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DOES EXECUTIVE COMPENSATION AFFECT INVESTMENT?

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ABSTRACT

Investment decisions require trading off current expenditures against future revenues. If revenues extend far enough into the future, the executives responsible for designing long-run investment policy may no longer be in office by the time all the revenues are realized. We present evidence that: (1) on average, executives are close to leaving office (relative to the payout period of many investments); (2) bonuses based on accounting earnings constitute an important part of compensation for the typical executive; and (3) executives respond in predictable ways to compensation plans based on accounting measures of earnings. Based on these facts, we hypothesize that existing compensation policy induces executives to reduce investments during their last years in office. In our empirical work, however, we find that investment expenditures on research and development and on advertising tend to be *largest* in the final years of a CEO's time in office. We offer several possible explanations for this surprising finding.

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Does Executive Compensation Affect Investment?

Robert Gibbons and Kevin J. Murphy

Although decisions on individual investment projects are rarely made at the top-management level, top executives play an important role in designing long-run corporate investment policy. The willingness of top executives to undertake investments depends on several factors, including the potential financial and nonfinancial rewards they receive from doing so. Without disputing the potential importance of nonfinancial factors, this paper focuses on the effect of executive compensation policy on investment.

By definition, investment decisions require trading off current expenditures against future revenues. If revenues extend far enough into the future, the executives responsible for designing long-run investment policy may no longer be in office by the time all (or even any) of the revenues are realized. Executive compensation policy should provide incentives to undertake projects that are profitable for the firm, even if the projects' revenues are not realized until after the executives have departed (whether through retirement or for other reasons). To assess whether existing compensation policies provide such incentives, we draw on a variety of sources, including statistical analysis of data from 1,500 large corporations from 1970-1988, and theoretical and empirical results from academic research in accounting, finance, and economics.

We begin our analysis with a brief theoretical discussion of the investment incentives provided by alternative executive compensation policies. We argue that existing compensation policy often induces executives to focus on short-term profits rather than on long-run firm value. This argument is based on three assumptions: (1) on average, executives are close to leaving office (relative to the payout period of many investments); (2) bonuses based on

accounting earnings constitute an important part of compensation for the typical executive; and (3) executives respond in predictable ways to compensation plans based on accounting measures of earnings. We present theoretical arguments and evidence supporting these three assumptions.

We test the hypothesis that managers reduce expenditures as they approach retirement by analyzing *investment profiles*—defined as patterns in investment behavior during the time in office of each individual CEO. We find no direct evidence in support of the prediction that investment expenditures should decline as CEOs near retirement. Rather, we find that investment expenditures on research and development and on advertising tend to be largest in the final years of a CEO's time in office. On the other hand, we summarize recent research that suggests that the *growth rate* of research and development expenditures slows prior to retirement, and slows more for CEOs with weak stock-based incentives.

Overall, the evidence we present is mixed. On the surface, there is abundant evidence that executives are paid in ways that *should* give them diminished investment incentives as they near the ends of their careers. But there is no direct evidence that investment expenditures decline for CEOs near retirement; only the results on investment growth rates support the hypothesis that compensation affects investment. We conclude by summarizing the evidence and considering alternative explanations.

Investment Decisions and Compensation Policy

Well-diversified shareholders want executives to undertake an investment project if the *ex ante* present value is positive, but the *ex ante* present value of an investment opportunity is seldom known with certainty by shareholders, or even by the board of directors. Indeed, it is often the executive's superior information regarding alternative projects that makes him valuable. In these situations, financial incentives to undertake wealth-increasing projects can only be based on *ex post* performance measures, such as accounting earnings and stock-market performance.

Compensation based on current accounting measures of performance will provide correct investment incentives only if the manager expects to remain employed throughout the duration of a project. Consider, for example, a ten-year project with initial research and development outlays of $1 million in year one but with net revenues of $500,000 in years six through ten. As depicted in Exhibit 1, this project has a net present value of nearly $300,000 (assuming a 10% cost of capital) and so should be undertaken. If a manager's only incentives come from bonuses based on current earnings, however, then a manager with five (or fewer) years until retirement will consider only the $1 million reduction in first-year earnings and therefore will not undertake the project. Even a manager with eight years left until retirement will not undertake the project, since the project has a negative present value (of -$150,723) over its first eight years.

