



How much are differences in managerial ability worth?

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Received 1 April 1997; received in revised form 1 October 1998

Abstract

We identify manager/firm separations where managers quit for a new job and study abnormal returns associated with these events. Applying analyses from labor economics, we argue that the average ability of managers who resign for a similar position at another firm should be higher than that of managers who die suddenly. Controlling for age and tenure, we find that firms losing managers to other firms experience an average abnormal return of -1.51% , compared to $+3.82\%$ for firms whose managers die suddenly. We use differences in returns across groups to measure the value of differences in managerial ability. © 1999 Elsevier Science B.V. All rights reserved.

JEL classification: G30; J31; J41

Keywords: Managerial ability; Managerial labor markets; Executive compensation; Executive turnover

1. Introduction

How much is a good chief executive officer (CEO) worth to a firm's shareholders? Are CEO contributions to shareholder value sufficient to offset the

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salaries earned by top executives? These questions have been a common topic in the business press in recent years, but have not been extensively studied by economists. An elementary theory of wage determination for top executives would suggest that the level of pay ought to be set via a bargaining process between a manager and a firm. The level of pay must meet both parties' participation constraints and then any quasi-rent in the relationship will be split according to the relative bargaining strengths of the two parties. While this simple story is clear, the growing literature on executive compensation does not attempt to determine whether actual levels of executive pay conform to it.¹ In particular, one might be interested in the relation between pay levels and the marginal contribution of the manager to the value of the firm. Since a manager's marginal contribution to firm value is presumably a function of his ability, one might also like to know how much differences in managerial ability are worth.

In this paper, we take a first step toward addressing some of these issues by developing measures of differences in managerial values. We examine changes in the value of the firm at the time the manager/firm relationship is severed. We attempt to identify manager/firm separations where the firm appears willing to continue the employment relationship under pre-separation conditions. We argue that changes in the value of the firm around the time of such separations reflect the market's evaluation of the marginal contribution of the departing manager to shareholder wealth. In particular, the change in the value of the firm at the announcement of the manager/firm separation should represent the market's expectation of the difference between the present value of the firm's cash flows under the departing manager (net of the present value of his wages) and the present value of the firm's cash flows under the alternative manager (net of the present value of his wages). Departure of a high-ability executive should therefore result in negative abnormal returns.

Our methodology is to construct two samples of separations where we expect average managerial ability to differ systematically across the samples. To identify two such samples, we apply analyses from labor economics and argue that the cause of the manager/firm separation provides information regarding managerial ability. In particular, work by Harris and Holmstrom (1982) and Lazear (1986) suggests that the average ability of managers who are 'raided' – that is, those who leave one firm for a similar position at another – should be high. Managers who die suddenly, on the other hand, should represent a random selection from the ability distribution. Comparing abnormal returns across these groups should then yield a measure of the value of differences in ability.

¹ There is a significant literature studying determinants of cross-sectional differences in pay levels. Rosen (1992) provides a survey of this literature, which makes no attempt to address the questions we raise here.

We collect a data set consisting of 29 cases where CEOs died suddenly, 24 cases where CEOs left their jobs to take the CEO position elsewhere, and 105 cases where non-CEO managers (typically managers holding the titles President, Chief Operating Officer or Chief Financial Officer) left their jobs for the CEO position elsewhere. Controlling for managerial characteristics such as age and tenure with the firm, we find that firms losing managers to other firms experience an average abnormal return of -1.51% , compared to $+3.82\%$ for firms whose managers die suddenly. These figures suggest that differences in managerial ability can have large consequences for shareholder wealth. Our estimates of the value of differences in managerial ability range from \$12.6 to \$53.3 million.

We extend our analysis to provide additional evidence that differences in managerial ability drive, at least in part, abnormal returns associated with manager/firm separations. First, under Rosen's (1982) hypothesis that the ability of a manager and the scale of resources under his control are complements, better executives should be raided by larger firms. We show that abnormal returns of firms losing CEO or non-CEO managers to other firms are more negative when the firm hiring the manager is large in relation to the firm losing the manager. Second, we examine abnormal returns for firms hiring CEOs away from other firms and find these returns to be significantly positive. We also show abnormal returns for firms gaining and losing a particular executive to be negatively correlated, which is consistent with the idea that loss of an especially talented manager is bad news for the firm losing the manager and good news for the firm gaining the manager.

While there are substantial literatures on both executive compensation and stock returns surrounding executive departure, our analysis differs from previous research in several ways. Unlike most of the literature on executive pay, our analysis attempts to address questions relating to the *level*, as opposed to the *functional form*, of remuneration. As noted by Baker et al. (1988), the functional form of compensation – that is, the relation between compensation and the various potential outcomes stemming from the employee's actions – determines incentives, while the level of pay determines the employee's willingness to participate. Economists interested in testing agency-theoretic ideas about incentives have therefore focused on relations between compensation and various outcomes of executive actions.²

Our analysis differs from the existing literature on stock market responses to news of executive departure for two reasons. First, much of this literature examines management changes that are initiated by the firm. Such studies

² For example, Murphy (1985) and Jensen and Murphy (1990) analyze the relation between CEO wealth and performance as measured by stock market returns. Murphy (1998) surveys this literature.

typically address questions relating to the strength of internal corporate governance mechanisms. For example, Furtado and Rozeff (1987) find market reactions to news of such separations to be positive. Similar analyses are offered by Weisbach (1988), Warner et al. (1988) and Bonnier and Bruner (1989). Second, we believe our argument that across-group differences in market responses to separations can be used to measure differences in managerial ability to be unique. Both Johnson et al. (1985) and Worrell et al. (1986) analyze returns associated with sudden deaths, but neither study uses this information in the way we propose.

We proceed by presenting, in Section 2, the arguments of Harris and Holmstrom and Lazear that lead us to assert that the average ability of raided managers should be high. In Section 3, we describe our data, discuss our empirical methods, and present results. We conclude in Section 4.

2. Economics of managerial labor markets

In this section, we apply results from labor economics to the market for managerial talent and derive implications for financial market responses to news of unexpected separations of manager and firm. We summarize Harris and Holmstrom's theory of wage dynamics and argue that important aspects of this theory appear to fit the CEO employment context. We then apply Lazear's analysis of raids to study executive turnover.

2.1. Downward rigid wages as partial insurance

Harris and Holmstrom present a dynamic model of efficient wage contracts between a risk neutral firm and a risk averse employee when the two parties are symmetrically uninformed about the employee's ability at the time of contracting. After the initial contract is signed, the employee works on the firm's behalf and generates output that is freely observable. Since output is positively correlated with ability, the firm, the employee, and other potential employers learn over time about the employee's ability. The employee's ability determines the expected marginal product of his labor and therefore the wage he can command from other potential employers.

