Financial performance surrounding CEO turnover*

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We document the behavior of a variety of financial variables surrounding CEO departures, and estimate the extent to which changes in potentially discretionary variables are explained by poor economic performance rather than direct managerial discretion. We conclude that turnover-related changes in R&D, advertising, capital expenditures, and accounting accruals are due mostly to poor performance. To the extent that outgoing or incoming managers exercise discretion over these variables, the discretion appears to be limited to firms where the CEO's departure is preceded by poor performance. We find no evidence of managerial discretion in strongly performing firms where the CEO retires as part of the normal succession process.

1. Introduction


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expenditures surrounding CEO turnover are declining [Dechow and Sloan (1991)] or ambiguous [Butler and Newman (1989)].

Each of these studies typically focuses on a single financial variable, and offers explanations for the behavior of that financial variable surrounding CEO turnover. Poor stock-price and earnings performance preceding CEO turnover, for example, is attributed to performance-related CEO dismissals [Coughlan and Schmidt (1985), Warner et al. (1988), Weisbach (1988)]. The move to income-reducing accounting methods, and the write-off of unwanted operations and unprofitable divisions, is attributed to incoming CEOs who implicitly blame their predecessors for past ‘mistakes’ [Strong and Meyer (1987), Elliott and Shaw (1988), Weisbach (1993)]. The decline in R&D is attributed to outgoing CEOs’ attempts to boost current accounting profits in their final years [Dechow and Sloan (1991)]. The explanations in each study tend to be variable-specific, as the authors generally ignore the implications of concurrent changes in related financial variables.

We examine and document the behavior of a variety of financial variables surrounding CEO turnover, and consider the implications of simultaneous changes among the variables. Some of the variables we examine (such as R&D, advertising, capital expenditures, and accounting accruals) are assumed subject to considerable managerial discretion, while others (such as sales, assets, and stock-price performance) are assumed less discretionary, i.e., to reflect largely the economic health (‘performance’) of the organization. The behaviors of the various variables are inextricably linked because (i) the discretionary variables are influenced by the firm’s performance as well as CEO turnover and (ii) CEO turnover is endogenous and partially determined by the firm’s performance. Thus, for example, the decline in R&D associated with CEO turnover may reflect managerial discretion, but may also indicate that both R&D expenditures and turnover are caused by a third variable: poor corporate performance.

Many of the explanations offered in the literature regarding the behavior of financial variables surrounding CEO departures involve discretionary accounting or investment decisions made by either the outgoing or the incoming CEO. We focus on three nonmutually exclusive classes of potential managerial discretion associated with CEO departures. First, outgoing CEOs approaching a known retirement or departure date make accounting or investment decisions to increase earnings (and earnings-based compensation) in their final years, at the expense of future earnings (the ‘horizon problem’). Second, outgoing CEOs in poorly performing firms threatened by termination make accounting or investment decisions in an attempt to cover up the firm’s deteriorating economic health (the ‘cover-up’). Third, incoming CEOs take a ‘bath’; i.e., they boost future earnings at the expense of transition-year earnings by writing off unwanted operations and unprofitable divisions (the ‘big bath’).

The primary objective of this paper is to estimate the extent to which changes in potentially discretionary variables are explained by poor economic
performance rather than by direct managerial discretion. The first class of discretionary behavior – reflecting the managerial horizon problem – is likely to be relatively more pronounced in firms with good corporate performance and routine retirements. CEOs in these firms can anticipate their departure and make investment decisions further in advance. The other two classes of discretionary behavior – outgoing CEOs covering up poor performance and incoming CEOs taking a big bath – are likely to be more pronounced in firms with deteriorating economic health. The inextricable links between performance and discretionary behavior make it difficult to disentangle the effects of poor performance from the effects of managerial discretion. Despite these problems, we conclude that changes in R&D, advertising, capital expenditures, and accounting accruals surrounding CEO turnover are due mostly to poor performance. To the extent that outgoing or incoming managers exercise discretion over these variables, the discretion appears to be limited to firms whose poor performance precedes the CEO's departure. We find no evidence of managerial discretion in strongly performing firms where the CEO retires as part of the normal succession process.