To provide a manager near retirement with correct incentives to undertake a long-term project, compensation must (eventually) reflect the cash flows accruing after the manager retires. In principle, one way to solve a managerial horizon problem is to continue awarding bonuses based on earnings recorded after the manager retires. In practice, however, deferred bonuses (including those from so-called "long-term" plans) typically become fully vested or payable upon normal retirement; compensation plans explicitly tied to post-retirement accounting performance are rare. One possible explanation for the absence of post-retirement bonus plans is that managers may be reluctant to have their financial rewards primarily determined by the actions of their successors.

To the extent that current stock prices reflect expectations of future cash flows, compensation based on stock-market performance rather than accounting earnings encourages a manager to undertake investments that may not generate positive cash flows until after the manager's retirement. If the stock market were efficient and if the hypothetical investment opportunity in Exhibit 1 was a surprise to investors then the value of the firm would increase by the project's present value ($294,579) as soon as the investment is announced. It is often argued, of course, that there are imperfections in the stock market and that the market does not

fully value investment opportunities. But even the sharpest critics agree that stock prices will reflect future cash flows more quickly than will accounting earnings, since the latter do not do so at all. When a manager's horizon is short, basing compensation on stock-market performance therefore should provide better investment incentives than does earnings-based compensation.

Stock-based pay also provides more appropriate incentives when the manager's personal discount rate differs from the firm's cost of capital. Suppose, for example, that the cost of capital is 10%, as in Exhibit 1, but that the manager personally discounts future income at a higher rate, 15%, so that the present value of the project to the manager is negative (-$42,000). In this case, compensation based on stock-market performance will induce the manager to undertake the project (provided that the market is not too inefficient), while earnings-based bonuses will not.

We now present evidence supporting the three assumptions underlying our argument: (1) on average, executives are close to retirement; (2) bonuses based on accounting earnings constitute an important part of compensation for the typical executive; and (3) executives respond in predictable ways to compensation plans based on accounting measures of earnings.

CEOs are typically in their last six years

We analyze typical executive career lengths by following all chief executive officers listed in the Executive Compensation Surveys published in *Forbes* from 1971 to 1989. These surveys are derived from corporate proxy statements and include 2,972 executives serving in 1,493 of the nation's largest corporations during the fiscal years 1970-1988. Since we want to estimate the number of years remaining until a CEO leaves office, we restrict our analysis to CEOs who left their firms during the 1970–1988 sample period. (We use data from the 1990 *Forbes* survey to identify CEOs whose last fiscal year was 1988.) This subsample includes 1,631 CEOs, representing 916 firms.

Exhibit 2 presents histograms describing the frequency distributions of years in office and age, both measured at the date the CEO leaves office, for the 1,631 CEOs leaving office during the 1970-1988 sample period. Panel A shows that, upon leaving office, half of all CEOs haved served fewer than eight years. Assuming that the distribution in Panel A is representative of the population and stable over time, we calculate that at any given date, 20% of randomly chosen CEOs are in their final two years, 38% are in their final four years, and 52% are in their final six years.[1] Therefore, assuming that many investment projects do not finish realizing revenues within six years of the initial investment, Panel A suggests that a majority of CEOs currently in office have potentially important disincentives to invest. Panel B of Exhibit 2 shows that many CEOs leave their position near normal retirement age: 60% were between 60 and 66 when they left, and 31% were ages 64 or 65.

Executive compensation depends, in part, on accounting earnings

In an extensive survey of bonus plans in large manufacturing corporations, the Conference Board (1979) found that the bonus fund (or "pool") allocated to executives is almost always based on accounting earnings rather than stock-market measures of firm performance. Such earnings-based bonus schemes are an increasingly popular means of rewarding top-level managers. The Conference Board (1984) reports that over 90% of all large manufacturing firms had bonus plans in 1984, compared to 75% for a comparable group of manufacturers ten years earlier. The median bonus award for the CEO is 50% of his base salary; over 20% of the firms surveyed by the Conference Board report CEO bonuses exceeding 70% of salary.

Many researchers, including Lambert and Larcker (1987), Jensen and Murphy (1990), and Sloan (1991) have documented that accounting performance explains more of the year-to-

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1 Define t as the final number of years in office and N_t as the number of CEOs with that career length in Panel A of Exhibit 2. The probability of having X or fewer years remaining as CEO is then given by,

$$\text{Prob(X or fewer years left)} = \left(\sum_{t=1}^{t^*} t\,N_t\,\text{Prob(X or fewer years left | final duration t)}\right) / \left(\sum_{t=1}^{t^*} t\,N_t\right),$$

where t^* is the maximum observed career length, and Prob(X or fewer years left | final duration t) = min(1,X/t).

year variation in executive compensation than does stock-price performance. Jensen and Murphy, for example, find that stock-price changes explain less than 1% of changes in CEO salaries and bonuses, while adding accounting earnings increases the explanatory power to almost 5%. Overall, the evidence strongly supports the assumption that executive compensation indeed depends on accounting earnings.

