a new growth opportunity and to develop an organizational structure specific to that opportunity. Managerial ability, on the other hand, is defined as the capacity to produce goods within existing organizations. It is generally believed that entrepreneurship is a scarce resource, and that individuals with this ability may attempt to 'free up' their time in order to further pursue entrepreneurial activities. [5] Holmes and Schmitz predict that individuals with entrepreneurial talents will manage firms with significant growth opportunities, while those with managerial talents will find a niche in managing firms which require relatively lower levels of entrepreneurial judgment. Since the founding of a successful corporation meets every definition of entrepreneurship, firms with founding CEOs may tend to exhibit greater growth opportunities and other intangible assets than non-founder-managed firms. Based on these considerations, we posit that Tobin's q will be higher for firms whose CEOs are their founders. To examine whether founders and their descendants may play different roles in fostering a firm's intangible capital, we also include a dummy variable to represent those firms whose CEOs are direct descendants of the original firm founders. In addition, since the executive who founded the firm and his family successors may hold a significant portion of the firm's ownership due strictly to historical

[5] The notion that entrepreneurial skill is a very scarce resource has been recognized since Knight (1921). Recently, a group of authors has contributed stimulating arguments on the role entrepreneurs play in society. Baumol (1990) suggests that entrepreneurship can be 'productive' or 'unproductive' and the allocation of people between productive activities such as innovation and unproductive activities such as rent seeking is largely determined by the relative payoffs society offers to such activities. In a similar vein, Murphy et al. (1991) discuss the role of increasing returns to ability in explaining why rent seeking and productive entrepreneurship are competing for the very same people, who are the ablest in the society.

circumstance, dummy variables representing the founder and his family members are also included in the ownership equation.

2.2.6. Human capital (Y_2, Y_3)

The economic theory of human capital (see, e.g., Becker, 1964) suggests that investments in human capital influence worker productivity which, in turn, influences earnings. Ceteris paribus, executives with greater levels of human capital should be better able to perform their required tasks and, thus, earn higher levels of compensation. Further, the 'screening hypothesis' of labor markets of Arrow (1973), Taubman and Wales (1973), Stiglitz (1975), and Wolpin (1977) suggests that, in a world of asymmetric information, human capital variables such as education may effectively serve as *signals* of managerial quality and expected compensation. Accordingly, dummy variables representing two educational attributes of CEOs (i.e., college graduation and post-graduate education) are employed as proxies for human capital.

2.2.7. Company age (X_1, X_2, X_3)

Various CEO and firm characteristics may be different among firms with different ages. For instance, the firm's growth potential, size, CEO age, probability of a founder-CEO, and experience variables may systematically vary according to the age of the firm. In order to control for such factors, firm age (proxied by the date of first stock listing as reported in the CRSP data tape) is added as an explanatory variable.

2.2.8. Industry

Two-digit SIC code industry dummy variables are used to control for the possibility of spurious correlations among the variables operating through industry effects.

3. Data description

Data regarding CEO stockholding and other personal characteristics (i.e., years as the CEO, age, and founder-status) are obtained from The Directory of America's Corporate Elite – The Chief Executives of the 1000 Most Valuable Publicly Held U.S. Companies, published by Business Week in 1987. [6] We employ two measures of executive ownership: ownership in percent and ownership in dollars. The

[6] It should be noted that the Business Week ownership data do *not* include options ownership. Since option compensation is widespread, this may lead to a bias of unknown magnitude and direction in the empirical results. To the extent that stock and option ownerships are empirically correlated, however, the bias may not be systematic.

percent ownership of the CEO is obtained by dividing the number of shares owned by the CEO reported in the Business Week directory by the firm's total number of outstanding shares at the end of 1986 as reported in Standard and Poor's Compustat tape:

$$\text{CEO ownership (\%)} = \text{number of shares owned by the CEO/shares outstanding.} \quad (4)$$

Executive ownership in dollars is obtained by multiplying the number of shares owned by the CEO by the market closing share price in 1986 reported in the Compustat tape:

$$\text{CEO ownership (\$)} = \text{number of shares owned by the CEO} \times \text{share price.} \quad (5)$$

As noted previously, the size-adjusted value of the firm's managerial and firm-specific intangible assets is proxied by Tobin's q:

$$\text{Tobin's } q = \text{market value of firm/replacement cost of assets.} \quad (6)$$

The data required for the calculation of the market value of the firm and the replacement cost of assets are obtained from the Manufacturing Sector Master File compiled at the National Bureau of Economic Research. [7, 8] The replacement cost of assets is employed as the proxy for the value of assets-in-place, and the market value of the firm as the proxy for the combined value of assets-in-place and intangible assets.

Executive compensation is measured by the salary and bonus paid during 1986 as reported to the Securities and Exchange Commission (SEC). Although most executives also receive a variety of other compensations (e.g., deferred and contingent compensation, stock options, fringe benefits, savings plans, uncondi-

[7] This file contains the panel data of publicly traded United States manufacturing firms which were created and updated at the National Bureau of Economic Research from 1978 through 1987. There are about 90 variables in the data set, including the market value of debt, the inflation adjusted net capital stock, and the market value of the firm.