A secondary objective of this paper is to address several methodological issues relevant to interpreting existing research in this area. First, prior studies are based on small, specifically selected samples where the posited behaviors are most likely to be observed [Dechow and Sloan (1991), Pourciau (1993), DeAngelo, DeAngelo, and Skinner (1994)]. We examine the robustness and generalizability of earlier results by analyzing a large sample of over 1,000 CEO departures. Second, many studies (including our own) are drawn from samples of firms such as the Forbes 500, which introduces sample-selection biases since firms entering these samples are likely characterized by abnormally high economic performance; we document and attempt to control for these potentially important biases. Third, ultimate inferences often depend on whether the variable in question is controlled by the outgoing or incoming CEO, and there has been inconsistent treatment of the ‘transition year’ in the literature. We discuss alternative interpretations and control for the relative influence of outgoing and incoming CEOs by segmenting the sample by CEOs leaving early and late in the fiscal year.

We begin in section 2 by describing the behavior of eight financial variables surrounding CEO departures. We summarize the explanations offered in the literature regarding the behavior of each variable, and show declining transition-year growth rates for both the relatively discretionary and the relatively nondiscretionary variables. The declining transition-year growth rates across all financial variables underscore the difficulty in drawing inferences

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1Because of the difficulty to distinguish empirically CEO ‘firings’ from CEO ‘quits’ from CEO ‘normal retirements’ at a prespecified age, we use the terms ‘turnover’ and ‘departures’ to encompass all three cases.
regarding managerial discretion surrounding CEO departures, since the discr
etionary variables and turnover itself are both driven, in part, by the deteriora
tion of overall corporate performance. In section 3, we control for firm perform-
ance using a system of simultaneous equations that allows for endogenous CEO
departures, and find little evidence of managerial discretion after controlling for
firm performance. In addition, we segment the sample into subsamples in which
departures are unrelated to performance, and conclude that managerial discre-
tion (if it is exercised at all) is limited to performance-related CEO departures.
Section 4 considers alternative treatments and interpretations of the transition
year and alternative definitions of accounting accruals. Section 5 summarizes
the paper and offers some conclusions.

2. Growth rates surrounding CEO departures

The purpose of this section is to describe the behavior of eight financial
variables surrounding CEO departures, before trying to disentangle the effects
of performance and managerial discretion. Section 2.1 describes our sample of
over 1,000 CEO departures from 1971 to 1989. Section 2.2 defines the variables
analyzed and presents and interprets evidence on growth rates surrounding
CEO departures. Section 2.3 presents evidence on growth rates after adjusting
each variable for contemporaneous market factors.

2.1. Data sources

We obtain starting and ending dates for a sample of CEOs from the 1971 to
1990 Forbes annual surveys of executive compensation. Using these surveys, we
identified 1,630 executives serving in 915 corporations who left office during the
1971–1989 sample period (these CEOs may have started in office prior to 1971).
We only consider going concerns and exclude CEO departures associated with
bankruptcies, takeovers, and going-private transactions. The fiscal year in which
the CEO changes is defined as the transition year; thus the year preceding the
transition year is the outgoing CEO’s last full fiscal year, and the transition year
is the first partial year for the incoming CEO.

We analyze the performance of various financial variables – described sepa-
ratey below – in the transition year, the five fiscal years preceding the transition
year (or over the CEO’s career if the CEO is in office fewer than five years), and
the five fiscal years following the transition year. Both CEOs are in office for
some portion of the transition year. In interpreting the results below, it is
important to remember that financial data for the transition year are likely
influenced by both the outgoing and incoming CEO. For example, even if CEO
turnover occurs early in the transition year, the outgoing CEO is likely to have
had a substantial impact on the transition year’s operation if the budgets and
operating plans set by the outgoing CEO in the preceding year are followed. On the other hand, when the transition occurs late in the fiscal year, the incoming CEO could still have a significant impact on transition-year operations if the incoming CEO was involved early in the planning process or if the incoming CEO changes the outgoing CEO's operating plans or makes year-end accounting adjustments for the transition year.