Earnings-based compensation affects managerial behavior

Healy (1985) provides direct evidence that earnings-based bonus plans affect managerial decision-making. Bonus pools always have floors and often have ceilings.[2] Healy argues that bonus plans of this kind create incentives for executives to manipulate earnings across years (such as by incurring costs in December that could have been postponed until January). If current earnings are sufficiently low that this year's bonus is sure to be zero, there is an incentive to delay earnings until next year, in the hope of increasing next year's bonus. Similarly, if current earnings are above that necessary to reach the maximum bonus, there is again an incentive to delay "excess" earnings until next year. If current earnings result in bonus payments between the floor and ceiling, however, then there is an incentive to record future earnings now, thereby increasing this year's bonus.

Healy tests these predictions by studying total accruals (an approximation to the manipulable part of earnings) from 1930 to 1980 for firms belonging to the *Fortune* 250 in 1980. He calculates the proportion of observations with negative discretionary accruals for firms grouped by whether the expected bonuses are at the floor (usually zero), at the ceiling, or between the floor and the ceiling. He documents that firms at either the floor or the ceiling are more likely to make income-reducing accounting decisions (*i.e.* negative accruals) than firms with expected bonuses between the floor and the ceiling. This finding is consistent with the hypothesis that managers take predictable actions to increase their earnings-based bonuses.

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2 For example, a typical formula for a bonus pool is "2% of net income in excess of 8% return on assets, not to exceed 10% of total dividends."

Empirical Evidence on Investment Profiles

We explore the hypothesis that top managers alter their investment decisions as they near retirement, first reporting our own findings and then summarizing related research. Our findings are based on the sample of 1,631 CEOs who leave office during the 1970-1988 sample period (recall Exhibit 2), and on three measures of corporate investment: research and development expenditures, advertising expenditures, and capital expenditures. For each measure of investment, we use Standard and Poor's Compustat tape to construct each CEO's *investment profile*—the time series of annual investment expenditures beginning with the CEO's first year in office (or 1970, if he became CEO prior to 1970) and ending with the first full fiscal year of his successor.[3] All monetary variables are adjusted by the Consumer Price Index to reflect 1988-constant dollars. After eliminating observations with missing firm data, the final sample includes 1,507 CEOs from 857 firms, representing 12,785 CEO-years of data.

Changes in Investment Ratios as CEOs Near Retirement

Each investment variable reflects current expenditures expected to generate future cash flows. The Financial Accounting Standards Board (FASB) requires firms to treat R&D and advertising expenditures as expenses in the year incurred.[4] Therefore each dollar spent on R&D or advertising results in a dollar decline in the year's accounting earnings (assuming that the benefits from the investment do not begin accruing before the year's end). Capital expenditures are not immediately expensed, however, so each dollar spent on capital decreases accounting earnings by only the first-year charge to depreciation. Therefore, retiring CEOs

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3 Using "he" to describe CEOs reflects more than convention: only one (Liz Claiborne's Elizabeth C. Otenberg, who retired in June 1988) of the 1,631 CEOs in Exhibit 2 is female. The full Forbes sample includes two additional female CEOs still in office as of May 1990: Katherine Graham of the Washington Post and Marion Sandler of Golden West Financial.

4 FASB has required expensing of R&D expenditures only since 1974 (see Dechow and Sloan, 1991). Accordingly, years prior to 1974 are excluded in our R&D analysis below. The sample begins in 1971 for advertising and capital expenditures, and ends in 1988 for all three investment measures.

wishing to increase accounting-earnings-based compensation should reduce R&D and advertising expenditures more than capital expenditures.

Levels of investment differ substantially across firms, and it is therefore necessary to make adjustments to the data to facilitate cross-sectional comparisons. First, since we are most likely to identify investment patterns in firms where overall investments are large relative to firm size, for each investment variable we restrict our analysis to firms for which the variable *averages* at least one percent of sales during the sample period; we also exclude firms that report "immaterial" or negligible investments in more than 20% of the sample period. Second, to eliminate the effect of outliers on the estimates, for each investment measure, we drop the observations for which the ratio of investment expenditures to sales is in (roughly) the top 1% of the sample.[5] Finally, to control for differences in investment associated with industry or size, and to control for different investment propensities across CEOs, we define the 'Investment Ratio' in each year as the investment expenditures in that year divided by the average investment expenditures realized over the CEO's career (or realized since 1970, if the CEO was already in office that year):

$$\text{Investment Ratio} = \frac{\text{Investment Expenditures}}{\text{Average Investment Expenditures Over CEO's Career}}.$$

An investment ratio exceeding 1.0 in a given year indicates that the year's investment expenditures are above the average for the CEO's career, while a ratio less than 1.0 indicates below-average investment expenditures.