Since ability is uncertain at the time of initial contracting and the agent is risk averse, the firm can benefit by offering a contract that insures the employee's ability-related risk. A full-insurance contract would shift all ability-related risk to the firm, which would pay the agent a fixed wage. Harris and Holmstrom argue that full-insurance contracts are not feasible, since the employee cannot commit to refuse an offer from another employer in the event that his ability turns out to be higher than expected. The authors demonstrate that, under these conditions, the efficient *partial-insurance* contract features a wage that is

downward rigid. The firm insures the employee against adverse realizations of ability, but must raise the employee's wage to retain him if his ability is revealed to be high. If the employee's marginal product is revealed to be lower than the initial wage, the firm is bound by contract to keep the employee and take negative profits.³ If, on the other hand, the employee's marginal product is higher than the initial wage, then competition from other employers means that the firm must revise the employee's wage upward.⁴

While the Harris and Holmstrom model contains many simplifying assumptions, two essential features of the model are present in the CEO employment context. First, there is often uncertainty surrounding a potential CEO's aptitude for the job, even though virtually all new CEOs have been successful in other positions. Top executives are therefore subject to considerable human capital risk. Second, remuneration for top executives appears to be downward rigid. While underperforming CEOs are unlikely to receive the large bonuses and option grants that top performers earn, it is rare for a CEO's salary to be cut significantly. In addition, while it is often difficult to identify from press accounts the precise cause of a CEO's departure, evidence provided by Weisbach and Warner et al. suggests CEOs are not commonly terminated for poor performance.

2.2. Raids in the managerial labor market

We next examine how the presence of implicit partial insurance affects inter-firm mobility. We rely on work by Lazear, who develops a model in which a manager's productivity at a specific firm depends on both the manager's ability level and how well the manager's skills match the firm's needs. Inter-firm mobility is driven by a matching process – raids can be viewed as attempts to match each manager with the firm that can best employ the manager's talents.

We use Lazear's analysis to argue that if wage contracts feature implicit partial insurance and inter-firm mobility is driven by matching, then managers with low ability are less likely to be raided than managers with high ability. The key to this claim is that the partial insurance contracts can prevent efficient matching; in particular, downward rigid wages cause the matching process to work imperfectly for managers with low ability.

As an example, consider a manager with unknown ability who accepts a partial insurance contract from firm 1. After some period of employment,

³ Note that even in the absence of an explicit contract requiring the firm to keep the employee, reputational mechanisms can support an implicit contract of this form.

⁴ Harris and Holmstrom consider the implications of their model for labor market equilibrium. Since equilibrium implies firms must earn zero expected profits on any wage offer, the initial wage offer must be below the employee's expected marginal productivity.

a potential raider, firm 2, observes the manager's performance at firm 1 and determines that the match between the manager's skills and firm 2's needs is better than that between the manager's skills and firm 1's needs.⁵ In this case, it is efficient for firm 2 to employ the manager, since the manager's firm 2 productivity is higher than his firm 1 productivity.

To see how implicit partial insurance might impede efficient matching, recall that under the partial-insurance contract, firm 1 commits not to cut the manager's wage if the manager's ability is revealed to be low. Therefore, if the manager's ability is sufficiently low, his wage at firm 1 will exceed his productivity at firm 1. In this case, firm 2's raid can be successful only if the manager's firm 2 productivity is higher than the manager's firm 1 wage. If the manager's firm 2 productivity is *above* his firm 1 productivity but *below* his firm 1 wage, then it is efficient for firm 2 to employ the manager but firm 2's raid cannot be successful. Efficient matching of low-ability managers occurs only if the quality of the match between the manager and the raider is strong enough to offset the effect of the partial insurance.

If, on the other hand, the manager's ability is revealed to be high, then partial insurance means firm 1 is willing to increase the manager's wage up to his firm 1 productivity. Since, by assumption, the manager is more productive at firm 2 than at firm 1, firm 2 is always willing to offer a higher wage than firm 1 – a high-ability manager is therefore always matched efficiently.

Thus, managers with low ability get raided only when the match is *strongly* in favor of the raider, whereas high-ability managers get raided *any time* the match favors the raider. Implicit partial insurance and downward-rigid wages mean the sample of managers who are raided is not random. Since low-ability managers are less likely to be targets of raids, the average ability level of a sample of raided managers will be high.

2.3. Financial market reaction to news of separation

We use the assertion that the sample of raided managers is not random to derive a measure of the value associated with differences in managerial ability. We compute the difference in abnormal returns around the time of manager/firm separation across two groups: managers who are raided and managers who die suddenly. To illustrate why this difference is informative regarding the value of managerial ability, we introduce some simple notation. Consider a firm that loses a high-ability manager in a raid that is not anticipated by the financial market. Prior to the raid, the firm's value depends on both how the manager's ability affects the firm's future cash flows and the wages the firm must pay the

⁵ We use the term 'raider' to refer to a firm that hires away another firm's manager and 'target' to refer to a firm whose manager is hired away.

manager. Let $v_h - w_h$ denote the value of the target firm net of the present value of wages prior to the raid. When the high-ability manager departs, the firm employs its next best alternative manager. Let $v_0 - w_0$ denote the value of the target firm net of the present value of wages paid to the alternative manager. The firm may also incur switching costs associated with changing managers, which we denote by k . The change in the value of the firm at the announcement of the raid is therefore given by

$$(v_h - w_h) - (v_0 - w_0) - k. \quad (1)$$

Now consider a firm that loses a manager of average ability to a sudden death.⁶ Let $v_a - w_a$ represent the value of the firm net of the present value of wages prior to the executive's death and let $v_1 - w_1$ denote the value of the firm net of the present value of wages paid to the replacement manager. We can write the change in the value of the firm at the announcement of the executive's death as

$$(v_a - w_a) - (v_1 - w_1) - k. \quad (2)$$

Examining the difference between Eq. (1) and Eq. (2) nets out any switching cost k and leaves

$$((v_h - v_a) - (w_h - w_a)) - ((v_0 - w_0) - (v_1 - w_1)). \quad (3)$$

The term of interest in Eq. (3) is $v_h - v_a$, which represents the difference in cash flows generated by high- and average-ability managers. If it were the case that (i) wages did not differ across managers (so that $w_h = w_a$), (ii) the net profits from hiring the alternative manager did not differ across firms (so that $v_0 - w_0 = v_1 - w_1$) and (iii) the raid was completely unanticipated by the market, then the difference in market returns around the separation would provide a direct measure of $v_h - v_a$.