Fiscal-year financial data from 1965–1989 are obtained from Standard and Poor's Compustat (primary, tertiary, supplemental, OTC, research, and full-coverage) files, and all monetary variables are restated to 1988 constant dollars using the end-of-fiscal-year consumer price index. We control for the effects of outliers by omitting observations in the top or bottom 1% for each variable. Omitting these outliers affects the magnitudes, but does not affect the sign or significance of our results.

One difficulty in interpreting behavior in financial variables surrounding CEO departures is distinguishing financial performance actually associated with CEO departures from firm-specific behavior unrelated to departures. For example, a general downward trend in firm performance (reflected in declining growth rates for a wide range of financial variables) might be incorrectly interpreted as a CEO-departure phenomenon. In the appendix, we show that using Forbes surveys to identify CEO turnover introduces a definite time-series pattern into the financial variables: high growth rates when firms enter the Forbes list and declining thereafter. We control for such firm-specific trends by (i) analyzing financial performance following as well as preceding CEO departures and (ii) using only firms ranked in the Forbes 500 for at least eight of the ten years prior to the CEO departure. This restriction reduces our sample to 1,063 executives serving in 599 firms. The frequency of CEO departures by year ranges from 42 in 1977 to 67 in 1983, suggesting relatively little time clustering.

2.2. Financial variables

Research and Development. Researchers investigating managerial horizon problems — such as Butler and Newman (1989) and Dechow and Sloan

\footnote{Forbes compensation surveys were first published in 1971, covering fiscal year 1970. These surveys, which cover approximately 800 CEOs annually, are based on the Forbes 500 that includes CEOs whose firms ranked among the 500 largest U.S. companies on at least one of four criteria: sales, profits, assets, and market value of equity. For fiscal years prior to 1970, we construct a 'synthetic Forbes 500' by ranking all nonforeign Compustat firms on the basis of sales, assets, income, and market values, and then select the 500 largest firms ranked on each criteria in each year as being on our 'synthetic Forbes'.}

\footnote{As an alternative approach to control for firm-specific trends, we also de-trended the performance data after allowing firm-specific linear growth trends for each variable. Results on the de-trended variables were generally insignificant, reflecting both nonlinearities in firm growth patterns and the fact that de-trending in this fashion masks the CEO career effects we've attempted to identify.
(1991) have focused on research and development (R&D) expenditures as a likely target for managerial discretion preceding CEO departures. To the extent that CEOs are rewarded based on the accounting performance of their firms, CEOs nearing retirement have incentives to increase short-run earnings at the expense of long-run profitability. Since 1974, the Financial Accounting Standards Board (FASB) has required firms to treat R&D expenditures as expenses in the year incurred. Therefore, assuming that these expenditures do not benefit the year of the investment, each dollar cut in the current year's R&D budget results in a dollar increase in the year's before-tax accounting earnings.

Panel A of fig. 1 shows the growth rates in R&D expenditures preceding and following CEO departures. Year 0 is the transition year, year -1 is the last full year of the outgoing CEO, and year +1 is the first full year of the incoming CEO. The growth rates are positive in all years (except year +1), reflecting the general increase in R&D investment over the sample period [Gibbons and Murphy (1992)]. R&D growth rates fall preceding CEO departures, and remain at a relatively low level during the first several years of the new CEO.

The shading in fig. 1, panel A indicates whether the growth rates in years -1 through +5 are significantly different from the growth rates in years -5 through -2. These significance levels are determined by estimating the following pooled cross-sectional time-series regression:

\[
\Delta \ln(R&D)_t = a + b \left( \text{Last full year old CEO} \right)_t + c \left( \text{Transition year} \right)_t \\
+ d \left( \text{First full year new CEO} \right)_t + e \left( \text{Second year new CEO} \right)_t \\
+ f \left( \text{Third year new CEO} \right)_t + g \left( \text{Fourth year new CEO} \right)_t \\
+ h \left( \text{Fifth year new CEO} \right)_t. \tag{1}
\]

Mean growth rates in years -5 to -2 are separately depicted as the lightly shaded bars in fig. 1, but these years are combined as the intercept in the regression. The last full fiscal year and the transition year are unshaded in panel A, indicating that the estimated coefficients for \( b \) and \( c \) are not statistically different.