Exhibit 3 shows average investment ratios for R&D, advertising, and capital expenditures for sample CEOs grouped according to their years remaining as CEO. In addition to the six years-remaining groups, the figures also include investment ratios for the transition

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5 We drop observations from the R&D analysis if the ratio of R&D to sales exceeds 25%, from the advertising analysis if the ratio of advertising to sales exceeds 25%, and from the capital-expenditures analysis if the ratio of capital expenditures to sales exceeds 50%.

year and for the first full fiscal year of the replacement CEO.[6, 7] We interpret investment in the transition year as being at least partially influenced by the preceding CEO (even though he is not CEO at the year's end), since the investment budget was likely designed and approved during his tenure.

Research and development investment profiles are depicted in Panel A of Exhibit 3, which is based on 304 CEOs from 184 firms with R&D expenditures averaging more than 1% of sales from 1974 to 1988. The figure shows that a typical CEO with more than five years remaining has R&D expenditures about 20% below his career average, while expenditures are 18% above his career average in the transition year, and 24% above the prior CEO's career average in the first full fiscal year of the subsequent CEO's time in office. Panel B is based on 328 CEOs from 185 firms with advertising expenditures averaging more than 1% of sales from 1971 to 1988, and shows a similar pattern: advertising is significantly lower than average for CEOs with long horizons, and higher than average for CEOs close to retirement and for their immediate replacements. The pattern for R&D and advertising is repeated for capital expenditures; see Panel C, which is based on 977 CEOs in 559 firms with capital expenditures averaging more than 1% of sales from 1971 to 1988.

The data portrayed in Exhibit 3 suggest that R&D, advertising expenditures, and capital expenditures *increase* rather than decrease as the CEO nears retirement. These results are inconsistent with the hypothesis that earnings-based compensation affects managerial investment decisions in the direction predicted in Section 3. The fact that initial expenditures for the replacement CEO exceed the average for his predecessor, however, suggests that the results in Exhibit 3 may be driven by an underlying trend, rather than solely by the CEO's

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6 What we call the transition year will be the first *full* fiscal year of the replacement CEO if the incumbent leaves office on the final day of the preceding fiscal year. The first full year of the replacement CEO is not used in constructing the average investment expenditures over his predecessor's career.

7 The histograms reflect sample average investment ratios for each CEO group. Statistical tests are conducted using a least-squares regression of the investment ratio of the i^{th} CEO in year t on a constant, one dummy variable for each of the CEO's last five years, a dummy variable for the transition year, and a dummy variable for the first full year of the replacement CEO.

horizon. We investigated this possibility by analyzing time trends for R&D, advertising, and capital expenditures. Our findings are summarized in Exhibit 4.

Each time series in Exhibit 4 is based on annual data for all the firms from the full *Forbes* sample (*i.e.*, all 2,972 executives serving in 1,493 large corporations during the fiscal years 1970-1988, regardless of whether the CEO left office during the sample period). From this sample, we consider firms in which the average ratio of investment expenditures to firm revenues over the sample period exceeds 1%. In each year, there are roughly 260 such firms for R&D investments, approximately 280 for advertising, and about 810 for capital expenditures. The R&D/sales ratio has increased from only 3% in 1974 to almost 5% in 1986, falling back to 4.5% by 1988. For advertising investments, the analogous ratio has increased from 3.15% in 1975 to more than 4% in 1988, although the ratio declined substantially in the early 1970s. Finally, the ratio of capital expenditures to sales shows greater variation than the other ratios but no pronounced trend.

The results in Exhibit 4 suggest that large domestic corporations have been increasing their investments in R&D and advertising (as measured as a percentage of sales) over the past two decades. These underlying time trends may be confounding our estimates of CEO investment profiles in Exhibit 3. In particular, the apparent increase in R&D and advertising as CEOs near retirement may reflect that, in our data, observations for CEOs near retirement are more likely to come from later years than are observations for CEOs far from retirement.[8] The absence of a pronounced trend for capital expenditures in Exhibit 4, however, suggests that the investment profile in Panel C of Exhibit 3 cannot be explained by an underlying trend.