[8] The market value of the firm is proxied by PREFST + VCOMS + LTDEBT + STDEBT − ADJ, where PREFST is the liquidating value of preferred stock, VCOMS is the price of the common stock times the number of shares outstanding at the close of the year, LTDEBT is the value of long-term debt adjusted for its age structure, STDEBT is the book value of current liabilities, and ADJ is the value of net short-term assets [i.e., the book value of current assets − the book value of inventories − the book value of current liabilities + the book value of the debt in current liabilities (Compustat data item #34)]. The replacement cost of assets is proxied by TOTASST − BKCAP + NETCAP, where TOTASST is the book value of total assets, BKCAP is the book value of net capital stock (i.e., the book value of net plant and equipment + the book value of inventories + the book value of investments in unconsolidated subsidiaries and others and intangibles), and NETCAP is the inflation adjusted net capital stock (i.e., the net value of the plant adjusted for inflation + the value of inventories adjusted for the effects of inflation + the value of investments in unconsolidated subsidiaries and intangibles plus other investments adjusted for inflation). For a detailed description of these variables, see Hall (1990).

tional stock awards, and pensions), previous research indicates that salary and bonus constitute the major proportion of most executives' total compensation package. For example, Murphy (1985) reports that salary and bonus constitute 80 percent of the total value of executive remuneration (exclusive of pensions) for all publicly held corporations in the Fortune 500. Similarly, in an earlier study, Eaton and Rosen (1983) reported that salary and bonuses accounted for 64 percent of the total value of executive compensation for the firms in their sample.

The process of computing the present value equivalent of other compensation is quite complex and far more prone to errors than the salary and bonus figures reported to the SEC. In addition, since the pension component of an executive's compensation is typically determined by a formula that applies to *all* employees covered by the corporation's pension plan, a given CEO's claim to future pension benefits may not prove particularly sensitive with respect to CEO efforts and/or qualifications. Finally, when Lewellen and Huntsman (1970) separately regressed the two compensation measures (i.e., salary plus bonus versus salary plus bonus plus the present value of other incentive payments) against a common set of independent variables, they identified no significant differences in their results. Indeed, they suggest that the two measures of executive compensation are highly correlated – differing perhaps only by a scale factor. For these reasons, we believe the employed definition of executive compensation is an excellent proxy of total executive remuneration.

Firms are included in the final sample only if both CEO personal characteristics and firm data are available from the Business Week directory, the Manufacturing Sector Master File, and the Compustat tape. Only data for 1986 are employed in the analysis in an effort to fully coordinate the q and other data with the Business Week ownership data. The number of CEOs/firms in the final sample is 404. The average age of the sampled CEOs and the average number of years as CEO are 56.6 and 8.5 years, respectively.

Table 1 presents summary statistics of the variables. The mean value of CEO stockholding is \$11 725 000, which is equivalent to 1.29 percent of the market value of equity of our sample of firms. The median value of CEO stockholding, however, is only \$2 120 000 (0.15 percent of the market value of equity). These results suggest that executive stockholding is highly skewed. The average annual remuneration for the sampled CEOs is \$735 000.

When the sample is divided into two groups according to whether or not the present CEO is the founder of the firm or an immediate family successor (i.e., son, daughter, spouse, sister, or brother), the results reveal the expected disparity of ownership. The average ownership level of the founder/family-CEOs is 4.96 percent whereas the non-founder-CEOs hold, on average, only 0.62 percent of their firm's common shares. Similarly, Tobin's q is greater for family-managed firms. The mean Tobin's q of firms whose CEOs are also the founders or their immediate family members is 1.478 whereas that of the non-family-managed firms is only 1.204. Although this result would seem to support Holmes and Schmitz's

Table 1
Summary statistics

	Mean	Standard deviation	Median	First quartile	Third quartile
All firms ($N = 404$)					
Ownership (%) [a]	1.29	4.20	0.15	0.03	0.78
Ownership ($) [b]	11725	39958	2120	670	6391
Tobin's q [c]	1.246	0.876	1.027	0.764	1.459
Compensation ($) [d]	735	875	624	439	847
CEO is founder or founder's family successor ($N = 63$)					
Ownership (%)	4.96	8.20	2.94	0.96	6.89
Ownership ($)	45136	86570	19929	7673	34000
Tobin's q	1.478	1.205	1.151	0.876	1.681
Compensation ($)	775	1626	453	324	753
CEO is not founder or founder's family successor ($N = 341$)					
Ownership (%)	0.62	2.38	0.10	0.03	0.38
Ownership ($)	5552	16757	1549	546	3803
Tobin's q	1.204	0.795	1.003	0.750	1.416
Compensation ($)	728	652	646	465	855

[a] The ratio of the number of common share held by the CEO to the total number of shares outstanding.
[b] The number of common share held by the CEO times share price (in thousand dollars).
[c] The ratio of the market value of the firm to the replacement cost of assets.
[d] The salary and bonus as reported to the Securities and Exchanges Commissions (in thousand dollars).

(1988a) conjecture that founder-CEO firms may exhibit greater growth opportunities (and/or higher levels of other firm- or manager-specific intangible assets), it is possible that the noted high Tobin's q of the founder/descendant-CEO firms may result from other factors. For example, the high q ratio of founder-CEO firms may be driven by the greater CEO ownership of these firms, rather than by the mere fact that their CEOs are founders per se who presumably possess superior entrepreneurial talents. Accordingly, a closer empirical analysis of this issue is performed in the next section.