Rewards for current accounting performance can be pecuniary (e.g., annual bonuses) or non-pecuniary (e.g., prestige and publicity associated with strong accounting performance). We ignore the effects of stock-based compensation and other long-term plans designed to mitigate the horizon problem [Gibbons and Murphy (1992)].
from years $-5$ through $-2$; thus our findings do not support the hypothesis that CEOs reduce R&D expenditures before their departure. The incoming CEO's first year and third year are completely shaded in panel A, indicating that the estimated coefficients for $d$ and $f$ are statistically different from zero at the 1% level; thus, R&D growth rates in year $+1$ and $+3$ are significantly smaller than growth rates in years $-5$ through $-2$. Similarly, the cross-hatched bars for years $+2$ and $+4$ indicate that the estimated coefficients for $e$ and $g$ are statistically different from zero at the 10% level, indicating that R&D growth rates in year $+2$ and year $+4$ are significantly lower than growth rates in years $-5$ through $-2$.

Our findings in panel A of fig. 1 are consistent with Butler and Newman (1989) and Gibbons and Murphy (1992), who conclude that departing executives do not reduce R&D expenditures in their final year. Indeed, our results suggest that R&D expenditures are cut by incoming CEOs (in years $+1$ through $+4$) rather than by departing CEOs. Dechow and Sloan (1991), however, combine the CEO's last full fiscal year and the transition year and report a significant fall in the growth rate of R&D expenditures during these two final years for a sample of CEOs in R&D-intensive industries. Overall, therefore, the evidence regarding R&D growth surrounding CEO turnover is mixed, although there is some evidence that CEOs in R&D-intensive industries reduce R&D growth prior to departure.

Advertising. Similar to R&D expenditures, advertising is an expensed investment in which the benefits from the investment are probably not fully realized during the year of the expenditure. Since the outgoing CEO bears the cost of current advertising via bonus compensation plans but does not receive the full future benefits (because the CEO is retired), he reduces these expenditures in the year(s) before he retires. Panel B of fig. 1 shows that the growth rate of advertising expenditures is significantly smaller in the transition year than in years $-5$ through $-2$. The significance levels are determined by estimating eq. (1) using $\Delta \ln (\text{Advertising})$ as the dependent variable. The result that the transition-year dummy variable is negative and significant is consistent with the conjecture that outgoing CEOs cut advertising expenditures prior to their departure. This interpretation, however, hinges on the assumption that the outgoing CEO (and not the incoming CEO) controls advertising expenditures in the transition year. We find no drop in advertising in year $-1$, the last full fiscal year of the outgoing CEO.

Throughout the paper, all significance levels are two-tail tests.

Using 'he' to describe CEOs reflects more than convention: only one (Liz Claiborne's Elizabeth C. Otenberg, who retired in June 1988) of the 1,630 CEOs depicted in our sample 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.
Note: Growth rates for earnings given by $\Delta X_{t}/Sales_{t-1}$. Growth rates for all other variables is $\Delta \ln(X_t)$.

- Not significantly different from years -5 to -2
- Significantly different from years -5 to -2 at 10% level
- Significantly different from years -5 to -2 at 1% level

Fig. 1. Growth rates in financial variables surrounding CEO departures; both the outgoing and incoming CEO serve during the transition year (0).
Capital expenditures are similar to R&D and advertising expenditures in that the benefits from current investment are not fully realized until many years following the investment. Unlike R&D and advertising, however, capital expenditures are not immediately expensed, so each capital expenditure dollar decreases accounting earnings by only the first-year charge to depreciation (less any first-year benefits). Therefore, departing CEOs wishing to increase earnings-based compensation should reduce R&D and advertising expenditures more than capital expenditures.

Panel C of fig. 1 shows that the growth rate of capital expenditures is significantly lower in the transition year and in the incoming CEO's first full year than in years −5 through −2. It seems implausible to attribute the decline in capital expenditures to departing CEO's investment decisions that increase accounting earnings because cutting these expenditures likely has only a small effect on current earnings. This result suggests that similar transition-year declines in R&D and advertising reflect factors other than the exercise of managerial discretion.