If $w_h > w_a$, as one might expect given the hypothesized ability levels, then the difference in market returns would underestimate $v_h - v_a$. In particular, if

⁶Our assertion that managers who die suddenly represent a random sample from the ability distribution is subject to the following caveat. Conditional on a manager leaving a firm via sudden death, it must be the case that the manager did not leave the firm via a raid. Hence, the managers who die suddenly represent a sample from the distribution of managers who were *not raided*. Since raided managers are likely to be of high ability, managers who are not raided are likely to be of below-average ability. However, given that raids are infrequent events (as we discuss in Section 3.1), we expect the ability level of managers who die suddenly to be very close to average. Note also that our use of differences in abnormal returns across groups as a measure of differences in ability relies only on the premise that ability differs systematically in the two samples, not on the specific assertion that the deaths are a random sample from the ability distribution.

managers capture their *full* marginal contribution to firm value, then shareholders should be completely indifferent as to the identity of the manager, and we should detect no changes in firm value in response to manager/firm separation. A similar bias is induced if firms whose current managers are more able also expect to earn higher profits from the replacement manager (so that $v_0 - w_0 > v_1 - w_1$). We may expect this to be the case if more able top managers tend to surround themselves with more able management teams. Also, if a management change is anticipated by rational market participants, then all or part of the effect of the change should be incorporated into stock prices prior to the event. Since, as we discuss below, we have tried to be careful to ascertain that the deaths in our sample were indeed sudden, this prior anticipation should affect the market response to raids only. This effect will induce a downward bias in our estimate of $v_h - v_a$. This attenuation will be especially severe if managers with highest ability are also those who are thought to be most likely to be raided. To see this, consider that the stock price reaction to managerial departure reflects the expected changes in the firm's underlying cash flows weighted by the 'surprise' that the manager departed. If the managers whose departures reduce the firm's underlying cash flows the most (that is, those with highest ability) are also those who the market is least surprised to see depart, then it is not necessarily the case that the departures of more able managers will generate the largest stock price reactions.⁷

A final potential source of bias in our measure arises if managers who depart their firms do so because their private information suggests that the firm's future prospects are poor. If departing managers are leaving a 'sinking ship', then market participants may revise their estimates of the firm's future net cash flows downward in response to this news. If this effect is important, then our measure will overstate the true difference between v_h and v_a .

3. Empirical analysis and results

3.1. Data

We identified changes in the Chief Executive Officer (CEO) position for firms traded on the NYSE, AMEX, or NASDAQ exchanges between 1979 and 1994 by searching the Lexis/Nexis Executive Changes and News databases. We collected information about firms of CEOs who died and firms that hired an outsider as CEO.

⁷ Lanen and Thompson (1988) provide an analysis of the relation between stock price reactions and underlying net cash flow effects when market participants' expectations are endogenous.

We included deaths in our sample if the death was ‘sudden’. We find 29 sudden deaths; among these, there are fifteen deaths described by press accounts as ‘heart attacks’, seven that are described as ‘sudden’ or ‘unexpected’ with no cause listed, three described as ‘accidents’ (automobile or airplane), one stroke, one lightning strike, one murder and one suicide. For the deaths described as ‘sudden’ or ‘unexpected’ with no cause listed, we searched press accounts prior to the event for any news that the executive was ill. We could find no such news for the seven deaths of this type in our sample. Dropping the murder and the suicide from our sample does not affect the results in any meaningful way.

For firms hiring outsiders, we included the event in the sample if the new CEO was employed in the six months prior to his appointment by another publicly traded firm. We began with 144 such observations. We eliminated CEOs who, news reports indicated, had been ‘fired’ or had ‘resigned under pressure from the board’ from the previous job. While our sample selection criterion is designed to capture manager/firm separations where the manager quits the firm, it is often difficult to ascertain from news accounts the precise reasons why an executive leaves a job. Hence, it is possible that some firm-to-firm moves in our sample do not fit this criterion of managers quitting to accept a new job. This sample selection problem would tend to bias our results against finding a negative response to loss of an executive to another firm. After restricting the sample further due to confounding events and data limitations, we have 24 events in which a CEO of a publicly held firm left his job and became CEO of another publicly held firm, and 105 events in which a top non-CEO executive (typically Chief Operating Officer, President or Vice President) of a publicly held firm left his job and became CEO of another publicly held firm.⁸

We examine both CEO-to-CEO and non-CEO-to-CEO moves for three reasons. First, non-CEOs are likely candidates to become CEOs in the target firms (Vancil, 1987); loss of a potential future CEO would certainly affect shareholder wealth. Second, since non-CEO managers take important actions that can impact firm performance, shareholder wealth can be affected even by the loss of a non-CEO who has already lost a promotion ‘tournament’ (Lazear and Rosen, 1981) and will never become CEO. Finally, since CEO-to-CEO moves are somewhat rare, we can augment our sample size by including both types of raids. If one thinks that loss of an able non-CEO manager has a smaller impact on shareholder wealth than loss of an able CEO (as in the case of a non-CEO who has already lost the tournament), then inclusion of these

⁸ Our finding of only 24 CEO-to-CEO moves over this fifteen year period is not surprising, as such events are relatively rare. Weisbach studies a sample of 286 top management changes in NYSE firms between 1974 and 1983 and reports only five instances where a CEO departed for a ‘prestigious appointment elsewhere’.

non-CEO-to-CEO raids will induce a downward bias in our estimates of differences in managerial ability. An upward bias may be introduced if loss of a non-CEO manager indicates to the market that the incumbent CEO is entrenched and is limiting the career prospects of other non-CEO managers.⁹

We study both the abnormal returns of the target firm's stock associated with the announcement that the executive is leaving his job and the abnormal returns of the raider firm's stock associated with the announcement of the new CEO. In many cases these announcements occurred on the same date, while in other instances the announcement that the CEO was leaving the target firm preceded the announcement of his new position.

For this sample of 158 executives, we also collected from various sources the executive's age at the time of the event, his tenure with the firm and whether he or a member of his family founded the firm.¹⁰ Panel A of Table 1 presents summary statistics for this group of executives. Note that the executives who die suddenly tend to be older and have longer tenures than executives who are targets of raids.¹¹ In addition, eight of the managers who died suddenly founded (or were associated with the founding family of) their firms. We control for these differences in executive characteristics in our statistical tests.