We control for time trends in investment expenditures by deflating expenditures for each firm by an index representing cumulative market-wide growth in investment expenditures. In particular, for each investment variable, we construct the market index for period t as:

$$(\text{Index})_t = (\text{Index})_{t-1} \frac{(\text{Aggregate Investment})_t}{(\text{Aggregate Investment})_{t-1}} .$$

[8] More precisely, in our sample of CEOs who left their firms between 1970 and 1988, observations for CEOs far from retirement cannot come from the last years of the sample.

The market index is computed using all firms in the *Forbes* surveys for which investment expenditures exceed one percent of sales, on average, over the sample period. The initial value of the index is scaled to 100 at the beginning of the period. We construct *trend-adjusted* investment expenditures by dividing actual expenditures by the market index; the direct analogy is constructing *inflation-adjusted* expenditures by dividing by the Consumer Price Index. The trend-adjusted 'Investment Ratio' in each year is defined as the trend-adjusted investment expenditures in that year divided by the average trend-adjusted investment expenditures realized over the CEO's career:

$$\text{Investment Ratio} = \frac{\text{Trend-Adjusted Investment Expenditures}}{\text{Average Trend-Adjusted Investment Expenditures Over CEO's Career}}.$$

Exhibit 5 portrays investment profiles that are analogous to those in Exhibit 3 but control for time trends in each investment variable. Panel A shows that trend-adjusted R&D investment increases slightly as the CEO nears the end of his career, although the increase is not nearly as pronounced as in Exhibit 3. Similarly, Panels B and C suggest that advertising and capital expenditures are higher than average for CEOs near retirement. Thus, controlling for the underlying trend makes an important difference, but we still find no evidence that CEOs alter investment behavior to increase accounting earnings as they near retirement.

The investment profiles in Exhibit 5 control for differences due to market-wide trends in investment expenditures but do not control for other potential differences across CEOs that might affect the estimated investment profiles, such as differences in the length of time CEOs stay in office. Short-duration CEOs may have relatively flat investment profiles, for example, since they will be gone before even relatively short-term investments yield significant benefits. Changes in investment policies may be more discernible for long-duration CEOs, since compensation based on accounting earnings creates different incentives to invest early versus late in their careers.

We compared investment profiles for CEOs grouped on the basis of the ultimate length of their tenure as CEO. We find a slight but insignificant decline in trend-adjusted R&D

expenditures for CEOs who stay in office for five or fewer years, AND increased expenditures in the year preceding departure for CEOs who stay in office for six or more years. Similarly, advertising investment ratios and capital expenditure investment ratios are essentially constant for short-duration CEOs, but are higher than average in the last years for long-duration CEOs. In summary, while are findings suggest that investment profiles may indeed vary with the duration of a CEO's time in office, we still find no evidence to support the hypothesis that managers systematically *reduce* R&D and advertising investment as they near retirement.

We also compared investment profiles for CEOs grouped by the CEO's age at retirement. In particular, we contrasted the investment profiles of CEOs who left at ages 64 or 65 with the profiles of those who left either earlier or later. For all three investment variables—R&D, advertising, and capital expenditures—the qualitative features of the investment profile vary only slightly by age at departure: each investment profile for CEOs retiring at ages 64 or 65 is quite similar to the analogous profile for CEOs leaving earlier or later. Again, there is no evidence of reduced investment near retirement for either subsample.

Changes in Investment Growth Rates as CEOs Near Retirement

Although we have been unable to detect a reduction in the *level* of investment expenditures as a CEO nears retirement, recent research by Dechow and Sloan (1991) shows that the *growth rate* (but not the level) of research and development expenditures declines during the CEO's last full fiscal year and in the year of a transition to a new CEO. Moreover, the decline in the growth of R&D is largest for CEOs with small stockholdings, suggesting that the mix of accounting-based and stock-based incentives is important in determining managerial investment behavior.

Exhibit 6 illustrates the main results of the Dechow-Sloan study, which is based on analyses of 58 CEO changes in R&D-intensive industries from 1979-1988. The average inflation-adjusted growth rate in R&D expenditures for CEOs *not* in their last full fiscal year or transition year is 6.9%, compared to average R&D growth of only 3.3% for CEOs in one of

these two years.[9] Dechow and Sloan also allow the near-retirement growth rate to vary with the ratio of the value of the CEO's stock and option holdings to his salary and bonus. The median and average stockholding-to-pay ratios in the Dechow-Sloan study are 9 and 90, respectively, indicating considerable skewness in the distribution of stock ownership. As shown in Exhibit 6, the average R&D growth rate of 3.3% for all CEOs near retirement can be decomposed into a growth rate of only 1.8% for CEOs with no stockholdings, a growth rate of 2.0% for CEOs with median (≈9.0) ratios of stockholdings to pay, a growth rate of 3.4% for CEOs with average ratios, and similarly for CEOs with other ratios of stockholdings to pay. The stockholding-to-pay ratio must be 300 (which is very large but still well less than the sample maximum stockholding-to-pay ratio of 1600) before growth in R&D during a CEO's final years is on a par with the average growth rate for CEOs not near retirement.