Accounting Accruals and Earnings. The predictions on managerial discretion over R&D and advertising suggest that outgoing CEOs take actions that increase accounting earnings (thereby increasing their earnings-based compensation) as they approach retirement. Accounting accruals, defined as the difference between accounting earnings and cash flows, are often used as a proxy for the portion of earnings over which the manager can exercise the most discretion. Therefore, increases in accounting accruals and earnings preceding CEO departures are evidence of managerial discretion by outgoing CEOs.

An alternative theory with a similar prediction is offered by DeAngelo (1988a, p. 7), who argues that managers ‘window-dress earnings to portray a favorable earnings picture during the (proxy solicitation) campaign’ thereby increasing the incumbent managers’ chances of retaining their jobs. If managers are fired for poor firm performance and managers have discretion over the performance measures used by the board in their termination decision, then CEOs who face a high likelihood of termination have incentives to select income-increasing

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*Compustat describes capital expenditures (data item 128) as the cash outflow for additions to property, plant, and equipment. Based on data in Compustat footnotes, up to one-sixth of the capital expenditure observations in any given year also include disposals and retirements of property, plant, and equipment. To provide comparability to other studies, we do not make any adjustments to Compustat's capital expenditures. The effect of this decision is to introduce measurement error into the calculated capital expenditure growth rates which biases the estimated regression coefficients towards zero.

*See, for example, Healy (1985), DeAngelo (1986, 1988a,b), and Pourciau (1992). The definition of accruals we use, following DeAngelo et al. (1994), is net income less funds from operations plus the changes in accounts receivables, inventories, and other current assets less the changes in accounts payable, taxes payable, and other current liabilities. We consider alternative definitions of accruals in section 4.2 below.
accounting accruals. Since the CEO's expectation of termination is likely high before an actual termination (i.e., terminations are not completely unexpected by the CEO), income-increasing accruals are likely more prevalent in the CEO's last year(s), assuming the CEO has not exhausted all available income-increasing procedures; see below.

Panel D of fig. 1 shows the ratio of accounting accruals to sales in the years surrounding CEO departures. We use the ratio of accruals to sales instead of measures based on changes in accruals due to our own analysis and evidence in Dechow (1992) regarding the time-series properties of accruals. In particular, we analyzed the time-series properties of R&D, advertising, capital expenditures, sales, assets, and stock prices using all available annual observations for 1,398 Forbes 500 firms from 1950–1989. The logarithm of these six variables are reasonably well described by a random walk. We cannot compute logarithms for accruals and earnings, since these variables are not strictly positive, but analyzed instead the time-series properties of their levels. Consistent with Dechow (1992), we find that while earnings are reasonably approximated by a random walk, we reject the random-walk model for accruals. The evidence in panel D suggests that accruals are significantly lower in the transition year than in prior years. This evidence is inconsistent with the joint hypothesis that outgoing CEOs control transition-year accruals and make accounting choices that increase their earnings-based compensation.

Panel E of fig. 1 shows the growth rates for accounting earnings – defined as the change in net income after extraordinary items deflated by lagged sales – surrounding CEO departures. The figure shows that the growth in earnings is significantly lower in the outgoing CEO's last full year and transition year than in years −5 through −2. Further, the incoming CEO's first full year is associated with a pronounced increase in earnings. Similar to the accrual results, this evidence is inconsistent with the prediction that outgoing CEOs make accounting choices to increase their earnings-based compensation.

Although the evidence in panels D and E of fig. 1 is inconsistent with the prediction that outgoing CEOs exercise managerial discretion over accruals and earnings in years −1 and 0, the evidence is consistent with the exercise of managerial discretion by incoming CEOs. A number of authors argue that incoming CEOs take a 'big bath' upon their appointment by increasing write-offs and accounting accruals thereby lowering reported earnings. Elliott and

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9 More precisely, we calculated the first-order autocorrelations of ln(Variable), by firm and found median autocorrelations for these six variables ranging from 0.77 for capital expenditures to 0.97 for sales and assets. The median autocorrelations of Δln(Variable), ranged from −0.14 for capital expenditures to 0.21 for assets. We interpret these results as supporting our use of Δln(Variable), as the variable of interest.