Tables 2 and 3 present the mean and median values of Tobin's q for different levels of CEO ownership in dollars (Table 2) and in percent (Table 3), respectively. As shown in Table 2, corporate executives, in general, have a substantial amount of wealth invested in their firms. For instance, 265 CEOs (60 percent of the sample) hold more than $1 million worth of stock in their company, while 79 CEOs (18 percent of the sample) have stock holdings in excess of $10 million. Consistent with hypotheses H1 and H2, there appears to be a strong and positive correlation between CEO ownership and Tobin's q. With the exception of a strong upward bias in CEO ownership levels for firms with founder-CEOs, qualitatively similar observations may be made with respect to both CEO subsets.

Table 2
Tobin's q by level of CEO ownership (in dollars)

CEO ownership [a] (in dollars)	Number of firms	Tobin's q [b]	
		Mean	Median
All firms ($N = 404$)			
0–100	23 (5.7)	0.749	0.682
100–500	60 (14.9)	0.932	0.890
500–1000	56 (13.9)	0.971	0.870
1000–5000	145 (35.9)	1.301	1.090
5000–10000	41 (10.1)	1.601	1.255
10000–50000	64 (15.8)	1.414	1.283
50000–100000	6 (1.5)	1.797	1.563
Over 100000	9 (2.2)	2.270	1.385
CEO is founder or founder's family successor ($N = 63$)			
0–100	0 (0.0)	n.a. [c]	n.a.
100–500	1 (1.6)	0.959	0.959
500–1000	3 (4.8)	0.915	0.889
1000–5000	5 (7.9)	1.029	0.843
5000–10000	9 (14.3)	1.478	1.171
10000–50000	35 (55.6)	1.329	1.232
50000–100000	4 (6.3)	1.903	1.563
Over 100000	6 (9.5)	2.812	2.096
CEO is not founder or founder's family successor ($N = 341$)			
0–100	23 (6.7)	0.749	0.682
100–500	59 (17.3)	0.932	0.874
500–1000	53 (15.5)	0.974	0.858
1000–5000	140 (41.1)	1.311	1.091
5000–10000	32 (9.4)	1.636	1.291
10000–50000	29 (8.5)	1.517	1.333
50000–100000	2 (0.6)	1.585	1.585
Over 100000	3 (0.9)	1.187	1.148

[a] The number of common share held by the CEO times share price (in thousand dollars).
[b] The ratio of the market value of the firm to the replacement cost of assets.
[c] No observation for this category.

Table 3 shows the mean and median values of Tobin's q for differing levels of CEO ownership (in percent). As indicated earlier, the results exhibit a strong skewness in the distribution of ownership for the entire sample. For example, in 316 firms (78.2 percent of the sample) executive stockholding does not exceed one percent of outstanding equity, and in 381 firms (94.3 percent of the sample) executive stockholding remains below five percent. For the sub-sample of firms with founder/family-CEOs, however, proportional CEO stockholding is, as expected, substantially larger than that of the entire sample. Indeed, 74.6 percent of

Table 3
Tobin's q by level of CEO ownership (in percent)

CEO ownership [a] (in percent)	Number of firms	Tobin's q [b]	
		Mean	Median
All firms ($N = 404$)			
0–1	316 (78.2)	1.162	0.956
1–5	65 (16.1)	1.460	1.280
5–10	11 (2.7)	2.001	1.290
10–20	10 (2.5)	1.453	1.117
20–40	1 (0.2)	2.317	2.317
Over 40	1 (0.2)	2.720	2.720
CEO is founder or founder's family successor ($N = 63$)			
0–1	16 (25.4)	1.068	0.921
1–5	29 (46.0)	1.457	1.280
5–10	9 (14.3)	2.176	1.450
10–20	8 (12.7)	1.437	1.117
20–40	0 (0.0)	n.a. [c]	n.a
Over 40	1 (1.6)	2.720	2.720
CEO is not founder or founder's family successor ($N = 63$)			
0–1%	300 (88.0)	1.167	0.965
1–5%	36 (10.6)	1.462	1.291
5–10%	2 (0.6)	1.211	1.211
10–20%	2 (0.6)	1.518	1.518
20–40%	1 (0.3)	2.317	2.317
Over 40%	0 (0.0)	n.a.	n.a.

[a] The ratio of the number of common share held by the CEO to the total number of shares outstanding.
[b] The ratio of the market value of the firm to the replacement cost of assets.
[c] No observation for this category.

the founder/family-CEOs hold more than one percent of their firms' outstanding equity and 14.3 percent hold more than ten percent.

