

Efficient Labor and Capital Markets: Evidence from CEO Appointments

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An examination of 268 CEO appointments in US firms indicates that, on average, appointment of a better-quality CEO (a CEO who receives a pay premium ex-ante) is accompanied by an immediate positive revaluation of stock prices, and is followed by an improvement in firm performance. This evidence supports the notion of jointly efficient and integrated labor and capital markets. The findings are particularly strong in non-regulated industries. The managerial labor market appears somewhat less efficient in internal successions, and the stock market appears less efficient or only relatively weakly integrated with the labor market in small firm appointments.

This study examines the hypothesis that the managerial labor market and the capital market are jointly efficient and integrated with respect to Chief Executive Officer appointments. In an efficient labor market, the firm hires a new CEO from a slate of internal and external candidates, and offers a compensation contract commensurate with the person’s quality and potential contribution to firm value. Further, if labor and capital markets are linked and jointly efficient, the stock market would respond positively to appointments of new CEOs who receive a pay premium in the labor market, indicating they are of better quality.

Finding evidence of joint efficiency is a non-trivial task. First, there are doubts about the rationality or efficiency of the managerial labor market. This is because CEO compensation appears high and unconstrained. CEOs typically earn twice the pay of their immediate subordinates (for example, see Ang, Lauterbach, and Schreiber, 2002), and over 200 times the pay of a production worker (Murphy, 1999). Hall and Liebman (1998) report that annual increases in CEO pay over 1982-1994 were more than ten times the average increase of all workers. Jensen and Murphy (1990) observe the low sensitivity of CEO pay to firm performance. Many have wondered whether CEO pay is consistent with CEO ability and marginal product.

Second, it is not clear how the stock market responds to a CEO appointment. Many doubt the thesis that CEOs have a significant impact on the value of the firm. Early studies based mainly on sports teams’ performance suggest that new CEOs fail to improve performance; that is, they are not more successful than their predecessors. This is the basis of the “vicious circle” (Grusky, 1963) and “ritual scapegoating” (Gamson and Scotch, 1964) views on managerial successions. Liberson and O’Connor (1972) present evidence that managerial input has very little effect on a firm’s sales and profits.

Consistent with this view, the stock market response to CEO appointments is small and statistically insignificant on average—see Reinganum (1985) and Warner, Watts, and Wruck (1988). A CEO change appears mostly an insignificant event with little value impact. Only a few studies find significant appointment effects in specific clear-cut replacement of inferior managers.

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Denis and Denis (1995), for example, report significant performance improvements following forced resignations of CEOs.

The premise and empirical design of our study are as follows. First, we define efficiency in the managerial labor market as consisting of two related elements: a) rational pay—CEOs with superior quality who can contribute more to the hiring firm's wealth demand and receive a pay premium from the firm in their appointment contract; and b) rational expectations—superior-quality CEOs who receive a pay premium *ex-ante* will deliver, on average, better future performance.

Second, we assume that investors acquire some labor market information, and, given this information, react to a new CEO appointment rationally (capital market efficiency). Consequently, the following two relations should also hold: c) higher perceived quality CEOs should elicit more positive stock price responses on the appointment announcement date; and d) the announcement stock price response should be a predictor of changes in the hiring firm's future performance.

There can be only joint tests of these predicted relations. The two specific testable propositions are: 1) the stock price response to the announcement of a new CEO appointment is positively correlated with the labor market pay premium of the new CEO, a combination of relations a) and c); and 2) share price response and labor market pay premium should be positively correlated with the improvement in future firm performance, a combination of b) and d).

We construct an estimate of the pay premium of new CEOs compared to their peers, and use it as an indicator of the *ex-ante* perceived quality of the CEO. We find a positive and significant relationship between this excess pay estimate (or quality indicator) and the stock market response to the appointment announcement, verifying proposition 1). Next, we demonstrate that the *ex-ante* excess pay estimate is positively correlated with future firm (accounting) performance, consistent with proposition 2). While there are some variations in the strength of the results depending on small and large firms, regulated and non-regulated industries, and external versus internal appointees, our evidence, in general, provides support for the hypothesis that the managerial labor market and the capital markets are jointly efficient.

Our study can also be viewed as testing the effects of CEO quality and pay on firm value and performance. From this perspective, our findings support recent evidence that CEO quality is rewarded by a pay premium (see Palia, 2000 and Fee and Hadlock, 2002) and that better CEO quality and higher pay result in improvements in firm performance (see Hayes and Schaefer, 2000). See also Chevalier and Ellison (1999), who find that fund managers who attended better undergraduate institutions achieve higher risk-adjusted excess return.

In Section I, we review the structure of the CEO labor market, and develop the hypotheses and testable propositions. Section II describes the data and methodology. Section III presents the empirical results, and Section IV concludes.

I. Background and Research Hypotheses

This section reviews the literature on the labor market for managers, and its relationship to the capital market. Testable hypotheses on the extent the two markets are integrated and some of their determinants are developed.

A. The CEO Labor Market and the Efficiency Hypothesis

The labor market for top executives is unique in several ways. First, the market is dispersed. There is no central marketplace or a commonly available source of key labor market information that would detail CEO asking prices, CEO characteristics, and other quality and experience indicators. Instead, the market consists of a large number of independent and competing

executive search firms (ESFs). Khurana (2002) describes ESFs as a “marriage broker”—a non-partisan intermediary seeking to create a union of two parties. According to Khurana’s evidence, both firms and CEO candidates are often aware of each other, but their relationship is best coordinated, mediated, and legitimated by the executive search firm.

ESFs invest in proprietary information on potential candidates, collecting data such as résumés, personal interviews, references, and ability and specialty indicators. Acquisition of these data by other firms looking for a CEO is costly. Recruiting firms often receive a fraction of the hired executive’s first-year pay, and in recent years some equity-linked pay (depending on hiring firm stock performance under the new CEO’s reign). In negotiations between company and prospective CEO, the ESFs are neither sellers nor buyers, but rather mediators, and CEOs often hire as their representative an executive compensation lawyer.

The many players in the executive market—the large recruiting firms with reputation concerns, and expert compensation lawyers—could make this market informationally efficient, as well as price-efficient for the buyers (the company board) and sellers (prospective CEOs). Compared to the capital markets, however, which have many low-cost venues for trading and disseminating information, these labor markets could be less efficient.

There are some clear impediments in the potential efficiency of the CEO labor market. First, it is segmented; there are many ESFs and limited information sharing. Unlike capital markets, there is no central marketplace or electronic order book.

Second, information concerning CEO quality is relatively noisy. The performance of the previous employer is also the result of the efforts and decisions of other executives and employees, to market conditions, and to pure luck. Quality inference is particularly difficult for CEO candidates who were lower-rank executives before.

Third, transaction costs in the CEO labor market are relatively high. The signing bonus to hire new CEOs, the severance package to release an underperforming CEO, as well as the typical reluctance of boards of directors to lay off CEOs, raise firms’ costs of hiring and firing (or trading in) CEOs. Finally, from the CEO’s own perspective, an underpriced CEO would have to incur significant search costs for a job that pays a “fair” price. Likewise, overpriced CEOs cannot sell themselves short. The strong form of CEO labor market efficiency, in which all CEOs are paid the unbiased value of their marginal product, thus appears unattainable.

In this study, efficiency means that CEO’s pay and compensation package are determined rationally, based on available information on CEO quality and potential contribution to the firm. Recall that we choose to focus on CEO appointments, when the CEO labor market is the most active, and efforts to collect and process information are extensive as well as intensive. Thus, our proposition that the new CEO’s pay is determined rationally, given available information, appears reasonable. In fact, we define an efficient CEO market as a market in which the new CEO receives compensation that is positively associated with relative quality and potential contribution to firm performance.

We also entertain the possibility that labor and capital markets are somewhat integrated. That is, stock market analysts and sophisticated investors may be willing to acquire from labor markets some relevant information about the new CEO quality and pay contract, and react rationally to it. Thus, our basic hypothesis is:

Hypothesis 1: The CEO labor market and the stock market are jointly efficient and integrated.

According to this hypothesis, new CEOs receive fair and rational compensation contracts, and the capital market collects information about and reacts rationally to the incremental perceived quality of the new CEO.

There are two issues with respect to robustness of the efficiency proposition (Hypothesis 1). First, is there a size effect? Are the stock and the labor markets efficient for small and large firms alike? Second, are these markets also efficient in cases of internal appointments of new CEOs, when the external labor market is often bypassed?