For our sample of 287 firms (one firm per sudden death, two firms per raid), we collected, in addition to daily returns, sales in the fiscal year preceding the event, assets at the end of the fiscal year preceding the event, and market value at the end of trading on the day prior to an estimation period that includes 126 trading days on either side of the event.¹² Panel B of Table 1 presents summary statistics for this group of firms. There are substantial differences in firm size across groups. For instance, in the cases where a non-CEO is raided, raiders tend to be smaller than the targets, and this difference is statistically significant at better than the 1% level. However, for cases where a CEO is raided, raiders

⁹ We explored this entrenchment hypothesis by regressing abnormal returns associated with loss of non-CEO managers on characteristics of the CEO. If founders or older, more entrenched managers limit career prospects of non-CEOs, we might expect abnormal returns associated with loss of non-CEOs to be negatively related to the age and founder status of the CEO. We found no relation between CEO characteristics and abnormal returns associated with loss of non-CEO managers.

¹⁰ Data sources include Lexis/Nexis searches, Dun and Bradstreet's *Reference Book of Corporate Managements* and 10-K reports for individual firms.

¹¹ Since our discussion in Section 2.3 indicates our measure of managerial ability will be downward biased if better managers earn higher wages, we also examined pre-separation salary and bonus figures for CEOs. Salary and bonus for CEOs who died suddenly averaged \$502,309, compared to \$670,128 for those making CEO-to-CEO moves. While grants of stock and options often comprise a large part of executive compensation, pre-1992 disclosure rules preclude construction of more comprehensive measures of CEO remuneration.

¹² Data sources include Compustat, CRSP, and 10-K reports for individual firms.

Table 1
Summary statistics

Panel A: CEO characteristics

	CEO sudden death	CEO raided	Non-CEO raided
Number of events	29	24	105
Median CEO age	61	51	51
Median tenure with firm	16	5	9
Number of founders	8	0	0

Panel B: Firm characteristics

	CEO sudden death	CEO target	Non-CEO target	CEO raider	Non-CEO raider
Number of events	29	24	105	24	105
Median sales	\$731.6	\$933.8	\$4,308.6	\$1,527.6	\$350.8
Median assets	\$716.8	\$994.6	\$6,062.9	\$1,372.4	\$419.2
Median market value	\$370.8	\$732.2	\$2,712.7	\$1,068.9	\$206.5

Note: Dollar values in millions.

are, on average, larger than targets, although not statistically significantly so. Firms who lose CEOs to raiders tend to be smaller than firms who lose non-CEOs, and this difference is statistically significant at the 5% level when sales and assets are used as measures of size. Finally, firms losing CEOs to raiders are larger than firms whose CEOs die suddenly, but this difference is not significant.

3.2. Analysis

3.2.1. Differences in abnormal returns by cause of separation

The objective of our empirical analysis is to explore cross-sectional differences in abnormal returns. To perform this analysis, we follow methods outlined by Thompson (1995) and Campbell et al. (1997). We estimate a standard one factor market model for each firm using the 253 trading days surrounding the event date. Let r_{jt} denote the return on firm j during day t , where $t \in [-126, 126]$ and day zero is the announcement date. Let x_t denote the return on the value-weighted market index on day t .¹³ Let δ_t be a vector of indicators having zeros

¹³ We obtained similar results using an equally weighted index as our market portfolio.

for days that are not in the event period and $1/T$ in the event period, where T is the number of days in the event period. Let γ_j be the cumulative abnormal return during the event period for firm j . We hypothesize the following relation between firm j 's returns r_{jt} and market returns x_t :

$$r_{jt} = \alpha_j + \beta_j x_t + \gamma_j \delta_t + e_{jt}. \quad (4)$$

An important research design question is the choice of event period. For our application, we are particularly concerned about information 'leaks' regarding departure of executives for another firm. This effect means that we face a tradeoff in selecting event periods. If we select a short event period centered on the event date, we run the risk of missing much of the market's reaction to the event. However, if we choose a longer event period, we increase estimation error. To manage this tradeoff, we select three different event periods: day zero, days -1 to $+1$, and days -7 to $+2$.¹⁴ Note that these difficulties in selecting the appropriate event period would tend to bias our results against finding any significant differences between groups.

We begin by estimating Eq. (4) separately for every firm in our sample that lost an executive. We compute average cumulative abnormal returns by taking the arithmetic mean of γ_j for each of three groups of firms: those losing a CEO to sudden death, those losing a CEO to a raider, and those losing a high-ranking executive (CEO or non-CEO) to a raider. To assess the statistical significance of these point estimates, we also compute an asymptotic standard error for each mean. Letting N denote the number of firms in a group, the asymptotic variance of $\frac{1}{N} \sum_{j=1}^N \gamma_j$ is given by

$$\frac{1}{N^2} \sum_{j=1}^N \hat{\sigma}_j^2,$$

where $\hat{\sigma}_j$ is the estimated standard error of γ_j . We present results in Panel A of Table 2.

For the group of firms whose CEO died suddenly, we find a statistically significant mean abnormal return for all three event periods. For the day zero and days -1 to $+1$ periods, the effect is significant at better than the 1% level. For the day zero event period, the mean abnormal return is 1.41%, while for the days -1 to $+1$ period, the mean abnormal return is 2.84%. For the days -7 to $+2$ period, our estimate of the mean abnormal return is also 2.84%, but this is only different from zero at the 10% level.

Our finding of a positive abnormal return associated with sudden CEO death confirms prior research in this area (see Johnson et al., 1985). It is also consistent

¹⁴ An earlier version of this paper focused on days -1 to $+2$ and days -15 to $+2$ and offered comparable findings. Similar results held for days -5 to $+1$ and -10 to $+2$.