10 The median autocorrelation for earnings and accruals was 0.67 and 0.07, respectively.
Shaw (1988) argue: 'By consciously overstating losses attributable to their predecessors, management improves expectations about the future and lowers the benchmark against which its performance will be measured.' DeAngelo (1988a), Moore (1973), Pourciau (1993), Strong and Meyer (1987), Elliott and Shaw (1988), and Weisbach (1992) report evidence consistent with incoming CEOs taking a big bath.¹¹

One problem in interpreting the behavior of accruals and earnings surrounding CEO turnover is our inability to identify exactly when the income-inflating discretion begins and how much discretion the CEO has remaining in any given year.¹² CEOs do not have a limitless supply of income-inflating accounting procedures, and managerial discretion over accruals in any given year is limited in part by the income-inflating decisions exercised in prior years. It is possible that CEOs in troubled firms successfully delay termination by inflating earnings over a number of years (e.g., years -5 to -2), and are fired only after exhausting the supply of income-inflating accounting procedures. Under this scenario, accruals are lower in the transition year than in years preceding the transition year — in spite of the outgoing CEO’s desire for higher accruals — reflecting the diminished supply of remaining income-inflating procedures. Moreover, the lower transition-year accruals (fig. 1, panel D) in this case do not reflect income-reducing discretion by the incoming CEO but rather reflect income-increasing accruals by the outgoing CEO in the ‘benchmark’ years -5 to -2.

Sales, Assets, and Stock Prices. Panels F, G, and H of fig. 1 show the behavior of the growth rates of sales, assets, and stock prices in the years preceding and following CEO turnover. Growth rates for both sales and assets decline significantly prior to CEO departures, and remain at a relatively low level for the first several years of the replacement CEO. The growth rate for stock prices — defined as \( \Delta \ln(1 + r) \) where \( r \) is the total return to shareholders including price appreciation and dividends — is also significantly lower immediately preceding CEO departures than in years -5 through -2.

Although sales, assets, and stock prices are subject to some managerial discretion (the realization of sales revenues, for example, can be accelerated from one period to the next) the discretionary influence is reasonably assumed to be less than on R&D, advertising, capital expenditures, accruals, and earnings.

¹¹Elliott and Shaw (1988, p. 110) conclude: 'Our evidence regarding accounting measures, returns, and analysts’ revisions suggests that large write-offs are reported by firms experiencing economic difficulty.' While not rejecting the big bath, their evidence is consistent with the bath occurring in poorly performing firms. For example, the bath acknowledges the firm’s problems to its lenders [DeAngelo et al. (1994)].

¹²Christie and Zimmerman (1992) report that in a sample of takeover targets, managers choose more income-inflating depreciation methods up to ten years before the takeover bid than nontargets in the same industry.
Under this assumption, the declines in sales, assets, and stock-price growth surrounding CEO departures primarily reflect not managerial discretion, but rather the fact that CEOs are more likely to leave when overall corporate performance is poor than when overall performance is high. These findings are consistent with results in Coughlan and Schmidt (1985), Warner et al. (1988), Weisbach (1988), Gibbons and Murphy (1990), and Jensen and Murphy (1990), who document poor firm performance in years immediately preceding CEO turnover. The findings are also consistent with Gilson (1989), who documents increased turnover in financially distressed firms.

The finding that CEO departures follow poor overall performance has generally been interpreted as evidence that implicit contracts between shareholders and executives provide incentives for managers to maximize firm value through threat of dismissal. But, in addition to incentives, there are other explanations for the empirical relation between poor performance and CEO turnover. For example, turnover will occur if the quality of the 'match' between the firm and the CEO deteriorates over his career as his human capital depreciates. Or, the likelihood of turnover increases when there are unexpected changes in the firm's environment and the current CEO does not possess the requisite skills to respond to the changed circumstances.

2.3. Market-adjusted financial variables

Panel H of fig. 1 suggests that stock-price performance declines prior to CEO departures and subsequently improves in years +2 to +5 to levels significantly higher than in years −5 through −2. Although this pattern of stock prices suggests a trading rule (purchase stock upon CEO departure announcements), it is also consistent with underlying market movements in stock prices. In particular, years +2 through +5 are disproportionately represented by the later years in our 1971–1989 sample when common-stock returns were generally high, while years −5 through −2 are disproportionately represented by the earlier years in our sample, when stock returns were generally lower. Similar business-cycle trends likely affect the other financial variables analyzed in fig. 1.