The Dechow-Sloan results are consistent with the hypothesis that the focus on short-term profit rather than long-term value is mitigated through stock ownership. In attempting to replicate their results using our data, however, we find that estimates of declining R&D growth surrounding management transitions are highly dependent on both model specification and sample construction. For example, we find no evidence that R&D growth declines near transitions after controlling for differences in average growth rates across CEOs or firms. More importantly, if managers manipulate R&D as a response to earnings-based compensation, we would expect corporate earnings (or at least accruals—the manipulable part of earnings, as discussed in Section 2) to increase near transitions. Neither Dechow-Sloan nor we find any evidence that either earnings or accruals increases as CEOs near retirement. This important finding suggests that factors other than manipulation may explain declining R&D growth rates near a CEO's retirement.

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[9] Estimates are based on an assumed market growth rate in R&D of 8%, which is approximately the value-weighted-average R&D growth rate for firms in the 14 three-digit SIC industries studied by Dechow and Sloan.

Conclusion

The prevalence of compensation based on accounting earnings, together with Healy's evidence concerning the manipulation of earnings across years, suggests that managers will resist investment projects that are profitable for the firm but generate substantial revenues after the manager retires. We find little evidence that compensation policy affects investment in this way. One possible explanation is that, as managers approach retirement, they switch to projects with more immediate payoffs but not do change overall investment expenditures. Since data are available only for total investment expenditures, and not for individual projects, we have no way to investigate this possibility.

Another explanation for our results is that long-run investment policy is formulated by the top-management team, not solely by the CEO, and that members of this team are not likely to reach retirement age simultaneously. Indeed, planning for succession may dictate otherwise (see Vancil 1987), and corporate investment policies and strategies may be influenced by the designated successor long before he takes office. Moreover, while older members of the management team may want to increase the bonus pool by cutting investment expenditures as they approach retirement, younger executives with long horizons will resist investment policies that increase current bonuses at excessive expense to future bonuses. This possibility illustrates an important difference between our study and Healy's. Because bonus plans have ceilings and floors, manipulating the timing of earnings (but leaving total earnings over several years unchanged) can increase bonuses in some years, at no expense to bonuses in other years. The entire top-management team has an incentive to agree to such manipulations. In the investment context, however, manipulation affects not just the timing of earnings but also total earnings over several years: foregoing profitable projects reduces earnings after the CEO has departed, so near-term bonuses rise at substantial expense to future bonuses.

A third potential explanation is that the potential increases in a CEO's wealth from manipulating investment decisions are too small to cause a noticeable shift in managerial behavior. Jensen and Murphy (1990) report that, holding shareholder returns constant, each

$1 million increase in accounting earnings corresponds to an average increase in CEO salary and bonus of only $177. Thus, slashing R&D expenditures by $100 million near the end of a CEO's career will increase his cash compensation by $17,700—or less than one-week's pay for a typical CEO in a large manufacturing firm. (The pay increase would be even smaller if the cost-cutting program caused stock prices to fall.) Jensen and Murphy conclude that current compensation practices, coupled with typical levels of CEO stock ownership, provide few incentives for average executives to take actions that increase shareholder wealth. Their results also suggest that executives have few financial incentives to increase or decrease investment expenditures during their tenure, since their compensation is largely fixed and independent of both stock-price and accounting performance.

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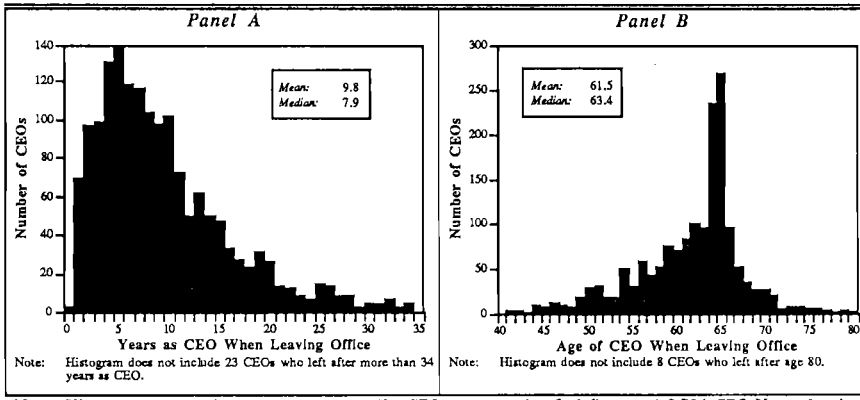
Exhibit 1