1. Firm Size and the Efficiency Hypothesis

The managerial labor market may be less efficient in the placement of executives at small firms. The lower pay of executives in small firms translates into less compensation to the ESFs per search assignment. There are many more potential candidates for smaller firms, and the candidates are less known, with shorter track records. Thus, collecting and maintaining information on candidates for small firms is also more costly.

The result is that many ESFs find it unprofitable to operate in this segment of the labor market, and the ESFs that do conduct searches only partially and imperfectly. In addition, some small firms that avoid ESPs to save the expense may conduct rather limited and relatively inefficient CEO searches. Hence, the margins of error in the labor market for small-firm executives are expected to be higher.

Uncertainty and the limited information about small-firm CEO candidates could influence stock market response to appointment announcements. It could also be the case that acquiring information about small-firm new CEOs is not economical for capital market participants. Hence, the managerial labor market and the stock market may be less congruent and efficient with respect to CEO appointments in small firms.

Mitigating this possible market inefficiency is the tendency of some ESFs and stock analysts to specialize in smaller or more local firms. Other ESFs and stock analysts specialize in industries, and find it possible to cover all companies in an industry (large and small). Thus, the dependence of efficiency on firm size is an empirical issue.

To examine this, we extend the null hypothesis, and propose:

Hypothesis 1a: The CEO labor market and the stock market are jointly efficient and integrated for small and large firms alike.

2. Internal Appointments and the Efficiency Hypothesis

Most firms appoint their new CEOs from inside the company. This practice provides continuity and promotes employee loyalty. External appointments are usually “change agents” brought in to revitalize a firm, or outstanding CEO talents who are unexpectedly made available to the firm. If the external labor market is efficient, will the market for internal hires, out of sight of the external market, be as efficient?

There are reasons to believe that external and internal CEO candidates participate in an integrated labor market, so both internal and external markets are efficient. Potential inside candidates have the option to promote their availability in the external labor market. They stay with a firm because they expect to receive no less than what they can receive elsewhere. In addition, board compensation committees, with the advice from outside compensation consultants, are typically familiar with the pay scale for industry executives, and can set the new inside CEO pay at a level comparable to CEOs in similar firms. Hence, inside appointees are likely to be compensated competitively.

Yet, there are also reasons why insider and outsider CEO markets may be segregated. Some internal candidates may view appointment as CEO a major achievement in and of itself because of its high non-financial value (prestige or achievement of a career goal). Thus, internal candidates may accept less than market pay. Internal successors are also in a weaker

bargaining position than external candidates because they are already captives of the firm and face a high opportunity cost of moving.¹ Finally, some internal appointees are risk averse or may succumb to inertia or family ties, thus avoiding outside exploration of job opportunities.

While these factors may reduce insider candidate compensation relative to outsiders, it is still likely that, controlling for the source of the new CEO, better-quality CEOs would receive higher pay, which is the essence of the labor market efficiency proposition.

Another problem relates to capital markets response to internal appointments. If the labor markets were less efficient with respect to internal appointments, the stock market response to the pay premium of new internal CEOs would be muted. Further, if capital markets face difficulties in obtaining reliable information on internal candidates, the market response to these appointments can be less clear-cut and subject to more error.

A corollary of our null hypothesis is:

Hypothesis 1b: The CEO labor market and the stock market are jointly efficient and integrated for internal and external appointees alike.

B. Testable Implications

In a well-functioning managerial labor market, we propose that better-quality managers will receive higher compensation and be expected to (and will) contribute more value to their firms. Since the economic surplus generated by a superior manager is most probably split between the CEO and the firm, neither the new CEO nor the firm extracts the entire value-added. We assume that a more able CEO receives higher pay, but less than the total product of the CEO's incremental ability; some of the quality-related marginal product goes to the firm. Thus, the more competent is the new CEO, the higher is the net value-added to the firm. In an efficient labor market, higher CEO skills should be associated with higher CEO pay and with greater contributions to firm value.

If labor and capital markets are linked, the capital market should respond to the announcement of a new CEO appointment in the direction of the perceived quality of the new CEO. If the new CEO is perceived to have superior managerial skills, the stock price response to the appointment would be positive because of the greater than normal prospective value gains to the firm.

Combining the notions of efficient labor and capital markets suggests that superior-quality new CEOs receive a pay premium in the labor market, we have:

Proposition 1: The capital markets respond positively (negatively) to appointments of new CEOs with higher-than (lower-than) normal pay.

A unique property of the proposition is that at the time of the announcement of new executive appointments, capital markets' reactions have to rely on investors' own research on executives' quality. They could not rely on the details of the actual pay package, which is not yet announced. Thus, above is a rather demanding test of capital market efficiency since market response is formulated as a function of an unobserved variable that would only be available later.

In efficient and rational markets, a superior-quality new CEO who receives a pay premium should also be able to deliver previously unexpected improvements in a firm's accounting measures

¹Executives who leave a company often forfeit some options and stock grants received in previous years.

of performance (operating performance). Thus, if rational expectations prevail, we can advance:

Proposition 2: The pay premium of the new CEO and the appointment response of the stock are positively related to the firm's unexpected future accounting performance.²

C. The Quality Perspective

Propositions 1 and 2 can also be viewed as tests of the relationship of CEO quality (approximated by the CEO pay premium) to firm value (Proposition 1) and to future performance (Proposition 2). These tests are interesting, given the ongoing debate as to whether CEOs have a significant impact on their firm's future. If Propositions 1 and 2 are supported, our evidence will uphold the thesis that better-quality CEOs contribute significantly to firm value.

Our measure of quality—the labor market determined CEO pay premium—is a little unusual, although other authors have suggested the relation between CEO quality and pay. Palia (2000), for example, reports that CEOs who graduate from more prestigious institutions are more likely to be slotted into non-regulated industries, where they receive a pay premium. Fee and Hadlock (2002) show that new CEOs moving from firms that have demonstrated excellent performance receive a pay premium, presumably because they are perceived to be better managers. Hayes and Schaefer (2000) find a positive correlation between CEO pay and changes in future firm performance. This research suggests to us that CEO quality is reflected in CEO pay, so CEO pay premium may serve as a quality indicator.

Pay premium may represent more than CEO's quality. In labor economics, and even in the management literature, pay premiums are directly related to inducing greater managerial efforts. Carpenter (2000), for example, argues that CEOs must be offered a pay premium in order to encourage implementation of strategic changes in their firms. According to this view, firms that need more intensive managerial input offer a pay premium to their CEOs, who consequently exert more effort, improve firm performance, and enhance firm value. In this framework, the pay premium is pay for activism.

CEO's invested effort is also a component of managerial quality, that is, pay premium proxies not only for the manager's skills but also for the manager's expected willingness to expend effort and energy in the firm. The CEO's pay premium may thus nicely capture several facets of the abstract CEO quality construct.

Our main contribution to the literature on quality, pay, and performance is Proposition 1, which examines the stock revaluation upon the CEO appointment announcement. We test for the first time whether recruiting better perceived-quality CEOs leads to an immediate increase in firm value. Confirmation of Proposition 1 will show that CEO and firm split the surplus generated by CEO quality, and that both CEO and firm benefit from the CEO superior performance. Given that research into CEO quality, pay, and performance is relatively young, the evidence should help refine our understanding of the topic.

II. Data and Methodology

We describe the source and selection of data for the study. Research methodology is also presented, in which measures of perceived managers' quality by the labor and capital markets are developed.

²We focus on accounting performance because, by the efficient capital markets hypothesis, the initial price response captures all anticipated value gains to stockholders, and there should be no relation between the *ex-ante* pay premium of the new CEO and the *ex-post* future stock performance.

A. Sample Selection and Data

We use the Execucomp database to identify 499 CEO appointments in US companies traded on the New York Stock Exchange (NYSE), the American Stock Exchange (ASE), and the Nasdaq in the period 1991-1995. Two-hundred sixty-eight of these appointments qualified for our sample. Forty-six appointments are excluded because they involved either a major control change such as a merger or a trivial control change such as an intra-family father-to-son succession. Twenty appointments are omitted because we do not have complete stock price data from two years before to two years after the appointment (most of these are newly listed stocks). Twenty-three appointments are cut because the predecessor CEO (15 cases) or successor CEOs (eight cases) were lacking compensation data on Execucomp.³ Finally, 142 appointments are dropped because there were confounding announcements in the week before or the week after the appointment. Omitting appointments where there are confounding events is designed to reduce the noise in a stock's excess return on appointment announcement. Reinganum (1985) and Warner, Watts, and Wruck (1988) experienced difficulties in drawing conclusions on stock's response to CEO appointments. Thus, reducing the noise in appointment excess return appears important.