4. Empirical results

4.1. Specification of functional form and estimation method

Since theory suggests nothing about the functional form underlying Eq. (1)–(3), identification of the correct functional form is essentially an empirical issue. Thus, we perform a Box and Cox (1964) analysis in order to identify the best functional form from the data rather than impose one on an ad hoc basis. Since both linear and log–linear models are frequently employed in the empirical literature, we also perform a likelihood ratio test to determine whether the 'goodness of fit' of either model is significantly different from that of the Box–Cox model. The results of

the likelihood ratio test suggest that the goodness of fit of the log–linear model is similar to that of the Box–Cox model in all three equations. [9] Given this result, and considering that the log–linear model is simple and yields an easily interpretable coefficient estimate (i.e., elasticity), we employ the following log–linear structural model in the empirical investigation:

$$\begin{aligned}
&\ln(\text{CEO ownership}) \\
&\quad = \alpha_0 + \alpha_1 \ln(\text{Tobin's } q) + \alpha_2 \ln(\text{market value of equity}) \\
&\qquad + \alpha_3 \ln(\text{CEO years}) + \alpha_4 \ln(\text{CEO age}) + \alpha_5 \ln(\text{company age}) \\
&\qquad + \alpha_6 \text{founder dummy} + \alpha_7 \text{family dummy} \\
&\qquad + \alpha_8 - \alpha_{27} \text{industry dummies for two-digit SIC codes} + \epsilon_1, \qquad (7) \\
&\ln(\text{Tobin's } q) \\
&\quad = \beta_0 + \beta_1 \ln(\text{CEO ownership}) + \beta_2 \ln(\text{market value of equity}) \\
&\qquad + \beta_3 \ln(\text{CEO years}) + \beta_4 \ln(\text{company age}) + \beta_5 \text{college dummy} \\
&\qquad + \beta_6 \text{graduate dummy} + \beta_7 \text{founder dummy} + \beta_8 \text{family dummy} \\
&\qquad + \beta_9 - \beta_{28} \text{industry dummies for two-digit SIC codes} + \epsilon_2, \qquad (8) \\
&\ln(\text{CEO compensation}) \\
&\quad = \gamma_0 + \gamma_1 \ln(\text{Tobin's } q) + \gamma_2 \ln(\text{total asset}) \\
&\qquad + \gamma_3 \ln(\text{CEO years}) + \gamma_4 \ln(\text{CEO age}) + \gamma_5 \ln(\text{company age}) \\
&\qquad + \gamma_6 \text{college dummy} + \gamma_7 \text{graduate dummy} \\
&\qquad + \gamma_8 - \gamma_{27} \text{industry dummies for two-digit SIC codes} + \epsilon_3. \qquad (9)
\end{aligned}$$

Since an application of the ordinary least-squares (OLS) method to a structural model may be subject to simultaneous equation bias (and thus yield biased and inconsistent parameter estimates), three-stage least-squares (3SLS) regression is employed to estimate the above structural model. [10, 11] Both percentage and dollar measures of executive ownership are employed in the analysis. Since the two measures of executive ownership are highly correlated (the correlation coefficient

[9] Specifically, when CEO ownership is regressed against Tobin's q, the market value of equity, CEO years, CEO age, company age, and dummy variables for the founder, his family successor, and industry, we find that the value of Box–Cox λ is 0.03 with the maximum log-likelihood value of 1889.76 (with $R^2 = 0.591$), whereas the values of the log-likelihood function of the linear (i.e., when $\lambda = 1$) and log–linear (i.e., when $\lambda = 0$) model are 757.83 (with $R^2 = 0.217$) and 1888.43 (with $R^2 = 0.588$), respectively.

[10] Strictly speaking, the correct functional form underlying each of Eqs. (1)–(3) should be jointly identified within the context of the structural model. Currently, however, there is no commercially available statistical package which performs Box–Cox analysis for the structural model.

[11] We checked the order and rank conditions to see whether Eqs. (7)–(9) are identified. The results show that all three equations are identified. See Judge et al. (1982) for the general discussion of the rank and order conditions.

between the two is 0.858), however, regression results using dollar ownership are virtually identical to those employing percentage ownership with one exception: the market value of equity is insignificant in the ownership equation when dollar ownership is employed, whereas this variable is significant when percentage ownership is used. This result should come as no surprise since the wealth constraint effect does not exist when executive stockholding is defined in terms of an absolute dollar amount. Hence, we focus our discussion on the regression results employing percentage executive ownership. Also, when industry dummy variables are deleted from the structural model, R^2 falls by less than four percent. Similarly, the estimated elasticities with and without industry dummy variables are qualitatively identical. Thus, we report, for the sake of brevity, only results without industry dummy variables.

Finally, in order to illustrate the potential errors likely to result from the failure to properly incorporate the simultaneous nature of the variable interactions in the model estimation, Eq. (7)–(9) are also estimated separately via the OLS method. As suggested by Greene (1993) and others, the results presented below indicate that the differences in the results achieved by the two methods in the presence of simultaneous variable interactions are by no means trivial. As such, the present study illuminates the biases in previous efforts to ascertain the relationships between the examined variables resulting from the failure to explicitly acknowledge the *bi-directionality* of the variable interactions.