Table 2
Mean abnormal returns by cause of manager/firm separation

	Event period		
	Day 0	Days - 1 to + 1	Days - 7 to + 2
<i>Panel A: Mean abnormal returns by group</i>			
Sudden deaths:			
Mean abnormal return	0.0141* (0.0046)	0.0284* (0.0082)	0.0284*** (0.0153)
<i>N</i>	29	29	29
CEO raids:			
Mean abnormal return	- 0.0113*** (0.0067)	- 0.0187 (0.0118)	- 0.0275 (0.217)
<i>N</i>	24	24	24
CEO and non-CEO raids:			
Mean abnormal return	- 0.0030 (0.0020)	- 0.0062*** (0.0035)	- 0.0145** (0.0064)
<i>N</i>	129	129	129
<i>Panel B: Differences in mean abnormal returns across groups</i>			
Sudden deaths vs. CEO raids:			
Difference in mean abnormal return	0.0254* (0.0081)	0.0471* (0.0143)	0.0559** (0.0265)
Wilcoxon rank sum test	2.23**	2.94*	2.34**
Sudden deaths vs. all raids:			
Difference in mean abnormal return	0.0171* (0.0050)	0.0346* (0.0089)	0.0429* (0.0165)
Wilcoxon rank sum test	1.91***	2.35**	2.03**

Notes: Asymptotic standard errors in parentheses. Significance at the 1%, 5%, and 10% levels (two-tailed) is denoted by *, **, and ***, respectively. Under the null hypothesis that the abnormal returns for the two groups are drawn from the same distribution, the Wilcoxon statistic has a standard normal distribution.

with our discussion of the Harris and Holmstrom model above. In their model, wages of high-ability managers are bid up over time to match their productivity, meaning that firms' profits from employing these managers are dissipated. In contrast, wages of low-ability managers are downward rigid, so firms earn negative profits from continued employment of these managers. Taking a random sample of sudden CEO deaths, we should find some low-ability managers and some high-ability managers. Abnormal returns associated with the sudden death of low-ability managers should be positive, while abnormal returns for deaths of high-ability managers should be negative. However, since managers are more likely to die suddenly late in their careers, the abnormal returns for

high-ability managers should be close to zero, as the profits from these managers will be partially dissipated. On average, then, we should expect positive mean abnormal returns.¹⁵

For the sample of firms whose CEO was raided, we reject the hypothesis that the mean abnormal return is zero for only the day zero event period. The mean abnormal return for firms losing CEOs to raids on the event day is -1.13% . When we include firms who lost any high-ranking manager, we gain significance for the other periods. For the days -1 to $+1$ period, we obtain an estimate of -0.60% and significance at better than the 10% level, while for the days -7 to $+2$ period the mean event effect is -1.45% , which is significant at the 5% level. The finding of negative abnormal returns associated with loss of these managers is consistent with our argument that the average ability level of managers who become targets of raids is high.

The tradeoff discussed earlier regarding choice of event period is readily apparent from examination of Table 2. We expect that the abnormal return for the sudden deaths should be concentrated in a narrow period around the event date. When we select a larger event period, we increase our estimation error and the statistical significance of our estimate falls. On the other hand, we expect that information leaks may cause the abnormal returns for our sample of raids to be spread over a longer period. We do not find a significant abnormal return on day zero for the sample of CEO and non-CEO raided managers; however, the significance of these estimates increases as we examine longer periods.

We argued earlier that managers who are raided should be of higher ability, on average, than those who die suddenly. This implies that the difference in abnormal returns associated with separation across subsamples measures the value of differences in managerial ability. We present estimates of this difference in Panel B of Table 2. Differences in abnormal returns across groups are both economically and statistically significant. The point estimates range from 1.71% to 5.59% . Five of the six point estimates are significant at the 1% level or better, while the sixth is significant at better than the 5% level. To verify that these differences are not driven by outliers or by parametric assumptions underlying our standard errors, we test for differences across groups using the non-parametric Wilcoxon rank sum test.¹⁶ The null hypothesis that the distribution of returns is the same across groups is rejected for all six cases.

¹⁵ This positive abnormal return could reflect, in part, entrenchment of the low-ability manager. Note however that the Harris and Holmstrom model suggests that it may be efficient for firms to allow such managers to become entrenched – doing so insures managers' human capital risk *ex ante*.

The positive abnormal return could also indicate that the average ability of managers who die suddenly is below the population average. See footnote 6.

¹⁶ Mood et al. (1974) discuss the properties of this test.

3.2.2. Multivariate tests

Our results thus far indicate significant differences in abnormal returns across groups. However, these differences might be driven by differences in age, tenure or founder status rather than by cause of separation. We next use multiple regression analysis to assess differences in abnormal returns across groups controlling for characteristics of the manager such as age and tenure. Let F_j be a row vector of executive characteristics, and let G be a column vector of parameters measuring the influence of F on the abnormal return. We hypothesize the following relation between abnormal returns γ_j (computed for each firm from Equation 4), firm characteristics F_j , and parameters G :

$$\gamma_j = F_j G + \varepsilon_j. \quad (5)$$

Let $RAID_j$ be a dummy variable taking value one if firm j lost its executive due to a raid. Similarly, let $DEATH_j$ be a dummy variable taking value one if firm j 's executive died suddenly. Let AGE_j ($TENURE_j$) be the age (tenure as CEO) of firm j 's executive at the time the manager/firm relationship ended minus the median age (tenure) of managers in our sample. Finally, we define $FOUNDER_j$ as a dummy variable taking value one if firm j 's manager or a member of the manager's family founded the firm.

To specify Eq. (5), we let F_j consist of the following: $RAID_j$, $RAID_j*AGE_j$, $RAID_j*TENURE_j$, $DEATH_j$, $DEATH_j*AGE_j$, $DEATH_j*TENURE_j$, and $FOUNDER_j$. This specification estimates separate intercepts and separate coefficients on AGE and $TENURE$ for the two groups of managers. It also allows a separate intercept for founders who die suddenly.

We subtract median age and median tenure from our AGE and $TENURE$ variables to ease interpretation of our results. The difference in the coefficients on $RAID$ and $DEATH$ can be interpreted as the difference between the abnormal return when a non-founder manager of median age and median tenure is raided and the abnormal return when a non-founder manager of median age and median tenure dies suddenly.¹⁷ This regression specification therefore allows us to perform the thought experiment of taking two non-founder managers of median age and tenure and asking what the difference in abnormal returns would be if one died suddenly and the other left for another firm.

We estimate Eq. (5) using ordinary least squares and report parameter estimates along with White's (1980) heteroskedastic-consistent standard errors in Table 3.¹⁸ Since, as noted above, firms' profits from employing good

¹⁷ Note that, without this transformation, the difference in the coefficients on $RAID$ and $DEATH$ would be the difference between the raid and sudden death abnormal returns for a non-founder manager of age zero and tenure zero. This data transformation does not affect our coefficients on $RAID_j*AGE_j$, $RAID_j*TENURE_j$, $DEATH_j*AGE_j$, and $DEATH_j*TENURE_j$.

¹⁸ We also estimated Eq. (5) using weighted least squares where we weighted each observation by the inverse of the estimated variance of γ_j . The results are similar to those we present.