Firms included in the final sample have similar general characteristics as the omitted firms. For example, the average total assets of included (omitted) firms at the end of the year preceding the appointment is \$6.8 billion (\$8.7 billion); the average return on assets of included (omitted) firms in the year preceding the appointment is 7.9% (8.1%); and the average cumulative excess return of included (omitted) firms in the year preceding the appointment is -10.1% (-8.2%). The differences in these characteristics are statistically insignificant. Thus, our final sample appears representative of the initial raw sample.

Using Execucomp and the announcement reports in the *Wall Street Journal* and Lexis-Nexis, we classify each appointment according to: 1) origin of the CEO—internal (from inside the firm), or external (from outside)⁴; 2) duality—CEO receives only the CEO position, or is also appointed president or chairman; and 3) simultaneity—predecessor departure and successor appointment are announced on the same day, or not.

Data on the firm's market value of equity, return on assets (ROA), and return on equity (ROE) are collected from Compustat. Compustat data also serve to compute the average ROA and ROE of each two-digit SIC code industry group to form industry-adjusted individual firm ROA and ROE. Stock return data are from the Center for Research in Security Prices (CRSP).

CEO compensation data are from Execucomp. Our primary compensation measure is total compensation, which includes base salary, cash bonuses, long-term compensation, and the value of options granted during the year. It does not include changes in CEO wealth resulting from revaluation of the CEO's portfolio of firm stocks and options, or changes in CEO wealth due to changes in lifetime expected income—see Jensen and Murphy (1990). This compensation measure is best described as the direct total compensation paid by the company.

A second compensation-related variable we examine is the CEO's equity linked wealth (ELW, for short). A CEO's ownership of firm stocks and options is typically the major component of

³Most (11) of the 15 appointments with missing predecessor compensation data occurred in 1991-1993, when Execucomp had just begun collecting data. Thus, some of the missing data are attributable to Execucomp start-up problems, while the rest are cases where predecessor CEO lasted less than two years in office. The number of new CEOs missing information (lasting less than two years in office) is relatively small and about equal to the number of predecessor CEOs lasting less than two years in office. Thus, it is likely that exclusion of these 23 cases (motivated primarily by lack of data) has only minor effects on the results.

⁴New CEOs who joined a firm less than a year before the succession are classified as external. Outside board members who became CEOs are also classified as external.

CEO's gain or loss from firm performance. Thus, it is interesting to focus also on the CEO's ELW, which largely determines CEO's pay performance sensitivity. Recent studies highlight the CEO's pay performance sensitivity, showing that it depends on the firm's contracting environment (Demsetz and Lehn, 1985; Himmelberg, Hubbard, and Palia, 1999; and Palia, 2001) and on productivity shocks to the economy (Himmelberg and Hubbard, 2001).

We calculate CEO's ELW as the sum of the value of company stock and in-the-money options held by the CEO. Both these values are extracted from Execucomp, which reports the number of shares that the CEO owns, end-of-year share price, and the values of exercisable and non-exercisable in-the-money options held by the CEO. One problem in this ELW estimate is that it neglects the value of out-of-the-money options. A second (offsetting) problem is that CEOs with undiversified portfolios value their stock and option-based compensation at less than market value—see Meulbroek (2001).

Finally, a third (technical) problem is that for many companies the previous CEO ELW is missing. This problem is important because the way we estimate the excess compensation of the new CEO is also based on a comparison to the former CEO. We find data on the ELW of the former CEO for only 150 of our 268 firms, primarily because in the early 1990's firms did not report such data. Given these data problems we use ELW only as a supplement to our main pay variable (total compensation), mainly for robustness checks of our central results.

Another deficiency of our compensation measure is that it neglects the CEO's non-monetary income and private benefits (such as perquisites and social standing). We argue that the pay premium in total compensation is positively correlated with the excess non-monetary income and private benefits of the new CEO. This is because a new CEO earning a pay premium probably also receives more respect and greater perks; boards are more flexible with star CEOs. Thus, our total compensation pay premium may serve as a proxy for the excess private benefits and non-pecuniary income of a new CEO.

An important conclusion is that our total-compensation-based pay premium estimate has some measurement problems, and is only a noisy estimate of the new CEO's quality. The regressions thus suffer from an "error in the variable" problem, and may only assess the sign (and not the extent) of the relationship among CEO pay, stock value, and future firm performance.

B. Methodology and Pay Premium Measures

Our empirical work seeks to support inferences about two relationships: first, the relation between appointment announcement abnormal stock return and new CEO pay premium—a test of Proposition 1; second, the relation of the unexpected future accounting performance of the firm to the new CEO pay premium and to the appointment abnormal return—a test of Proposition 2.

The appointment abnormal return is estimated as a two-day (days -1 and 0) excess return (day 0 is the *Wall Street Journal* publication day). The computation of abnormal returns uses the market model with an equally weighted index of NYSE, ASE, and Nasdaq stocks, and a parameter estimation period from 300 days before to 46 days before the appointment. This methodology is fairly standard.

The future operating performance is represented by two measures: ROA—operating income (after depreciation) divided by total assets, and ROE—net income divided by book equity. The ROA and ROE of each firm in each year are further industry-adjusted by dividing them by the corresponding average ROA and ROE of the firm's (two-digit SIC code) industry group. To estimate unexpected performance, we regress accounting performance in year $+2$ (year 2 after the appointment) on year -1 and -2 (pre-succession) accounting performance. The residual of this regression is our estimate of the abnormal accounting performance.

By focusing on year +2 abnormal performance, we admittedly take a rather short-term view of performance improvements. Performance improvements in the longer run are more difficult to measure, and any inference about the relation of longer-term performance to appointment pay premium would require follow-up data on the CEOs.⁵ For these reasons we adopt the shorter-term perspective.

A more involved issue is estimation of the portion of CEO pay that can be attributed to differential quality. First, we estimate the normal pay of a new CEO. Then, we deduct the normal pay from the actual pay to obtain our estimate of the quality pay premium. We estimate the normal pay for an average-quality CEO using the cross-sectional regression model:

$$\text{Ln(New_tc)} = a_0 + a_1 \text{Ln(Old_tc)} + a_2 \text{Int} + a_3 \text{Ln(MV)} + a_4 \text{Dual} + a_5 \text{Ln(Lev)} + \varepsilon_1 \quad (1)$$

where New_tc is the new CEO total compensation; Old_tc is the former CEO total compensation; Int is a dummy variable for internal/external succession; MV is the market value of firm stock; Dual is a dummy variable for duality (when CEO is also chairman or president); Lev is the firm's leverage measured as the book value of debt divided by the market value of equity; and ε_1 (the residual) is our pay premium estimate.

Some explanations on the choice of explanatory variables are in order. First, CEO pay is well known to increase with firm size; see Murphy (1999), who also stratifies the data by industry, highlighting the lower pay and pay for size elasticity of utilities. In Murphy (1999), the financial services sector also appears different, with relatively low pay for size elasticity (especially in the beginning of the 1990s, our sample period). These results suggest that regulation limits the scope of a new CEO's discretion and potential impact. We suspect that the greater regulation of utilities and financial services would dampen their reaction of such firms to new CEO appointments. Hence, we also estimate Equation (1) excluding utilities and financial services firms.

Leverage is included in the pay equation because evidence such as in Berger, Ofek, and Yermack (1997) shows that CEOs in higher-leverage firms receive more generous compensation contracts. This result is not obvious, because higher leverage may reduce agency costs and also reduce the need for incentive pay; that is, total CEO compensation should decline with leverage. CEOs, on the other hand, may demand and receive higher pay for positions in high-leverage firms in that an impatient lender may suddenly terminate their careers. Fluck (2002) claims that higher CEO compensation in more leveraged firms is part of an optimal pay contract and financing design by the entrepreneur.

Our pay equation also includes appointee characteristics as explanatory variables. We have suggested that external appointees may receive higher pay. Second, when a new CEO is also president or chairman, the CEO's scope of discretion and pay are likely to be relatively high. Finally, predecessor pay, Ln (Old_tc), is added to Equation (1) as a parsimonious instrumental variable for omitted variables and firm-specific characteristics that should be reflected in new CEO pay.

We also use an alternative pay premium estimate that is a refinement of the pay premium estimate extracted from Equation (1). Our propositions focus on the pay premium of the new CEO at the time of the appointment, but we do not have data on the *ex-ante* signed compensation contracts of new CEOs. Execucomp details only the actual *ex-post* pay of the CEO in years +1 and +2. This *ex-post* pay includes also *ex-post* adjustments unknown at the time of the appointment. Most of these adjustments are pay for performance items. Core,

⁵Relevant questions would be: 1) did the CEO stay with the firm? and 2) how did CEO pay revisions after the appointment year influence the longer-term firm performance?