4.2. Regression results

The left side of Table 4 presents the results of the 3SLS regression, and the right side shows the results of the OLS regression. The 3SLS results show that the included variables jointly account for nearly two-thirds of the variation in CEO ownership, Tobin's q, and CEO compensation. The comparison of the estimated elasticities of the 3SLS regression with those of the OLS regression reveals that the OLS regression, by ignoring the simultaneity of the process determining these variables, results in considerably misleading values. For example, according to the OLS estimates, a one percent increase in CEO ownership results in a 0.049 percent increase in Tobin's q, whereas the 3SLS results suggest that the same increase in ownership results in a 0.997 percent increase in Tobin's q. [12] Similarly, in the

[12] The fact that 94 percent of our sample firms have CEO ownership levels below 5 percent of the value of their firms' total equity suggests caution in the interpretation of the ownership results. When we repeat the simultaneous estimation of the structural model without inclusion of the ownership equation (i.e., executive ownership is treated as an independent variable only), the results for the remaining two equations fall between the 3SLS and OLS results reported in Table 4. It appears, therefore, that the lower ownership level of CEOs in our dataset does induce a certain degree of instability in our empirical model. Despite these new findings, however, it is important to emphasize that the interpretation of the results remains qualitatively consistent with those presented in Table 4. We are grateful to an anonymous referee for bringing this possibility to our attention.

Table 4
Three-stage least-squares (3SLS) and ordinary least-squares (OLS) estimation of simultaneous-equation model of determinants of executive ownership, Tobin's q, and executive compensation

	Results of 3SLS regression			Results of OLS regression		
	CEO ownership [a] (in %)	Tobin's q [b]	CEO compensation [c]	CEO ownership (in %)	Tobin's q	CEO compensation
Intercept	−1.302	1.299	3.382	−1.196	−0.361	3.357
	(−1.84) [g]	(1.59)	(3.98 * *)	(−0.40)	(−1.82)	(3.96 * *)
Tobin's q	1.003		0.247	0.738		0.275
	(3.34 * *)		(3.21 * *)	(3.35 * *)		(4.76 * *)
CEO ownership		0.997			0.049	
		(3.35 * *)			(3.36 * *)	
Market value of equity	−0.860	0.857		−0.833	0.137	
	(−9.89 * *)	(3.56 * *)		(−9.83 * *)	(5.79 * *)	
Total asset [d]			0.278			0.280
			(12.71 * *)			(12.91 * *)
CEO years [e]	0.638	−0.636	0.099	0.653	0.013	0.098
	(7.73 * *)	(−2.92 * *)	(4.38 * *)	(7.41 * *)	(0.55)	(4.36 * *)
CEO age	−0.001		0.156	−0.061		0.159
	(−0.01)		(0.75)	(−0.08)		(0.76)
Company age	−0.017	0.017	0.045	−0.059	−0.154	0.048
	(−0.154)	(0.151)	(1.60)	(−0.56)	(−5.96 * *)	(1.71)
College		0.001	0.111		−0.027	0.112
		(0.02)	(1.04)		(−0.26)	(1.05)
Graduate		0.000	0.080		−0.041	0.080
		(0.01)	(0.74)		(−0.40)	(0.74)
Founder	2.072	−2.064		2.041	−0.222	
	(5.88 * *)	(−3.06 * *)		(5.82 * *)	(−2.34 *)	
Family [f]	1.179	−1.175		1.190	−0.015	
	(3.22 * *)	(−2.28 *)		(3.25 * *)	(−0.15)	
System weighted R^2		0.629				
System weighted MSE		54.097				
Adjusted R^2				0.570	0.396	0.458
F-value				17.60 * *	8.91 * *	11.61 * *

[a] The ratio of the number of common share held by the CEO to the total number of shares outstanding.
[b] The ratio of the market value of the firm to the replacement cost of assets.
[c] The salary and bonus as reported to the Securities and Exchanges Commissions.
[d] The book value of total assets.
[e] The total number of years as the CEO.
[f] Family dummy is 1 if the CEO is an immediate family member of the founder and 0 otherwise.
[g] The numbers in parentheses are t-values.
* * Significant at the one percent level; * significant at the five percent level.

Tobin's q equation, estimated coefficients for CEO experience and company age from the 3SLS regression are significantly different from those of the OLS regression. Since, as noted above, 3SLS regression presumably results in more accurate estimates of the structural model than OLS, interpretation of the empirical results hereafter will be based solely on 3SLS.

As hypothesized, CEO ownership and Tobin's q are strongly positively correlated. The regression results suggest that a one percent increase in Tobin's q will result in a 1.003 percent increase in executive ownership. Conversely, as noted above, a one percent increase in executive ownership will result in a 0.997 percent increase in Tobin's q. Overall, these results are consistent with the joint hypotheses that (i) firms with higher levels of intangible assets *require* greater levels of managerial ownership, and (ii) firms with greater executive ownership will have greater size-adjusted market values, since executives may become more closely allied with outside shareholders as inside (executive) stock ownership rises.

As noted in Table 4, the results of the study suggest the existence of a negative correlation between executive ownership and the market value of common stock outstanding. Specifically, a one percent increase in equity size is associated with a 0.86 percent decrease in executive ownership. This result is consistent with the predictions of the wealth constraint hypothesis in which wealth limitations and restrictions on personal borrowing prohibit executives from holding a large fraction of the shares of larger firms. This result may also partially reflect the fact that risk-averse executives may not hold a large fraction of the shares of large firms since such holdings (and their associated high dollar values) might imply a significant under-diversification of their personal wealth.

Not surprisingly, the number of years as CEO is significantly and positively related to executive stockholding. This result is consistent with the view that the cumulative value of incentive compensation received in the form of stock options may be larger for executives with longer employment histories. The regression results indicate, however, that there is no significant relation between CEO age and CEO stock ownership. This result would appear to refute the notion that executives may tend to reduce the degree of under-diversification of their personal wealth as they become older (and, thus, perhaps more risk averse).