Cash Flows From Hypothetical Ten-Year Investment Project

Year	Cash Flow	Present Value of Cash Flow at 10%	Cumulative Present Value
1	-$1,000,000	-$1,000,000	-$1,000,000
2	$0	$0	-$1,000,000
3	$0	$0	-$1,000,000
4	$0	$0	-$1,000,000
5	$0	$0	-$1,000,000
6	$500,000	$310,461	-$689,539
7	$500,000	$282,237	-$407,302
8	$500,000	$256,579	-$150,723
9	$500,000	$233,254	$82,530
10	$500,000	$212,049	$294,579

Exhibit 2

Frequency Distributions for Final CEO Tenure and Age for CEOs Leaving Office During the 1970-1988 Sample Period

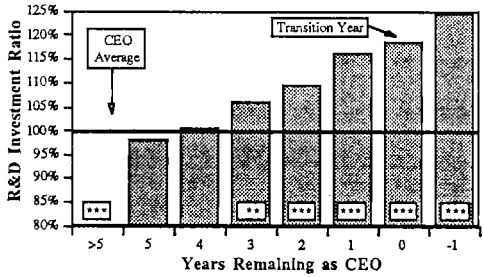


Note: Histograms and statistics are based on 1,631 CEOs, representing 916 firms and 8,786 CEO-Years, leaving their firms during the 1970-1988 sample period.

Exhibit 3

CEO Investment Profiles for Three Measures of Investment: Research and Development, Advertising, and Capital Expenditures

Panel A: *Research and Development Expenditures*



Results based on sample of:

304 CEOs

186 Firms

Sample includes only firms with 1974-1988 average (R&D expenditures)/Sales greater than 1%; years with ratios exceeding .25 are deleted.

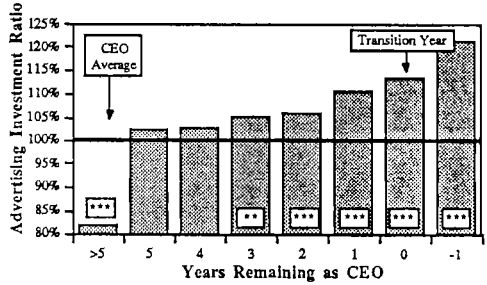
Panel B: *Advertising Expenditures*

Results based on sample of:

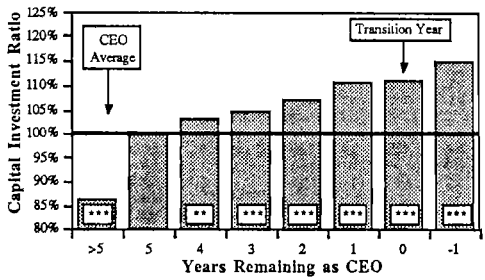
345 CEOs

189 Firms

Sample includes only firms with 1971-1988 average (Advertising expense)/Sales greater than 1%; years with ratios exceeding .25 are deleted.



Panel C: *Capital Expenditures*



Results based on sample of:

977 CEOs

559 Firms

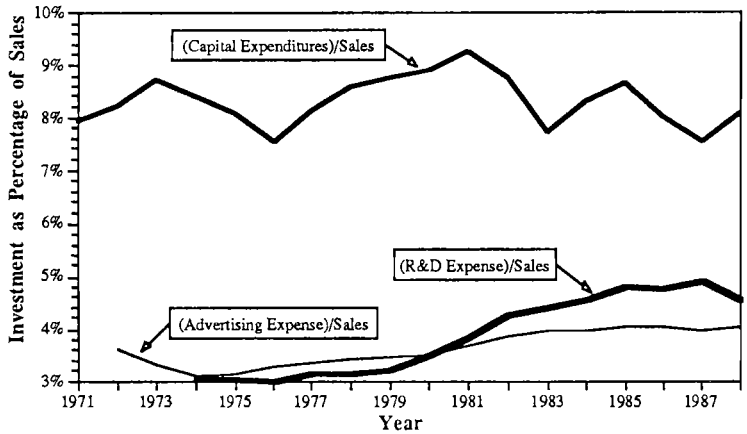
Sample includes only firms with 1971-1988 average (Capital expenditures)/Sales greater than 1%; years with ratios exceeding .50 are deleted.