Guay, and Verrecchia (2000) present evidence that for most CEOs, performance pay depends on stock returns only. Thus, we need to filter out ex-post pay adjustments due to ex-post stock performance.

The firm's pre-appointment performance may also affect the new CEO pay. New CEOs are likely to ask for higher pay in poorly performing firms because they must exert more effort and risk more of their reputation when taking the leadership position in such a firm. Higher pay may also serve the poorly performing firms' interests. McConaughy and Mishra (1996) find that increasing the pay-performance sensitivity (i.e., increasing incentive pay) is particularly beneficial in the case of poor-performing firms. Thus, the new CEO pay is probably negatively correlated with past firm performance (all other things equal).

Taking into account pre- and post-performance dictates a pay regression as follows:

$$\begin{aligned} \text{Ln(New_tc)} = & a_0 + a_1 \text{Ln(Old_tc)} + a_2 \text{Int} + a_3 \text{Ln(MV)} + a_4 \text{Dual} + a_5 \text{Ln(Lev)} \\ & + a_6 \text{CARA} + a_7 \text{CARB} + \varepsilon_2 \end{aligned} \quad (2)$$

where the new variables CARA (and CARB) are measures of the abnormal stock price performance in the years after (before) the appointment.

The role of CARA in Equation (2) deserves further discussion. By the efficient capital markets hypothesis, CARA cannot be anticipated at the time of the new CEO appointment. Thus, any ex-post pay related to CARA is an ex-post added compensation, which is not part of the *ex-ante* pay. The residual in Equation (2), ε_2 , is a pay premium estimate that is orthogonal to ex-post stock performance. Hence, ε_2 may be a relatively clean estimate of the *ex-ante* contractual pay premium to the new CEO.

The residual ε_2 does not necessarily dominate the previous estimate ε_1 . If we live in a world with asymmetric information, where firms have better information than the capital markets about the quality of a new CEO, firms may elect to reward the new CEO *ex-ante* (on appointment) for future expected abnormal returns—see Hayes and Schaefer (2000). Thus, part of the relation between ex-post pay and ex-post performance could be due to a relationship between *ex-ante* pay premium and ex-post performance. Filtering out the full effect of ex-post performance, as in ε_2 , may overcorrect, while disregarding CEO pay adjustments to unexpected ex-post stock returns, as in ε_1 , probably results in a bias in the opposite direction. In our empirical work we use both ε_1 and ε_2 .

Several other variables could be added to the new CEO pay models in Equations (1) and (2), particularly new CEO education, age, and past experience—see Palia (2001). We do not include these variables because they are probably correlated with CEO quality. Our approach uses only objective non-quality-related variables as explanatory variables, so that the residuals ε_1 and ε_2 may capture as much of the quality pay as possible.

III. Empirical Results

Empirical results to test the hypotheses developed in the previous section are presented below. The analyses provide empirical verification of whether capital market are informed about managers' quality, that is consistent with the labor market's evaluation. We relate managers' pay premium to capital market response at announcement, as well as with subsequent accounting performance. Types of managerial appointments are differentiated with respect to size, and CEO origin in the regression analyses.

A. Sample Description

Table I presents the mean, median, standard deviation, minimum and maximum values for the variables in the study. About 70% of the appointments are internal. In almost 90% of the sample, the announcements of former CEO departure and new CEO appointment are simultaneous, and in

Table I. Descriptive Statistics for the Sample of CEO Appointments 1991-1995

The sample is based on Execucomp data, and excludes firms with confounding events in the trading interval (–5 days, 5 days) relative to the appointment announcement.

	No. of Observations	Mean	Median	Standard Dev.	Min.	Max.
Market value of firm's stock (in millions of dollars) ^a	268	2219	793	3861	8.4	32352
Origin of New CEO (0 – external; 1– internal) ^b	268	0.69	1	0.46	0	1
Duality (0–CEO receives one top position; 1–more than one) ^b	268	0.93	1	0.25	0	1
Simultaneous announcement on (former CEO) departure and (new CEO) appointment (0–no; 1–yes) ^b	268	0.88	1	0.32	0	1
Announcement (days –1 and 0) excess return ^c	268	0.0071	0.0043	0.050	–0.162	0.313
Pre-appointment performance (months –36 to –1 logarithmic cumulative excess return) ^c	225	–0.200	–0.306	0.96	–2.71	9.56
Post-appointment performance (months 1 to 36 logarithmic cumulative excess return) ^c	225	–0.214	–0.279	0.75	–2.11	3.84
Average base salary of former CEO in Years –2 and –1 (in thousands of dollars) ^d	268	527	454	312	38	2882
Average total compensation of former CEO in Years –2 and –1 (in thousands of dollars) ^d	268	1320	916	1252	110	7468
Average base salary of new CEO in Years 1 and 2 (in thousands of dollars) ^d	268	498	483	215	73	1500
Average total compensation of new CEO in Years 1 and 2 (in thousands of dollars) ^d	268	1954	1401	1925	115	16555
Average equity-linked wealth of former CEO in Year –1 (in thousands of dollars) ^e	150	11074	3439	24474	0	154271
Average equity-linked wealth of former CEO in Year 1 (in thousands of dollars) ^e	244	6480	2272	19452	0	206713

^aCalculated at the end of the year preceding the appointment using Compustat data.
^bCoded according to the announcement report in the *Wall Street Journal* and Lexis-Nexis.
^cCalculated according to CRSP data. Announcement abnormal returns are calculated using the market model. Pre- and post-appointment stock performances are computed using size adjustment only.
^dCollected from the Execucomp data base.
^eEquity-linked wealth is the value of shares and in-the-money company options held by the CEO (calculated from Execucomp data).

over 90% the new CEO is appointed to more than one top position (is also chairman or president).

The average base salary of the new CEO is similar to that of the former CEO (about \$0.5 million). The average total compensation of the new CEO, however, at about \$2 million is approximately 50% higher than that of the former CEO. The t-statistic of the difference in total compensation is 4.5. Hence, new CEOs receive on average higher performance-contingent pay (bonus, options, and long-term compensation) than their predecessors.

The higher option compensation of new CEOs may be due in part to the general trend in the 1990s to strengthen the pay-performance relationship via option distributions; see Hall and Liebman (1998). A more fundamental explanation is that new CEOs need some quick injection of incentives to make their compensation more sensitive to performance. This explanation is consistent with the evidence in Table I about CEOs' equity-linked wealth (ELW). The average value of equity held by the former CEO at the end of the year before the appointment is about \$11 million (the median is \$3.4 million). Compare this to the average value of equity held by the new CEO at the end of the year after the appointment of about \$6.5 million (median is \$2.3 million). The difference in average ELW is statistically significant (t-statistic of 2.0). Thus, the higher option compensation and performance-contingent compensation of new CEOs is probably intended to increase the new CEO's exposure to the firm's equity performance.⁶

Not surprisingly, the pre-appointment performance of these firms replacing CEOs is poor, as is evidenced by months -36 to -1 average cumulative abnormal return (CAR) of minus 20% that is significantly lower than zero (t-statistic = -3.1). To obtain this CAR figure, in each month we estimate the excess return of each stock *i* as stock *i*'s return minus the return on an equally weighted portfolio of stocks in the same size decile. Then, excess returns are cumulated over time, and averaged across the stocks in the sample. By an identical methodology, the average post-appointment CAR in months +1 to +36 is a dismal -21.4%, statistically significantly negative (t-statistic = -4.2), but insignificantly different from the mean pre-appointment CAR of -20%. It appears that CEO changes on average do not guarantee to solve the fundamental problems plaguing the firm.

Given the pre- and post-appointment performance evidence, it may not be surprising to find that the announcement (day -1 and 0) average abnormal return is small, 0.71% only. The small positive abnormal return appears in other studies as well (see Warner, Watts, and Wruck (1988), for example). This small positive announcement abnormal return is statistically significant (t-statistic of 2.3; p-value of 0.02).

Table II compares the mean statistics across cross-sections of the data. Panel A compares internal and external appointments. External appointees appear to be more common among small firms (where there may be little depth in managerial talent), and among firms with poor prior performance (where drastic changes are called for). This has been observed by others; see the reviews by Kesner and Sebora (1994) and Murphy (1999).

The average pay of new CEOs is similar for external and internal appointees, but the average total compensation increase of external candidates is statistically significantly higher than that of internal ones. Since almost all of the total compensation increase of new CEOs is paid in the form of options and other long-term compensation, it becomes apparent that new external CEOs are granted more options than new internal CEOs. This is understandable, given that new internal CEOs have accumulated some stock and options during their previous service in the firm, while new external CEOs typically do not have such holdings.