The dummy variables for the firm founder and his or her family successor are significant and positive in the ownership equation. This result is consistent with the view that the executive who founded the firm and his or her family successor may tend to own more stock simply because of historical circumstance. The results show, however, that firms whose CEOs are also the founders (or their family successors) tend to have lower q values. This result is inconsistent with the implications of the Holmes and Schmitz (1988a) conjecture that firms whose CEOs are also the founders (entrepreneurs) may exhibit *greater* levels of corporate intangibles than non-founder firms. Rather, this finding supports the hypothesis that founders and their family members may tend to place shareholder wealth maximization at a lower point on the managerial hierarchy than do the CEOs of

non-founder firms. [13] As such, the present results are consistent, at least in spirit, with the findings of Johnson et al. (1985) that the unexpected deaths of chief executives are accompanied by significant price increases in their firms' stocks *only* when the dying executives were the firms' founders.

As illustrated in Table 4, the estimation results suggest that firms managed by longer-tenured CEOs possess lower overall Tobin's q values. One possible interpretation of this result is that the typical executive may become more conservative and take a moderate route as his tenure with the company becomes longer. Similarly, this finding also suggests that firms headed by less experienced, perhaps younger CEOs may assume relatively greater risks in pursuit of more profitable opportunities. Interestingly, neither CEO college nor graduate education appears to affect corporate value. Whether this finding should be interpreted as implying that entrepreneurial and/or managerial skills are not fostered by higher education, however, remains an open empirical question.

Clearly, there exists a strong and positive correlation between Tobin's q and executive compensation. This result supports the view that it may be optimal for firms with relatively greater levels of intangible assets to attract (by paying more) persons with relatively greater levels of entrepreneurial and/or managerial talent.

As with many previous studies (e.g., Ciscel and Carroll, 1980; Baker et al., 1988), the present results indicate a significant and positive association between executive compensation and firm size. The elasticity of compensation with respect to firm size (as measured by total assets) is 0.278, indicating a 10 percent increase in firm size is associated with an average increase in executive pay of 2.78 percent. As expected, the number of years as chief executive is positively related to executive compensation. This finding lends support to the premise that the time served as a chief executive may constitute a type of training which in turn commands a significant wage premium. Alternatively, longer-tenured executives may be better able to influence their respective boards of directors, and in so doing achieve overall higher levels of compensation. The estimated coefficients indicate

[13] It is conceivable that the founders may add significant value to their firms during early years of their careers as top executives although they and/or their family successors may thwart value maximization in later years. In order to examine this possibility, our sample firms are divided into two groups according to whether or not the number of years as the CEO is less than seven. If the founders exercise their entrepreneurial talents and add more value to their firms than do non-founder CEOs (at least) during early years of their career, we would expect a positive sign for the dummy variable for the founder if we use only firms whose CEOs have a relatively short tenure. Specifically, we re-estimated the simultaneous equation model (i.e., Eqs. (7)–(9)) using a subset of our sample for which CEO tenure years is less than seven. Contrary to our expectation, the dummy variable for the founders has a negative coefficient. Hence, it appears that, regardless of different stages of their career as top managers, founder-CEOs do not add significantly to the intangible assets of their firms. One possible interpretation of this result is that the typical founder becomes rather conservative and assumes a more moderate route once the enterprise becomes well established, whereas the average professional manager tends to take more risk in an effort to increase the level of the firm's intangible assets.

that, once employed as a chief executive, specific training for that post continues to return a wage increment amounting to about 9.9 percent as executive tenure doubles. The age of CEOs, however, appears to have no effect on their compensation. This result appears to reject the hypothesis that age, as a proxy variable for general training or experience, affects executive compensation. Hence, the positive empirical relationship between age and income (holding education constant), so well established in census data, does not appear to apply to the executive labor market, at least for this sample. This result may indicate that executive positions are characteristically different from other jobs and suggests that general experience per se may not increase a chief executive's total productivity.

Neither of the education dummy variables is significantly related to executive compensation. This result implies that practical experience in the world of business and other on-the-job training are more important determinants of CEO compensation than is formal education. It should be noted, however, that this result does not necessarily lead to a rejection of the screening hypothesis, since it is reasonable to assume that the effect of education on an individual's earnings will fall over time as employers gain increased first-hand information concerning productivity. Since our sample executives tend to be substantially older than the general population and, in general, possess long records as chief executives (approximately 8.5 years), the use of education as an executive screening device may no longer prove rational.

In an effort to illuminate the extent to which founder-CEOs or their family successors may have influenced their compensation levels through their unique status, we also estimate the system of equations with founder/founder's family dummy variables included in the compensation equation. [14] However, the obtained regression results fail to reveal any evidence of 'compensation entrenchment' by members of the founding family. On the contrary, founding CEOs or their family successors tend to receive *less* compensation than their non-founder counterparts, although the statistical significance of the relation is weak. Thus, although founding CEOs presumably wield significant influence over the boards of directors of their respective firms, they apparently do not choose to exercise this influence in the determination of their cash remuneration. Rather, these CEOs may take more compensation in the form of stock rather than salary.