Note: Investment ratios for each year are defined as investment expenditures divided by the average investment expenditures over the CEOs career (excluding data prior to 1974 for R&D and prior to 1971 for advertising and capital expenditures).

Asterisks indicate that investment ratios are significantly different from the CEO's career average at the 10% (*), 5% (**), or 1% (***) level.

Exhibit 4

Average Investment Expenditures as a Percentage Sales for Large Investment-Intensive Corporations, 1971-1988

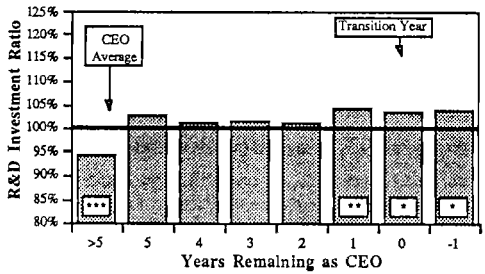


Note: For each investment variable, the time trend is based on firms covered in the *Forbes* surveys with average investment/sales ratios exceeding .01 (after eliminating firm-years ratios above .25 for R&D and advertising, and above .50 for capital expenditures). The research and development ratios are based on data from approximately 260 firms from 1974-1988, the advertising ratios are based on data from approximately 280 firms from 1972-1988, and the capital expenditure ratios are based on data from approximately 810 firms from 1971-1988.

Exhibit 5

CEO Investment Profiles for Three Measures of Investment, Including Adjustment for Market-Wide Investment Time Trends

Panel A: *Research and Development Expenditures*



Results based on sample of:

304 CEOs

186 Firms

Sample includes only firms with 1974-1988 average (R&D expenditures)/Sales greater than 1%; years with ratios exceeding .25 are deleted.

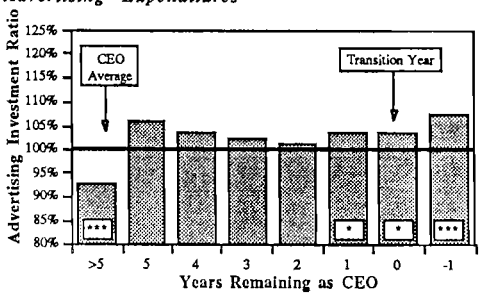
Panel B: *Advertising Expenditures*

Results based on sample of:

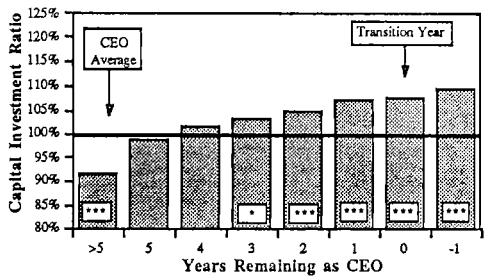
345 CEOs

189 Firms

Sample includes only firms with 1971-1988 average (Advertising expense)/Sales greater than 1%; years with ratios exceeding .25 are deleted.



Panel C: *Capital Expenditures*



Results based on sample of:

977 CEOs

559 Firms

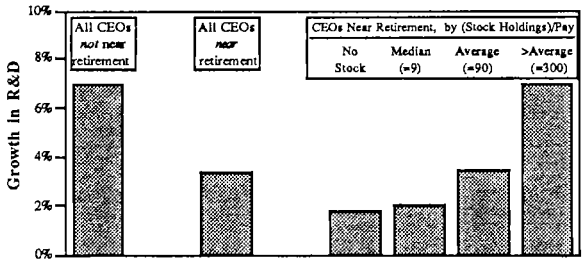
Sample includes only firms with 1971-1988 average (Capital expenditures)/Sales greater than 1%; years with ratios exceeding .50 are deleted.

Note: Investment ratios for each year are defined as investment expenditures divided by the average investment expenditures over the CEOs career (excluding data prior to 1974 for R&D and prior to 1971 for advertising and capital expenditures). Time trends are controlled for by detrending investment expenditures by market averages.

Asterisks indicate that investment ratios are significantly different from the CEO's career average at the 10% (*), 5% (**), or 1% (***) level.

Exhibit 6

Growth Rates in R&D Expenditures for CEOs Grouped by Years Remaining and the Ratio of Stock Holdings to Cash Compensation



Source: Dechow and Sloan (1991). CEOs near retirement defined as CEOs in their last full fiscal year and in the transition year. The ratio of stock holdings to cash compensation is calculated by multiplying (shares held + .6*(options held)) by the year-end stock price, and dividing by cash compensation.