The average announcement abnormal return upon external appointments (1.1%) is about twice the size as upon internal appointments (0.53%). Similarly, the mean performance

⁶Higher option compensation also has attractive after-tax pay consequences, see Long (1992).

Table II. Some Basic Effects of Firm Size and New CEO Origin

The table compares the mean of various key variables over the external/internal succession and small/large firm categorizations. In Panel B, the sample is split in half. The market value cutoff between small and large firms is \$793 million.

<i>Panel A. Internal vs. External Successions</i>			
	Internal n = 186	External n = 82	t-statistic of Difference (p-value)
Mean market value of firm's stock (in millions of dollars)	2694	1142	4.2 (0.0001)
Mean duality (0—CEO receives one top position; 1— more than one)	0.94	0.93	0.3 (0.80)
Mean simultaneous announcement on (former CEO) departure and (new CEO) appointment (0—no; 1—yes)	0.92	0.79	2.7 (0.008)
Mean announcement (days -1 and 0) excess return	0.0053	0.0110	-0.9 (0.39)
Mean pre-appointment performance (months -36 to - 1 logarithmic cumulative excess return)	-0.10	-0.41	1.8 (0.07)
Mean post-appointment performance (months 1 to 36 logarithmic cumulative excess return)	-0.22	-0.19	-0.3 (0.79)
Mean performance improvement (three-year post-appointment minus three year pre- appointment cumulative excess returns)	-0.12	0.22	1.6 (0.12)
Mean average base salary of former CEO in years -2 and -1 (in thousands of dollars)	553	469	2.0 (0.04)
Mean average total compensation of former CEO in years -2 and -1 (in thousands of dollars)	1407	1123	1.7 (0.09)
Mean average base salary of new CEO in years 1 and 2 (in thousands of dollars)	514	461	1.9 (0.06)
Mean average total compensation of new CEO in years 1 and 2 (in thousands of dollars)	1874	2137	-0.9 (0.38)
Mean difference in average total compensation between new CEO and former CEO (in thousands of dollars)	467	1014	2.0 (0.05)

Table II. Some Basic Effects of Firm Size and New CEO Origin (Continued)

<i>Panel B. Small vs. Large Firms</i>			
	Small Firms n = 134	Large Firms n = 134	t-statistic of Difference (p-value)
Mean market value of firm's stock (in millions of dollars)	317	4121	-9.4 (0.0000)
Mean origin of New CEO (0 – external; 1 – internal)	0.59	0.80	-3.8 (0.0002)
Mean duality (0 – CEO receives one top position; 1 – more than one)	0.90	0.96	-2.0 (0.05)
Mean simultaneous announcement on (former CEO) departure and (new CEO) appointment (0 – no; 1 – yes)	0.88	0.89	-0.2 (0.85)
Mean announcement (days -1 and 0) excess return	0.0093	0.0049	0.7 (0.47)
Mean pre-appointment performance (months -36 to -1 logarithmic cumulative excess return)	-0.44	0.01	-3.6 (0.0003)
Mean post-appointment performance (months 1 to 36 logarithmic cumulative excess return)	-0.20	-0.23	0.3 (0.74)
Mean performance improvement (three-year post-appointment minus three year pre- appointment cumulative excess returns)	0.24	-0.24	2.8 (0.005)
Mean average base salary of former CEO in years -2 and -1 (in thousands of dollars)	370	685	-9.5 (0.0001)
Mean average total compensation of former CEO in years -2 and -1 (in thousands of dollars)	751	1889	-8.3 (0.0001)
Mean average base salary of new CEO in years 1 and 2 (in thousands of dollars)	373	621	-11.6 (0.0001)
Mean average total compensation of new CEO in years 1 and 2 (in thousands of dollars)	1163	2746	-7.4 (0.0001)
Mean difference in average total compensation between new CEO and former CEO (in thousands of dollars)	412	857	-2.1 (0.04)

improvement of the firm, defined as the three-year post-appointment cumulative abnormal return on the firm's stock minus the three-year pre-appointment cumulative abnormal return on the stock, is positive (yet statistically insignificant) for external successions and negative (and statistically insignificant) for internal successions. These findings may suggest that external appointments yield on average better results, perhaps because there are some suspect

internal appointments.⁷ The differences between internal and external appointments' abnormal returns and in mean performance improvements are, however, statistically insignificant, which precludes any definite conclusions at this point.

Panel B presents a comparison of small- versus large-firm appointments. Firms below the median market value (of \$793 million) are denoted small, and the rest are denoted large. In panel B, we observe an insignificantly higher announcement return in small firm appointments. The increase in new CEO total compensation over former CEO total compensation is statistically significantly higher in large firms. In percentage terms, though, the increase in new CEO total compensation is similar and insignificantly different across firm size (a 55% average increase in small firms, and a 45% average increase in large firms).

More interestingly, small firms show worse pre-appointment performance than large firms, yet their post-appointment performance is similar to that of large firms. Accordingly, our mean performance improvement measure is positive and statistically significant at the 5% level (t-statistic = 2.2) for small firms, and negative and almost statistically significant (t-statistic = -1.9) for large firms. The difference between large and small firms in mean performance improvement is statistically significant (t-of-difference of 2.8). It appears that appointments in small firms slow down the deterioration process, while large-firm appointments on average hurt the firms.

The worsening in large-firm performance after CEO appointments may be consistent with Himmelberg and Hubbard's (2001) contention that excellent CEOs who can lead large firms are scarce. If new high-quality CEOs are hard to find, then new CEOs in large firms may be worse than their predecessors on average. Hence, the decay in large-firm performance. Another plausible explanation is that the smart CEOs of large firms quit while they are ahead, and may pursue short-term maximizing policies in their last few years in office. Exiting as winners allows these outgoing CEOs to keep some power and positions on their boards.

In any case, the negative post-appointment performance of small and large firms does not cause us to reject our efficiency propositions. Our market efficiency hypothesis requires only that new CEOs be paid on the basis of their relative quality and that the stock market responds to this relative quality.

B. Stock Price Response to New CEO Pay Premium

Table III tests Proposition 1 of our efficient and congruent capital and labor markets hypothesis. It predicts a positive relationship between executive quality (pay premium) and stock market response. First, we estimate the pay premium of each new CEO using the models specified in Equations (1) and (2). The alternative model specifications both yield statistically significant relations:

$$\begin{aligned} \text{Ln(New_tc)} = & 4.16 + 0.40 \text{ Ln(Old_tc)} - 0.31 \text{ Int} + 0.22 \text{ Ln(MV)} + 0.33 \text{ Dual} \\ & (6.1) \quad (6.3) \qquad \qquad (-3.3) \qquad (6.2) \qquad (3.0) \\ & + 0.013 \text{ Ln(Lev)} + \varepsilon_1, \\ & (0.8) \end{aligned}$$

(3)

⁷For example, some of the internal successors are hand-picked by the former CEOs for reasons of loyalty and because of their willingness to support the ex-CEO in future positions as a consultant or member of the board. Familiarity with the board and internal networking may also elicit some internal successions. In all of these cases, CEO ability is not maximized.

Table III. Stock Price Response to the New CEO Pay Premium

First, the pay premium of the new CEO is estimated using:

Model 1: $\text{Ln(New_tc)} = 4.16 + 0.40 \text{ Ln(Old_tc)} - 0.31 \text{ Int} + 0.22 \text{ Ln(MV)} + 0.33 \text{ Dual}$
 $+ 0.013 \text{ Ln(Lev)} + \varepsilon_1,$

or

Model 2: $\text{Ln(New_tc)} = 3.79 + 0.38 \text{ Ln(Old_tc)} - 0.38 \text{ Int} + 0.25 \text{ Ln(MV)} + 0.30 \text{ Dual}$
 $- 0.010 \text{ Ln(Lev)} + 0.24 \text{ CARA} - 0.093 \text{ CARB} + \varepsilon_2,$

where New_tc is the average total compensation of the new CEO in years 1 and 2 (in \$), Old_tc is the average total compensation of the former CEO in years -2 and -1 (in \$), Int is a dummy variable for the origin of the new CEO (0-external, 1-internal), MV is the market value of the firm stocks at the end of the year preceding the appointment (in \$), Dual is a dummy variable for CEO duality (0 – no duality, 1 – CEO is also Chairman and/or President), Lev is firm’s leverage measured as book value of debt divided by market value of equity^a; CARA (CARB) is the cumulative abnormal return on the firm stock in months 1 through 36 after (before) the appointment announcement, and ε_1 and ε_2 are the pay premium estimates (residuals of the regressions) according to Model 1 and Model 2. Second, appointment-announcement abnormal returns are regressed on the pay premium estimate. The dependent variable is a two day (days – 1 and 0) abnormal return, and it is calculated using the market model with an equally-weighted index of NYSE, ASE and Nasdaq stocks and a parameter estimation period extending from 300 days to 46 days before the appointment announcement. The results of the regressions are reported below, with t-statistics corrected for heteroscedasticity using the White method. Third, the process is repeated, excluding utilities and financial services firms. The fitted pay models are:

Model 1: $\text{Ln(New_tc)} = 4.70 + 0.30 \text{ Ln(Old_tc)} - 0.25 \text{ Int} + 0.26 \text{ Ln(MV)} + 0.39 \text{ Dual}$
 $+ 0.046 \text{ Ln(Lev)} + \varepsilon_3,$

and

Model 2: $\text{Ln(New_tc)} = 4.33 + 0.31 \text{ Ln(Old_tc)} - 0.31 \text{ Int} + 0.27 \text{ Ln(MV)} + 0.31 \text{ Dual}$
 $+ 0.021 \text{ Ln(Lev)} + 0.20 \text{ CARA} - 0.073 \text{ CARB} + \varepsilon_4$

Panel A. Stock Price Response to Model 1 Pay Premium Estimates

	All Firms			Excluding Utilities and Financial Services		
	Number of Observations	Coefficient of Pay Premium (t-statistic)	Adjusted R ²	Number of Observations	Coefficient of Pay Premium (t-statistic)	Adjusted R ²
All Appointments	262	1.18 (1.9)	0.016	201	1.79 (2.1)	0.034
External Appointments	81	1.19 (1.3)	0.018	66	1.78 (1.9)	0.039
Internal Appointments	181	1.16 (1.3)	0.011	135	1.79 (1.4)	0.026
Small firm Appointments ^b	131	0.37 (0.3)	-0.006	103	1.10 (0.7)	0.001
Small Firms with External Appointments	55	0.50 (0.4)	-0.014	44	1.69 (1.1)	0.014

^aFor 13 firms with no debt Ln(Lev) is set equal to -8, which is close to the lowest Ln(Lev) observation in firms with debt in our sample.

^bThe cutoff market value (of stocks) between small and large firms is \$793 million. This cutoff value is the median market value of the firms in our sample at the end of the year preceding the appointment.

Table III. Stock Price Response to the New CEO Pay Premium (Continued)

<i>Panel A. Stock Price Response to Model 1 Pay Premium Estimates (Continued)</i>						
	All Firms			Excluding Utilities and Financial Services		
	Number of Observations	Coefficient of Pay Premium (t-statistic)	Adjusted R ²	Number of Observations	Coefficient of Pay Premium (t-statistic)	Adjusted R ²
Small Firms with Internal Appointments	79	0.29 (0.2)	-0.013	59	0.71 (0.3)	-0.014
Large Firm Appointments ^b	131	1.90 (3.2)	0.073	98	2.42 (3.5)	0.100
Large Firms with External Appointments	26	2.31 (2.7)	0.109	22	2.15 (2.2)	0.074
Large Firms with Internal Appointments	105	1.69 (2.1)	0.050	76	2.60 (2.7)	0.095
<i>Panel B. Stock Price Response to Model 2 Pay Premium Estimates</i>						
All Appointments	220	1.20 (1.9)	0.017	167	1.70 (2.0)	0.031
External Appointments	70	1.03 (1.1)	0.010	57	1.46 (1.4)	0.025
Internal Appointments	150	1.34 (1.6)	0.014	110	1.88 (1.6)	0.027
Small Firm Appointments ^b	105	0.86 (0.7)	-0.001	82	1.44 (0.9)	0.007
Small Firms with External Appointments	47	0.41 (0.3)	-0.018	37	1.18 (0.8)	-0.002
Small Firms with Internal Appointments	58	1.63 (0.8)	-0.001	45	1.89 (0.7)	-0.002
Large Firm Appointments ^b	115	1.50 (2.5)	0.039	85	1.92 (2.8)	0.061
Large Firms with External Appointments	23	2.21 (2.1)	0.057	20	2.11 (1.7)	0.040
Large Firms with Internal Appointments	92	1.15 (1.6)	0.018	65	1.81 (2.1)	0.046

$$\begin{aligned}
 \text{Ln(New_tc)} = & 3.79 + 0.38 \text{ Ln(Old_tc)} - 0.38 \text{ Int} + 0.25 \text{ Ln(MV)} + 0.30 \text{ Dual} \\
 & (5.3) \quad (5.9) \quad (-4.0) \quad (6.5) \quad (2.3) \\
 & - 0.010 \text{ Ln(Lev)} + 0.24 \text{ CARA} - 0.093 \text{ CARB} + \varepsilon_2 \\
 & (-0.4) \quad (4.2) \quad (-3.7)
 \end{aligned} \tag{4}$$

where t-statistics, adjusted for heteroscedasticity using White's method, are shown in parentheses.

We also estimate pay regressions substituting $\text{Ln}(\text{Total Assets})$ for the size proxy in place of $\text{Ln}(\text{MV})$. The coefficient of $\text{Ln}(\text{Total Assets})$ in these regressions is positive and highly statistically significant, but the adjusted R^2 s are lower than those of Models (3) and (4). Hence, $\text{Ln}(\text{MV})$ is our selected size variable.

In other attempts at improvement, we add dummy variables for appointment year to the regressions. Appointment year dummies may be necessary if there is a time trend, or when regulation and reporting procedures change. (In 1993, the middle of our sample period, the Security and Exchange Commission reformed the executive compensation reporting rules.) All the coefficients of the appointment year dummies are statistically insignificant, so these dummies are not included in our final pay models.

The adjusted R^2 of the fitted Model (3) is 0.45, and the adjusted R^2 of the fitted Model (4) is 0.49. These R^2 s are typical in research similar to ours. Tosi, Werner, Katz, and Gomez-Mejia (2000) report that firm size accounts for about 40% of the cross-sectional variance of total pay, while performance explains less than 5%. The difference between the fitted Models (3) and (4) is firm performance, and the adjusted R^2 increase achieved is only 4 percentage points.

We use the residuals of the fitted Regressions (3) and (4), i.e., the unexpected pay to new CEO, as our pay premium estimates. Panel A of Table III presents results of regressions of the announcement abnormal return on new CEO pay premium, with ε_1 as the pay premium estimate. The announcement abnormal return increases with the quality (pay premium) of the new CEO. The relation is statistically significant at the 10% level, and is particularly strong in large-firm appointments. Similar results are reported in Panel B, where ε_2 serves as the pay premium estimate. Proposition 1 appears generally consistent with the data.

Table III also presents results for a sub-sample that excludes utilities and financial services firms. These industries were relatively heavily regulated during our sample period, which might limit labor market operation and CEO impact in these firms. Hubbard and Palia (1995) show that CEO pay, pay-performance sensitivity, and turnover rate increase upon deregulation (see also Palia, 2000). Thus, it appears that regulation isolates a firm somewhat, and weakens any labor market relationships. We would expect the relationships to be more significant in the sample that excludes utilities and financial services firms. The distinction between regulated and non-regulated firms may also be motivated as a sensitivity test. Many researchers introduce such a demarcation because of the special characteristics of utilities and the unique nature of financial services firms.

In the subsample without utilities and financial services firms, the fitted pay equations are:

$$\begin{aligned}
 \text{Ln(New_tc)} = & 4.70 + 0.30 \text{ Ln(Old_tc)} - 0.25 \text{ Int} + 0.26 \text{ Ln(MV)} + 0.39 \text{ Dual} \\
 & (6.4) \quad (4.0) \quad (-2.5) \quad (6.8) \quad (3.7) \\
 & + 0.046 \text{ Ln(Lev)} + \varepsilon_3 \\
 & (2.1)
 \end{aligned} \tag{5}$$

$$\begin{aligned}
 \text{Ln(New_tc)} = & 4.33 + 0.31 \text{ Ln(Old_tc)} - 0.31 \text{ Int} + 0.27 \text{ Ln(MV)} + 0.31 \text{ Dual} \\
 & (5.7) \quad (3.9) \quad (-3.0) \quad (6.4) \quad (2.4) \\
 & + 0.021 \text{ Ln(Lev)} + 0.20 \text{ CARA} - 0.073 \text{ CARB} + \varepsilon_4 \\
 & (0.8) \quad (3.5) \quad (-2.4)
 \end{aligned} \tag{6}$$

The adjusted R^2 s of Regressions (5) and (6) are 0.49 and 0.50, respectively, slightly higher than the adjusted R^2 s in overall sample [Equations (3) and (4)].