Table 3
Abnormal returns as a function of manager characteristics

Independent variable	Event period		
	Day 0	Days - 1 to + 1	Days - 7 to + 2
<i>DEATH</i>	- 0.0060 (0.0165)	0.0232 (0.0165)	0.0382** (0.0176)
<i>RAID</i>	- 0.0036 (0.0024)	- 0.0066*** (0.0036)	- 0.0151* (0.0053)
<i>DEATH*AGE</i>	0.0003 (0.0012)	- 0.0010 (0.0017)	- 0.0011 (0.0022)
<i>RAID*AGE</i>	- 0.0001 (0.0004)	- 0.0000 (0.0006)	0.0006 (0.0008)
<i>DEATH*TENURE</i>	0.0013*** (0.0008)	0.0010 (0.0007)	- 0.0014 (0.0010)
<i>RAID*TENURE</i>	0.0002 (0.0002)	0.0002 (0.0003)	0.0008 (0.0005)
<i>FOUNDER</i>	0.0154 (0.0223)	0.0191 (0.0308)	0.0545 (0.0363)
<i>N</i>	158	158	158
Adj. <i>R</i> ²	0.08	0.07	0.09
Difference between <i>DEATH</i> and <i>RAID</i> Wald statistic	- 0.0024 0.02	0.0298*** 3.13	0.0533* 8.39

Estimation of Eq. (5) using OLS. Dependent variable is the cumulative abnormal return over the event period specified, computed using the market model in Eq. (4). The difference between *DEATH* and *RAID* is calculated for the sample median CEO. Heteroskedastic-consistent standard errors in parentheses. Significance at the 1%, 5%, and 10% levels (two-tailed) is denoted by *, **, and ***, respectively.

managers are dissipated over time, Harris and Holmstrom's model predicts positive coefficients on age and tenure. We find, however, that these variables have little explanatory power. In none of the three regressions can we reject the hypothesis that the coefficients on the four age and tenure variables are zero.¹⁹ Among these estimates, only the parameter on *DEATH_j*TENURE_j* for the day zero event period is statistically significant. The point estimate on this parameter is 0.0013, suggesting that *ceteris paribus* an extra year of tenure increases the day zero abnormal return surrounding sudden executive death by slightly more than

¹⁹One might also expect positive coefficients on age and tenure if managerial ability decreases with age. Our results do not support this assertion.

one-tenth of one percent. The coefficients on *FOUNDER_j* are positive and indicate that abnormal returns associated with the sudden death of a manager who founded the firm are between 1.5% and 5.4% higher than those associated with the sudden death of non-founder managers. While the sign of these point estimates is consistent with a view that founders take excessive perquisites or use control of large blocks of shares to prevent efficient changes in corporate control, the estimates are not significantly different from zero.

The coefficients on *RAID* and *DEATH* are, with the exception of *DEATH* for the day zero period, of the expected sign. The coefficients on *RAID* are significantly negative for the days -1 to $+1$ and days -7 to $+2$ event period, while we obtain significance on *DEATH* for only the days -7 to $+2$ period. We compute Wald statistics to test the hypothesis that the coefficients on *RAID* and *DEATH* are identical. For the days -1 to $+1$ event period, we estimate that the abnormal return when a non-founder manager of median age and median tenure is raided is 2.98 percentage points lower than when a non-founder manager of the same age and tenure dies suddenly. This difference is significant at the 10% level. For the days -7 to $+2$ period, the difference is larger and more significant – a firm losing the median manager to a raid experiences an abnormal return that is 5.33 percentage points lower than a firm losing the median non-founder manager to sudden death and this difference is significant at better than the 1% level.²⁰

We conclude this section by describing the implications of our results for the value of differences in managerial ability. We have shown that, controlling for differences in manager characteristics such as age and tenure, the mean abnormal return associated with managerial departure varies with the cause of the separation. Under our assertion that the average ability of managers who are raided should be higher than that of managers who die suddenly, we can use this difference in mean abnormal return as a measure of the value of differences between high- and average-ability managers. From Table 3, our estimates of differences in mean abnormal returns for non-founder managers of median age and median tenure range from 2.98% to 5.33%. Given that the median target firm in our sample has a market value of about \$1 billion, the estimates suggest that differences in managerial ability affect shareholder wealth by \$29.8 to \$53.3 million for the median firm.

We can also assess the value of managerial ability by comparing median changes in firm value across the two subsamples. In Table 4, we list quartiles of

²⁰ As a robustness check, we re-estimated the parameters in Table 3 using a slightly different methodology. We directly parameterized abnormal returns to be a function of manager characteristics F_j and estimated the 158 market models simultaneously as described by Thompson, p. 974. The results are similar to those presented in Table 3.

Table 4
Abnormal changes in firm value by cause of manager/firm separation

Abnormal change in firm value	Event period					
	Day 0		Days -1 to +1		Days -7 to +2	
	DEATH	RAID	DEATH	RAID	DEATH	RAID
Maximum	\$740.6	\$320.5	\$322.0	\$644.7	\$281.9	\$1,139.9
Third quartile	\$16.1	\$21.7	\$16.7	\$21.3	\$14.1	\$21.3
Median	\$3.6	-\$0.4	\$3.7	-\$1.8	\$1.5	-\$11.1
First quartile	-\$1.5	-\$27.8	-\$6.8	-\$47.2	-\$12.3	-\$104.0
Minimum	-\$30.3	-\$1,460.8	-\$58.5	-\$1,026.5	-\$727.5	-\$1,488.4
N	29	129	29	129	29	129
Wilcoxon rank sum test	1.58		1.81***		1.78***	

Notes: Dollar values in millions. Under the null hypothesis that the abnormal changes in firm value for the two groups are drawn from the same distribution, the Wilcoxon statistic has a standard normal distribution. Significance at the 1%, 5%, and 10% levels (two-tailed) is denoted by *, **, and ***, respectively.

the distributions of abnormal changes in firm value for firms losing CEOs to sudden death and firms losing high-ranking (CEO or non-CEO) managers to raiders. We test for differences in distributions across groups using Wilcoxon rank sum tests. As with our comparison of percentage changes in firm value in Table 3, the differences across groups are statistically significant for only the days -1 to $+1$ and days -7 to $+2$ periods. In addition, the effects are largest for the days -7 to $+2$ event period. Among the 129 firms losing executives to raiders, abnormal changes in firm value over the days -7 to $+2$ period ranged from $+\$1,139.92$ million to $-\$1,488.4$ million, with a median of $-\$11.1$ million. For the 29 firms whose CEO died suddenly, abnormal changes in firm value over the days -7 to $+2$ period range from $+\$281.9$ million to $-\$727.5$ million, with a median of $+\$1.5$ million. Comparing median abnormal changes in firm value across subsamples yields an estimate of the value of managerial ability of $\$12.6$ million. While this estimate is of the same order of magnitude as the $\$29$ to $\$53$ million figure derived above, the fact that it is smaller suggests percentage changes in firm value in response to the loss of top executives are larger at smaller firms.