Finally, since non-founder CEOs have significantly less ownership interest in their firms than founder CEOs, it would be interesting to determine whether the interactive empirical association between CEO ownership and Tobin's q documented above holds among firms whose CEOs are neither founders nor their family successors. Regression results with a subset of our sample of firms (i.e.,

[14] The results are available from the authors upon request.

Table 5
Three-stage least-squares (3SLS) and ordinary least-squares (OLS) estimation of simultaneous-equation model of determinants of executive ownership, Tobin's q, and executive compensation for firms whose CEO is neither founder nor founder's family member

	Results of 3SLS regression			Results of OLS regression		
	CEO ownership [a] (in %)	Tobin's q [b]	CEO compensation [c]	CEO ownership (in %)	Tobin's q	CEO compensation
Intercept	−1.393	1.373	3.267	−2.652	−0.423	3.229
	(−1.62) [f]	(1.52)	(3.54 **)	(−0.78)	(−1.95)	(3.50 **)
Tobin's q	1.039		0.246	0.765		0.277
	(3.32 **)		(3.20 **)	(3.25 **)		(4.72 **)
CEO ownership		0.963			0.051	
		(3.37 **)			(3.26 **)	
Market value of equity	−0.867	0.835		−0.842	0.143	
	(−9.36 **)	(3.60 **)		(−9.37 **)	(5.72 **)	
Total asset [d]			0.289			0.291
			(12.89 **)			(13.07 **)
CEO years [e]	0.656	−0.631	0.117	0.659	0.015	0.116
	(7.35 **)	(−2.90 **)	(4.87 **)	(7.08 **)	(0.62)	(4.84 **)
CEO age	−0.008		0.176	0.278		0.182
	(−0.05)		(0.78)	(0.32)		(0.81)
Company age	−0.006	0.006	0.019	−0.048	−0.138	0.021
	(−0.05)	(0.05)	(0.63)	(−0.42)	(−4.86 **)	(0.72)
College		−0.000	0.141		−0.022	0.142
		(−0.01)	(1.17)		(−0.18)	(1.18)
Graduate		−0.004	0.129		−0.041	0.132
		(−0.06)	(1.06)		(−0.34)	(1.08)
System weighted R^2		0.547				
System weighted MSE		77.568				
Adjusted R^2				0.462	0.390	0.486
F-Value				11.71 **	8.64 **	11.87 **

[a] The ratio of the number of common share held by the CEO to the total number of shares outstanding.
[b] The ratio of the market value of the firm to the replacement cost of assets.
[c] The salary and bonus as reported to the Securities and Exchanges Commissions.
[d] The book value of total assets.
[e] The total number of years as the CEO.
[f] The numbers in parentheses are t-values.
** Significant at the one percent level; * significant at the five percent level.

non-founder CEO firms) are presented in Table 5. Perhaps surprisingly, the results are qualitatively identical to those presented in Table 4. Thus, although mean CEO equity ownership levels are much lower when neither firm-founders nor their family members are employed in top management than otherwise, executive ownership and Tobin's q are significantly interrelated.

5. Summary and concluding remarks

This study has examined the process by which executive ownership and the market value of firms (proxied by Tobin's q) are interactively determined. Unlike previous efforts on this important subject, the present analysis is explicitly predicated on the notion that these variables are *jointly determined* through a process in which one affects the other. The results of the study, obtained via three-stage least-squares, strongly support the concepts of variable interaction and process simultaneity in the market determination of these variables. That is, although CEO equity ownership positively influences Tobin's q, the former is also determined in response to the latter. This finding implies that firms recognize that executive ownership is an important means by which executives may be induced or bonded to act in the best interests of the firm's outside shareholders.

Other findings of the study are that, as expected, the level of executive ownership is strongly related to the market value of equity, executive tenure, and firm-founding status, and that Tobin's q, firm size (the book value of total assets), and CEO job-specific experience are important determinants of executive compensation. The latter finding is consistent with the view that firm managerial compensation differs cross-sectionally as a result of differences in both operating environments and key demographic characteristics of their chief executives. While, generally, executive jobs are frequently regarded as largely unique due to the difficulties in separating the person from the job (and are thus often considered to be less amenable to the processes of systematic study than are lower-level positions), the present study identifies important CEO characteristics which are strongly correlated with executive compensation.

Unfortunately, due to limitations in the nature of our data set, the study is unable to address several important issues deserving of further investigation. For example, by focussing on very large and (on average) older firms, the likely important role played by intangible assets (and thus, firm value) in the establishment of executive ownership levels (or vice versa) in younger and faster-growing firms has not been adequately addressed. Finally, a complete analysis of the impact of executive ownership stakes on firm value would incorporate other considerations such as the role of large shareholders (see, e.g., Shleifer and Vishny, 1986; Holderness and Sheehan, 1988) and the role of boards of directors (see, e.g., Weisbach, 1988).

Acknowledgements

Both authors gratefully acknowledge partial grants from The University of Memphis Fogelman College Faculty Research Program. This support does not necessarily imply endorsement of research conclusions by The University or College. The authors are grateful to two anonymous referees, as well as Stephen

Ferris, Anup Agrawal, Michael Gootzeit, and participants at the 1993 American Finance Association meeting (Anaheim) and the 1992 Financial Management Association meeting (San Francisco) for helpful comments. The usual disclaimer applies.