As expected, in the sample without utilities and financial services firms, the relation between new CEO pay premium and appointment excess return becomes stronger and statistically significant at the 5% level—see Table III. Again, the relationship appears particularly strong and clearly statistically significant only in large-firm appointments.⁸

The fact that the relation between CEO quality (pay premium) and announcement abnormal return is strong only for new appointments in large firms can be interpreted in several ways. First, the managerial labor market may be less efficient for lesser known and lower paid CEOs (going to smaller firms). Second, the capital markets may be less efficient in the case of smaller firms which are less intensively followed by analysts. Third, labor and capital markets may be less integrated in the case of small firms, perhaps because it is less cost-effective for investors to link these markets when firms are small.

This evidence also contributes to the CEO quality literature. If the pay premium is a valid quality proxy, our findings suggest that CEOs split with the firm the economic surplus generated by their quality. Appointment of a high-quality CEO benefits not only the CEO who receives a pay premium but also the stockholders; the firm stock value increases. The regressions in Table III suggest that the better the perceived quality of the newly appointed CEO, the higher is the firm revaluation on average. Apparently, finding and appointing the highest available quality CEO is an important task for the company board, because it could lead to an increase in firm value.

C. Robustness Tests

The relationship between stock price response and pay premium documented in Table III appears robust to several important factors. First, we add pre-appointment firm performance as an additional explanatory variable in the announcement abnormal return regressions. This is because in a firm with poor past performance, naming a new CEO might seem a relief (indicating a turning point), and draw a positive response from the capital markets, especially if the new CEO is external. It is interesting to examine how this relief (if it exists) affects our results.

In regressions of the announcement abnormal return on the pay premium and pre-appointment firm performance, the coefficients of the CEO pay premium remain positive, and the coefficients of pre-appointment performance are negative. For example, when pre-appointment performance is added to the all appointments regression in Panel B of Table III:

$$\text{AR}_i = 0.50 + 1.20 \varepsilon_{2i} - 0.74 \text{ CARB}_i + \eta_i, \tag{7}$$

(1.9) (−1.9)

where AR_i is the appointment announcement (days −1 and 0) abnormal return on stock i , ε_{2i}

⁸In the subsample of utilities and financial services firms (61 companies), the coefficients of the pay premium are negative yet statistically insignificant, however we splice the data. That is, the coefficient of pay premium is negative and insignificantly different from zero in large firms, small firms, utilities only, financial services only, and other partitions of the data.

is the pay premium of the new CEO of firm i [estimated as the residual in Equation (4)], and $CARB_i$ is the three-year pre-appointment cumulative abnormal return on stock i (t-statistics, adjusted for heteroskedasticity using the White method, shown in parentheses). The corresponding fitted regression in the subsample excluding utilities and financial services firms is:

$$AR_i = 0.78 + 1.70 \varepsilon_{4i} - 0.76 CARB_i + v_i \quad (8)$$

(2.0) (-1.8)

where ε_{4i} is the pay premium of the new CEO of firm i [estimated as the residual in Equation (6)].

The pay premium coefficients in Regressions (7) and (8) are identical to those reported on the first row of Table III Panel B. Thus, adding pre-appointment performance ($CARB$) to the announcement excess return regressions does not alter our conclusions regarding the relation between pay premium (CEO quality) and stock value. The only new message in Equations (7) and (8) is that the stock price response to an appointment also depends on pre-appointment performance. CEO appointments following a period of poor performance are favorably received by the stock market, while appointments following a period of excellent performance are viewed as disruptive and destroy value.⁹

A second robustness check regards the definition of CEO pay. Our pay premium estimates in Table III are based on the total compensation awarded by the firm to the new CEO. These pay premium estimates ignore CEOs' gain or loss on firm equity held (stock and options). We have data on CEOs' equity-linked-wealth (ELW), and can generate an estimate of the abnormal ELW of the new CEO, which may then serve as a measure of new CEO abnormal personal profit (loss) upon firm success (failure).

We further argue that abnormal ELW may be positively correlated with CEO quality. Higher-quality CEOs offer the firm higher marginal products (all other things equal). Hence, theory would predict that it is optimal for firms to pay them more and increase their equity exposure. Theory also predicts that more competent CEOs commit more of their personal wealth to firm equity (in order to signal their superior ability). Thus, there should be a positive correlation between CEO quality and abnormal ELW.

There are a few potential aberrations in the positive correlation between abnormal ELW and CEO quality. For example, internal appointees typically hold some stock and options from their previous positions in the firm. Thus, they may have more abnormal ELW than external appointees. Also, in some cases, internal appointees are major blockholders, i.e., belong to the control group. In such cases, CEO stock ownership is high regardless of managerial skills and quality.¹⁰

We examine the ELW of new CEOs at the end of the year after the appointment, and extract from it two estimates of the abnormal ELW by fitting the regressions:

$$\begin{aligned} \text{Ln(ELW_new)} = & -1.23 + 0.26 \text{Ln(ELW_old)} - 0.06 \text{Int} + 0.29 \text{Ln(MV)} + 1.02 \text{Dual} \\ & (-0.6) \quad (2.5) \quad (-0.2) \quad (2.8) \quad (1.9) \\ & + 0.015 \text{Ln(Lev)} + \varepsilon_5 \quad (9) \\ & (0.2) \end{aligned}$$

⁹Interestingly, when we add to Regressions (7) and (8) a dummy variable for external appointments and/or an interaction term between external appointment and pre-appointment performance, their coefficients are statistically insignificant.

¹⁰Palia and Ravid (2002) analyze the compensation of CEOs who are also the firm's founders or their heirs.

$$\begin{aligned}
\text{Ln(ELW_new)} = & -0.12 + 0.30 \text{Ln(ELW_old)} - 0.41 \text{Int} + 0.25 \text{Ln(MV)} + 0.76 \text{Dual} \\
& (-0.1) \quad (3.1) \quad (-1.4) \quad (2.6) \quad (1.5) \\
& - 0.008 \text{Ln(Lev)} + 0.49 \text{CARA} + 0.16 \text{CARB} + \varepsilon_6 \\
& (-0.2) \quad (2.9) \quad (1.5)
\end{aligned} \tag{10}$$

where ELW_new is the Equity Linked Wealth of the new CEO, ELW_old is the ELW of the former CEO, and t-statistics, adjusted for heteroskedasticity using White's method, are in parentheses.

In Equations (9) and (10), we use the same pay explanatory variables as in the models of total compensation [Equations (1) and (2)]. The residuals ε_5 and ε_6 in (9) and (10) are thus the equity-linked wealth that cannot be explained by the other factors; i.e., ε_5 and ε_6 estimate the abnormal ELW of new CEOs.

The abnormal ELW estimates are positively correlated with the stock price response. The correlation between ε_5 and the appointment excess return is 0.18 (p -value of 0.03), and the correlation between ε_6 and the appointment excess return is 0.21 (p -value of 0.02). Further, the correlation between ε_1 (the all appointments pay premium estimate used in Table III, Panel A) and ε_5 is 0.26 (p -value of 0.002), and the correlation between ε_2 (the all appointments pay premium estimate used in Table III, Panel B) and ε_6 is 0.18 (p -value of 0.05).

All these findings support the proposition that both the pay premium in total compensation and abnormal equity-linked wealth are positively correlated with CEO relative quality, and positively affect stock market response to the CEO's appointment.

D. New CEO Pay Premium and Future Firm Performance

Table IV tests Proposition 2 of our joint efficiency hypothesis. It suggests that firm's unexpected future accounting performance is related to the CEO quality (pay premium) and to the market appointment response (announcement abnormal return). The accounting measures of performance are ROA—operating income (after depreciation) divided by total assets—and ROE—net income divided by shareholders' book equity. Both ROA and ROE are further industry-adjusted by dividing them by the average ROA and ROE of their (two-digit SIC code) industry group. We estimate unexpected accounting performance as the residual in the regression of the accounting performance measure in year +2 after the appointment on the accounting performance in years −1 and −2. Twenty-one (22) firms with incomplete ROE (ROA) data on Compustat are dropped from the sample. The procedure is repeated in the sub-sample excluding utilities and financial services firms.

The regression results show significant positive relationships between pay premium and unexpected accounting performance. These relationships are consistent with the Hayes and Schaefer (2000) findings that pay precedes abnormal accounting performance. However, the appointment abnormal return is not successful as an explanatory variable of future accounting performance. Appointment abnormal return is statistically insignificant in the ROA and ROE regressions. One implication is that managerial quality and prospects for improving firm's performance are captured better by the labor market's pay premiums than by the capital markets' response to the appointment. This would be the case when a board of directors can observe managerial quality better than the stock market. Such a scenario is quite plausible because investors do not receive full information on new CEO's quality and pay premium.