3.2.3. Relative sizes of raiders and targets

In this section, we build on an argument made by Rosen (1982) to provide additional evidence that our findings are related to the loss of high-ability executives. Rosen hypothesizes a complementary relationship between a manager's ability and the scale of resources under the manager's control. He then develops a matching model of the managerial labor market in which higher-ability executives are matched with larger firms. According to Rosen's argument, loss of an executive to a larger firm should be perceived as worse news for the target than loss of an executive to a smaller firm.

We explore the relation between abnormal returns and the relative sizes of the raider and target using multiple regression analysis. For each raided manager j , let $ASSET\ RATIO_j$ be the ratio of the log of the assets of the raider firm to the log of the assets of the target firm. We regress abnormal returns on $ASSET\ RATIO_j$. In Table 5, we present results for two groups of managers: the 24 managers making CEO-to-CEO moves, and the 129 managers making CEO-to-CEO or non-CEO-to-CEO moves.

A negative coefficient on the ratio variable suggests that losing an executive to a relatively large raider is worse news for the target than losing an executive to a small raider. For the sample of managers making CEO-to-CEO moves, the coefficient on $ASSET\ RATIO_j$ is negative for all three event periods studied. The estimate is significantly different from zero at the 10% level for the day zero period, and at better than the 1% level for the days -1 to $+1$ and days -7 to $+2$ periods. For the sample of CEO and non-CEO managers, the results are comparable. The coefficient on $ASSET\ RATIO_j$ is negative for all three event

Table 5

Abnormal returns as a function of the relative size of raider and target firms

	Event period		
	Day 0	Days - 1 to + 1	Days - 7 to + 2
CEO raids:			
Intercept	0.0264 (0.0198)	0.0455* (0.0146)	0.1170** (0.0499)
<i>ASSET RATIO</i>	- 0.0345*** (0.0212)	- 0.0587* (0.0141)	- 0.1320* (0.0463)
<i>N</i>	24	24	24
Adj. R^2	0.09	0.19	0.42
CEO and Non-CEO raids:			
Intercept	0.0142*** (0.0082)	0.0156*** (0.0086)	0.0186 (0.0212)
<i>ASSET RATIO</i>	- 0.0216*** (0.0113)	- 0.0272** (0.0119)	- 0.0413 (0.0264)
<i>N</i>	129	129	129
Adj. R^2	0.06	0.06	0.02

Notes: Dependent variable is abnormal return for target firm. Heteroskedastic-consistent standard errors in parentheses. Significance at the 1%, 5%, and 10% levels (two-tailed) is denoted by *, **, and ***, respectively.

periods and statistically significant for the day zero and days -1 to +1 periods.²¹

This section documents a relation between target-firm abnormal returns and the relative sizes of the target and raider firms. This finding is consistent with Rosen's hypothesis that managerial ability and firm size are complementary. As we noted earlier, a potential source of bias in our estimates of the value of managerial ability is the possibility that departure of top managers conveys information regarding the firm's prospects. We take the results of this section as further evidence that differences in managerial ability drive, at least in part, abnormal returns surrounding managerial turnover. If the 'sinking ship' effect were the only factor contributing to negative abnormal returns associated with

²¹ We ran similar regressions using *SALES RATIO_j* (analogously defined) and including the *AGE* and *TENURE* variables defined above. The results were similar, except that the coefficient on *SALES RATIO_j* is not significant for the sample of managers making CEO-to-CEO moves on the day zero event period. We also obtained similar results using alternative measures of relative size, including the ratio of the firms' sizes (measured by assets or sales), the log of the ratio of the firms' sizes, and a dummy variable for whether the raider was larger than the target.

Table 6
Raider abnormal returns

	Event period		
	Day 0	Days - 1 to + 1	Days - 7 to + 2
CEO raids:			
Mean abnormal return	0.0103 (0.0075)	0.0363* (0.0131)	0.0571** (0.0244)
N	24	24	24
CEO and Non-CEO raids:			
Mean abnormal return	0.0034 (0.0033)	0.0106*** (0.0058)	0.0424* (0.0108)
N	129	129	129

Notes: Asymptotic standard errors in parentheses. Significance at the 1%, 5%, and 10% levels (two-tailed) is denoted by *, **, and ***, respectively.

raids, then we would not expect the magnitude of these abnormal returns to vary with the relative sizes of raiders and targets.

3.2.4. Raider abnormal returns

Finally, we provide evidence on the abnormal returns associated with hiring outsiders as CEO. We begin by computing a market model like that of Eq. (4) for each of the 129 firms in our sample that hired an outsider as CEO. We then compute the mean event effects for two groups: firms that raid another firm's CEO, and firms that raid another firm's high-ranking manager (CEO or non-CEO).

The results in Table 6 are striking. Raider event effects are positive and, for the days -1 to +1 and days -7 to +2 periods, statistically significant. Point estimates of the mean event effects range from 1.06% to 5.71%. There are a number of potential explanations for this finding. First, Lazear's model of raids suggests that inter-firm mobility is driven by attempts to match each manager with the firm that can best employ the manager's talents. Positive raider abnormal returns could arise if the firm captures the quasi-rents associated with this match. Second, selection of an outsider as CEO may convey to financial markets that the firm has discovered positive net present value projects that are best managed by the outsider. Third, the market may reward firms that are willing to hire an outsider as chief executive because this may reveal that the Board of Directors is not under the control of internal managers. Fourth, if departure of the previous CEO is contemporaneous with the hiring of the outsider, then positive abnormal returns could be indicative of the market's

Table 7
Correlation between raider and target abnormal returns

	Event period		
	Day 0	Days - 1 to + 1	Days - 7 to + 2
CEO raids:			
Pearson correlation	- 0.0861 (0.689)	- 0.2387 (0.261)	- 0.2188 (0.204)
Spearman correlation	0.1035 (0.630)	- 0.3565 (0.087)	- 0.3017 (0.152)
N	24	24	24
CEO and Non-CEO raids:			
Pearson correlation	- 0.0693 (0.435)	- 0.1310 (0.139)	- 0.1054 (0.235)
Spearman correlation	0.0522 (0.557)	- 0.1753 (0.047)	- 0.1044 (0.239)
N	129	129	129

Note: Figures in parentheses are the *p*-values.

assessment of the prior CEO. Finally, positive returns may indicate that the market has a low assessment of the remaining management team, since hiring from outside necessarily means passing over the best-qualified internal successor.