References

Arrow, K.J., 1973, Higher education as a filter, Journal of Public Economics 2, 193–216.

Baker, G.P., M.C. Jensen and K.J. Murphy, 1988, Compensation and incentives: Practice vs. theory, Journal of Finance 43, 593–616.

Baumol, W.J., 1990, Entrepreneurship: productive, unproductive, and destructive, Journal of Political Economy 98, 893–921.

Becker, G.S., 1964, Human capital (National Bureau of Economic Research, New York).

Box, G.E.P. and D.R. Cox, 1964, An analysis of transformation, Journal of the Royal Statistical Society 26, 211–243.

Brickley, J.A. and F.H. Dark, 1987, The choice of organizational form: The case of franchising, Journal of Financial Economics 18, 401–420.

Calvo, G.A. and S. Wellisz, 1979, Hierarchy, ability, and income distribution, Journal of Political Economy 87, 991–1010.

Ciscel, D.H. and T.M. Carroll, 1980, The determinants of executive salaries: An econometric survey, Review of Economics and Statistics 62, 7–13.

Demsetz, H., 1983, The structure of ownership and the theory of the firm, Journal of Law and Economics 26, 375–390.

Demsetz, H. and K. Lehn, 1985, The structure of corporate ownership: Causes and consequences, Journal of Political Economy 93, 1155–1177.

Eaton, J. and H.S. Rosen, 1983, Agency, delayed compensation, and the structure of executive remuneration, Journal of Finance 38, 1489–1505.

Fama, E.F., 1980, Agency problems and the theory of the firm, Journal of Political Economy 88, 288–307.

Fama, E.F. and M.C. Jensen, 1983, Separation of ownership and control, Journal of Law and Economics 26, 301–325.

Greene, W.H., 1993, Econometric analysis (Macmillan Publishing Company, New York).

Hall, B.H., 1990, The manufacturing sector master file documentation: 1959–1987, Mimeo, National Bureau of Economic Research, Stanford, CA.

Hart, O.D., 1983, The market mechanism as an incentive scheme, Bell Journal of Economics 14, 366–382.

Holderness, C.G. and D.P. Sheehan, 1988, The role of majority shareholders in publicly held corporations, Journal of Financial Economics 20, 317–346.

Holmes, T.J. and J.A. Schmitz, 1988a, How economies pursue opportunities: The role of specialization in entrepreneurial and managerial tasks, Working paper, University of Wisconsin.

Holmes, T.J. and J.A. Schmitz, 1988b, A theory of entrepreneurship and its application to the study of business transfers, Working paper, University of Wisconsin.

Jensen, M.C. and W.H. Meckling, 1976, Theory of the firm: Managerial behavior, agency costs and ownership structure, Journal of Financial Economics 3, 305–360.

Jensen, M.C. and R.S. Ruback, 1983, The market for corporate control: The scientific evidence, Journal of Financial Economics 11, 5–50.

Johnson, W.B., R.P. Magee, N.J. Nagarajan and H.A. Newman, 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.

Judge, G.G., R.C. Hill, W.E. Griffiths, H. Lütkepohl and Tsoung-Chao Lee, 1982, Introduction to the theory and practice of econometrics (John Wiley and Sons, New York).

Keim, D.B., 1986, The CAPM and equity return regularities, Financial Analysts Journal 42, 19–34.

Kester, W.C., 1986, An options approach to corporate finance, in: E.I. Altman, ed., Handbook of corporate finance (John Wiley and Sons, New York).

Knight, F.H., 1921, Risk, uncertainty and profit (Harper and Row, New York).

Lewellen, W.G. and B. Huntsman, 1970, Managerial pay and corporate performance, American Economic Review 60, 710–720.

McConnell, J.J. and H. Servaes, 1990, Additional evidence on equity ownership and corporate value, Journal of Financial Economics 27, 595–612.

Morck, R., A. Shleifer and R.W. Vishny, 1988, Management ownership and market valuation: An empirical analysis, Journal of Financial Economics 20, 293–315.

Murdoch, J., 1991, The systematic variation in incentive contracts: Identifying and explaining the pattern, Manuscript, Charles River Associates.

Murphy, K.J., 1985, Corporate performance and managerial remuneration: An empirical analysis, Journal of Accounting and Economics 7, 11–42.

Murphy, K.M., A. Shleifer and R.W. Vishny, 1991, The allocation of talent: Implication for growth, Quarterly Journal of Economics 106, 503–530.

Pindyck, R.S., 1988, Irreversible investment, capacity choice, and the value of the firm, American Economic Review 78, 969–985.

Rosen, S., 1982, Authority, control, and the distribution of earnings, Bell Journal of Economics 13, 311–323.

Shleifer, A. and R.W. Vishny, 1986, Large shareholders and corporate control, Journal of Political Economy 94, 461–488.

Stiglitz, J.E., 1975, The theory of 'screening', education, and the distribution of income, American Economic Review 65, 283–300.

Taubman, P.J. and T.J. Wales, 1973, Higher education, mental ability, and screening, Journal of Political Economy 81, 28–55.

Weisbach, M.S., 1988, Outside directors and CEO turnover, Journal of Financial Economics 20, 431–460.

Wolpin, K.I., 1977, Education and screening, American Economic Review 67, 949–958.