Panel B of Table IV investigates further the relation of pay premium to unexpected accounting performance by examination of sub-samples of small/large firms and internal/external appointments. Regressions of unexpected accounting performance are run once on

Table IV. The Relation of Ex-post Accounting Performance to the New CEO Pay and to the Appointment Excess Return

First, we calculate two measures of accounting performance: ROA – operating income (after depreciation) divided by total assets, and ROE – net income divided by book equity. Both ROA and ROE are further industry-adjusted by dividing them by the average ROA and ROE in their (two digit SIC code) industry group. Industry-adjusted ROA and ROE are calculated for each firm in years –2 through 2 (year 0 is the appointment year). Second, for each of the above industry-adjusted measures we estimate the unexpected accounting performance in year 2 as the residual in the regression of the accounting performances in year 2 on the accounting performance in years –2 and –1. Last, the unexpected accounting performance is regressed on the new CEO pay premium and on the appointment announcement excess return. The results are reported below, with t-statistics corrected for heteroskedasticity using the White method. The above procedure is repeated for a subsample excluding utilities and financial services firms.

Panel A. Overall Sample Results				
Dependent Variable	Number of Observations	Coefficient (t-statistics) of		
		Appointment Announcement Excess Return	New CEO Pay Premium (ε_1 in Model 1) ^a	New CEO Pay Premium (ε_2 in Model 2) ^a
<i>All Firms</i>				
Unexpected ROA	206	0.014 (0.9)		
Unexpected ROA	202		0.312 (3.1)	
Unexpected ROA	202			0.172 (1.5)
Unexpected ROE	207	-0.061 (-0.9)		
Unexpected ROE	203		0.79 (2.7)	
Unexpected ROE	203			0.98 (2.5)
<i>Excluding Utilities and Financial Services</i>				
Unexpected ROA	158	0.017 (0.9)		
Unexpected ROA	155		0.453 (3.4)	
Unexpected ROA	155			0.293 (1.9)
Unexpected ROE	158	-0.076 (-0.9)		
Unexpected ROE	155		0.72 (2.0)	
Unexpected ROE	155			0.97 (2.1)

^aModel 1 and Model 2 of estimating new CEO pay premium are presented at the top of Table III.

^aModel 1 and Model 2 of estimating new CEO pay premium are presented at the top of Table III.

Table IV. The Relation of Ex-post Accounting Performance to the New CEO Pay and to the Appointment Excess Return (*Continued*)

Panel B. Subsample Analysis				
Dependent Variable	Subsample	Number of Observations	Coefficient of New CEO Pay Premium when	
			Pay Premium is ε_1 or ε_3 of Model 1 ^a	Pay Premium is ε_2 or ε_4 of Model 2 ^a
<i>All Firms</i>				
Unexpected ROA	External Appointments	63	0.44 (1.8)	0.32 (1.4)
Unexpected ROA	Internal Appointments	139	0.23 (2.8)	0.06 (0.6)
Unexpected ROA	Small Firm Appointments	95	0.47 (2.6)	0.22 (1.0)
Unexpected ROA	Large Firm Appointments	107	0.18 (1.8)	0.13 (1.1)
Unexpected ROE	External Appointments	64	1.22 (2.0)	1.37 (1.7)
Unexpected ROE	Internal Appointments	139	0.49 (1.8)	0.65 (1.8)
Unexpected ROE	Small Firm Appointments	96	1.51 (2.8)	1.99 (2.7)
Unexpected ROE	Large Firm Appointments	110	0.10 (0.3)	−0.06 (−0.2)
<i>Excluding Utilities and Financial Services</i>				
Unexpected ROA	External Appointments	51	0.66 (2.1)	0.50 (1.5)
Unexpected ROA	Internal Appointments	104	0.33 (2.9)	0.15 (1.2)
Unexpected ROA	Small Firm Appointments	75	0.65 (3.0)	0.40 (1.5)
Unexpected ROA	Large Firm Appointments	80	0.26 (1.6)	0.19 (1.0)
Unexpected ROE	External Appointments	51	1.59 (1.8)	1.75 (1.7)
Unexpected ROE	Internal Appointments	104	0.22 (0.9)	0.41 (1.3)
Unexpected ROE	Small Firm Appointments	75	1.71 (2.5)	2.33 (2.7)
Unexpected ROE	Large Firm Appointments	80	−0.30 (−1.0)	−0.43 (−1.4)

ε_1 and once on ε_2 as the pay premium estimate, and the results are shown side by side. The relationship appears stronger (the point estimates of the coefficients are higher) in external appointments and for small-firm appointments. The parallel analysis in the subsample excluding utilities and financial services, also reported, yields similar conclusions.

The finding that unexpected future firm performance is more strongly related to the pay premium of external appointees suggests that these CEOs may have a greater influence on firm performance. This is consistent with the view that external appointees serve as “change agents” to shake up a firm. An alternative explanation is that the CEO labor market is less efficient with respect to internal candidates. Internal appointees’ pay contracts are negotiated within the firm, and less efficient outcomes (i.e., a weaker relation of pay premium to firm future performance, may result).

In this context, it is noteworthy that internal appointee pay contracts also involve forms of non-monetary compensation such as the internal candidate’s satisfaction in rising up the ladder, which may make the pay premium of internal appointees less informative about new CEO quality. Thus, the weaker relation of pay premium to future firm performance in internal appointments may also be a result of a pay premium measurement problem.

The second finding in Panel B is that there is a stronger relationship in small firms between new CEO pay premium and firms’ unexpected future performance. This suggests that new CEOs can have a greater impact on the fortunes of small firms, perhaps because small-firm management is less complex, and change can be effected in small firms more quickly. Alternatively, the CEO labor market might be less efficient for large firms, an interpretation that appears counter-intuitive.

Looking at the evidence in Tables III and IV together may help us shed some additional light on the issue of small firms. Recall that the finding in Table III that small-firm stocks show less response to new CEO pay premium can suggest that either the labor markets or the capital markets are less efficient with respect to these appointments. Yet, given the evidence in Table IV that small firms’ future performance is relatively strongly related to new CEO pay premiums, an inefficient managerial labor market becomes a much less likely explanation. The more likely interpretation of the weak response of small-firm stocks to pay premium is that the capital markets are less efficient or less closely linked with labor markets in the case of small firms. That is, in small firms, the labor market reflects CEO quality better than the stock market.

IV. Conclusions

Our examination of 268 CEO appointments in US companies over 1991-1995 indicates that appointment of a better-quality CEO (who receives a pay premium *ex-ante*) is accompanied by an immediate positive revaluation of stock price on average. Apparently, superior-quality CEOs offer a surplus that they share with their firms; the CEO receives higher pay, and the firm attains higher value. Further tests show that new CEOs earning pay premiums also generate unexpected improvements in their firms’ future accounting measures of performance. Again, an *ex-ante* pay premium is evidence of CEO quality that benefits both the CEO and the firm.

These findings support the notion of efficient and integrated labor and capital markets. The labor market appears to reward higher managerial skills with higher pay, and the capital markets correctly interpret the labor market signal and revise expectations regarding firm value, immediately on announcement date, to reflect expected improved operating results

due to the new CEO.

The empirical investigation also detects some potential imperfections in the efficient and integrated labor and capital markets hypothesis. Capital markets respond less vigorously to CEO appointments in small firms, which might indicate that the capital markets are less efficient or less closely linked with labor markets in the case of small firms. A more comprehensive perspective could rationalize this finding. Following smaller firms is relatively more expensive and less rewarding for stock analysts and sophisticated investors. Hence, for cost-effectiveness reasons, the reactions to small-firm appointments appear somewhat less efficient. As Grossman and Stiglitz (1980) suggest, efficiency is bounded by information costs.

Another apparent relative weakness relates to intra-firm labor markets. In the subsample of internal appointments, the relation of new CEO pay premium to future firm performance is weaker than in external appointments. This suggests that CEO pay, skills, and future performance are less correlated in the case of internal appointments. It appears that internal pay contracts are less efficient. From a more comprehensive viewpoint, this phenomenon too can be rationalized. Internal CEOs also receive some non-trivial emotional compensation that weakens the relationship between their monetary pay premium and their skills, efforts, and future achievements.

The practical implication of our research is that finding a high-quality CEO and paying her or him a pay premium is rational, because high-quality CEOs on average increase firm value and improve firm performance more than lower-quality CEOs. Future research might focus more on the division of economic surplus between CEO and firm. ■

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