We also examine the association between target firm abnormal returns and raider firm abnormal returns. If managerial ability drives the abnormal returns associated with managerial changes, then we would expect a negative correlation here, as raids of better managers should cause target returns to be more negative and raider returns to be more positive. We assess this association by computing both the Pearson and Spearman (rank) correlation coefficients of target and raider abnormal returns. Table 7 presents the results. The Pearson correlations between target and raider abnormal returns are negative for both groups of managers in all three event periods. These correlations are, however, not statistically distinguishable from zero. The Spearman correlations are positive and insignificant for both groups of managers for the day zero event periods, negative and significant for the days -1 to +1 period, and negative but insignificant for the days -7 to +2 periods. While these results are weak, they do provide an additional modicum of evidence that abnormal returns associated with manager/firm separations are related to differences in managerial ability.

4. Conclusion

In this paper, we study abnormal returns associated with manager/firm separations. We use these abnormal returns to construct a measure of the value of differences in managerial ability. Following Harris and Holmstrom and Lazear, we reason that the presence of implicit partial insurance in managerial compensation contracts means that separations where a manager resigns to take the CEO position at another firm are more likely if the manager is of high ability. In contrast, we expect the average ability level of a sample of managers who die suddenly to be at or slightly below the population average. Differences in mean abnormal returns across these two groups can therefore be used to construct a measure of differences in managerial ability.

Our primary finding is that, controlling for manager characteristics such as age and tenure, the mean abnormal returns are significantly different across groups. Computed for non-founder managers at the median age and tenure, estimates of these differences range from 2.98% to 5.33% depending on choice of event period. These estimates are economically and statistically significant and suggest that differences in managerial ability can have important effects on shareholder wealth. We also describe several factors that could bias our measure of the value of managerial ability. If high-ability managers are able to capture (through high wages) much of the value they add to the firm or if rational stock market participants expect that high-ability managers will become targets of raids, then our estimates will be biased downward. On the other hand, if a manager's utility is adversely affected when his employer's performance is poor, then managerial departure may convey information to the market that the firm's future prospects are poor. If this effect is important, then our estimates will be biased upward.

Finally, we demonstrate that target firm abnormal returns are inversely related to the relative size of the raider and target firms. Target firm returns are also negatively correlated with raider firm returns. These findings are consistent with a managerial-ability-based explanation for abnormal returns surrounding manager/firm separations. We argue that one should not expect to see these relations if a 'sinking ship' explanation is solely responsible for the negative average abnormal returns associated with raids.

Acknowledgements

We thank Elizabeth Demers, Ed Lazear, Bob Magee, Paul Oyer, John Roberts, Nathan Stuart, and Jeff Zwiebel for comments. Jerry Zimmerman (the editor) and Karen Wruck (the referee) offered many suggestions that greatly improved this research. Hayes acknowledges financial support from Deloitte and Touche and the Accounting Research Center at Kellogg. Schaefer

acknowledges support from the National Science Foundation and the State Farm Companies Foundation. We owe Richard Crabb a special debt for allowing us to present some results from our collaborative efforts here.

References

- Baker, G.P., Jensen, M.C., Murphy, K.J., 1988. Compensation and incentives: Practice vs. theory. *Journal of Finance* 43, 593–616.
- Bonnier, K.-A., Bruner, R.F., 1989. An analysis of stock price reactions to management change in distressed firms. *Journal of Accounting and Economics* 11, 95–106.
- Campbell, J.Y., Lo, A.W., MacKinlay, A.C., 1997. *The Econometrics of Financial Markets*. Princeton University Press, Princeton, NJ.
- Furtado, E.P.H., Rozeff, M.S., 1987. The wealth effects of company initiated management changes. *Journal of Financial Economics* 18, 147–160.
- Harris, M., Holmstrom, B., 1982. A theory of wage dynamics. *Review of Economic Studies* 49, 315–333.
- Jensen, M.C., Murphy, K.J., 1990. Performance pay and top-management incentives. *Journal of Political Economy* 98, 225–255.
- Johnson, W.B., Magee, R.P., Nagarajan, N.J., Newman, H.A., 1985. An analysis of the stock price reaction to sudden executive deaths. *Journal of Accounting and Economics* 7, 151–174.
- Lanen, W.N., Thompson, R., 1988. Stock price reactions as surrogates for the net cash flow effects of corporate policy decisions. *Journal of Accounting and Economics* 10, 311–334.
- Lazear, E.P., 1986. Raids and offer matching. *Research in Labor Economics* 8, 141–165.
- Lazear, E.P., Rosen, S., 1981. Rank-order tournaments as optimum labor contracts. *Journal of Political Economy* 89, 841–864.
- Mood, A.M., Graybill, F.A., Boes, D.C., 1974. *Introduction to the Theory of Statistics*. McGraw-Hill, New York.
- Murphy, K.J., 1985. Corporate performance and managerial remuneration: An empirical analysis. *Journal of Accounting and Economics* 7, 11–42.
- Murphy, K.J., 1998. Executive compensation. In: Ashenfelter, O., Card, D. (Eds.), *Handbook of Labor Economics*, Vol. 3, North-Holland, Amsterdam.
- Rosen, S., 1982. Authority, control and the distribution of earnings. *Bell Journal of Economics* 13, 311–323.
- Rosen, S., 1992. Contracts and the market for executives. In: Werin, L., Wijkander, H. (Eds.), *Contract Economics*, Blackwell, Cambridge, MA.
- Thompson, R., 1995. Empirical methods of event studies in corporate finance. In: Jarrow, R.A., Maksimovic, V., Ziemba, W.T. (Eds.), *Handbooks in Operations Research and Management Science*, Vol. 9, Elsevier Science, Amsterdam.
- Vancil, R.F., 1987. *Passing the Baton: Managing the Process of CEO Succession*. Harvard Business School Press, Boston.
- Warner, J.B., Watts, R.L., Wruck, K.H., 1988. Stock prices and top management changes. *Journal of Financial Economics* 20, 461–492.
- Weisbach, M.S., 1988. Outside directors and CEO turnover. *Journal of Financial Economics* 20, 431–460.
- White, H., 1980. A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity. *Econometrica* 48, 817–838.
- Worrell, D.L., Davidson, W.N., Chandy, P.R., Garrison, S.L., 1986. Management turnover through deaths of key executives: Effects on investor wealth. *Academy of Management Journal* 29, 674–694.