We control for market-wide movements in the eight financial variables by constructing growth rates that are adjusted for contemporaneous market factors. In particular, we compute market-adjusted growth rates by estimating

E. Accounting Earnings

F. Sales

G. Assets

H. Stock Prices

Note: Growth rates for earnings given by $\frac{\Delta X_i}{\text{Sales}_{t-1}}$. Growth rates for all other variables is $\Delta \ln(X_i)$.

- Not significantly different from years -5 to -2
- Significantly different from years -5 to -2 at 10% level
- Significantly different from years -5 to -2 at 1% level

Fig. 2. Market-adjusted growth rates in financial variables surrounding CEO departures; both the outgoing and incoming CEO serve during the transition year (0).
individual firm-specific time-series regression for each data series:

\[ X_{it} = \alpha_t + \beta_t X_{Mt} + \epsilon_{it}. \]  

(2)

where

\[ X_{it} = \Delta \ln(\text{Variable}_{it}) \text{ (or } \Delta \text{Variable}_{it}/\text{Sales}_{it-1} \text{ for earnings and Variable}_{it}/\text{Sales}_{it-1} \text{ for accruals).} \]

\[ X_{Mt} = \text{median value of } X_{it} \text{ from all firms in the CEO file in fiscal year } t. \]

\[ \epsilon_{it} = \text{residuals from the regression.} \]

Separate regressions for each firm are estimated for each of the eight financial variables using price-level-adjusted data from 1950 to 1989. The residuals from these equations contain the firm-specific amount after subtracting the component common to all the firms in the same fiscal year. The cross-sectional median is used as the independent variable in each regression in eq. (2) instead of the mean to reduce the weight placed on outliers. Ball and Brown (1967) use similar regressions to control for market-wide trends.

Fig. 2 presents the market-adjusted growth rates surrounding CEO departures for the eight financial variables. Although the magnitude and significance of some results are affected by using market-adjusted data, the inferences drawn from fig. 2 are similar to those drawn from the unadjusted data in fig. 1. Panel A shows that the growth rate of R&D expenditures falls significantly in the transition year, and remains significantly lower in the first four years of the incoming CEO (compared to years -5 through -2 for his predecessor). Panel B reports a significant drop in market-adjusted advertising expenditure growth in the transition year. Capital expenditure growth (panel C) falls in the transition year, and remains low during the first two full years of the replacement CEO. Panel D shows that the ratio of accruals to lagged sales drops significantly in the transition year, while panel E shows a significant decline in the change in earnings in the outgoing CEO's last full year and in the transition year, rebounding in the incoming CEO's first full year. Both the transition-year drop and subsequent-year rebound are consistent with the 'big bath' explanation. Market-adjusted growth rates of sales, assets, and stock prices decline preceding CEO departure; the profitable trading rule suggested in fig. 1 disappears after using market-adjusted stock-price data.

3. CEO discretion after controlling for poor performance

The evidence presented in section 2 suggests that firm performance and managers' exercise of discretion over financial variables are inextricably linked. All the financial variables in figs. 1 and 2, both those thought to be more susceptible to managerial discretion (R&D, advertising, capital expenditures,
accounting accruals, and earnings) and those thought to be less susceptible to managerial discretion (sales, assets, and stock prices), fall surrounding CEO turnover. These findings suggest that general poor firm performance is correlated with both CEO turnover and the discretionary variables. This section formally incorporates endogenous CEO turnover into models of discretionary spending using a system of simultaneous equations to control for firm performance. Two equations are proposed: a CEO turnover equation and an equation relating discretionary variables to both CEO turnover and firm performance. Section 3.1 describes the simultaneous-equation system. Section 3.2 presents the empirical findings from estimating the simultaneous-equation models. Section 3.3 presents an alternative way of controlling for firm performance, and section 3.4 discusses the relative importance of managerial discretion and overall corporate performance in explaining the behavior of the discretionary financial variables.

### 3.1. Endogeneity of CEO turnover

Earlier research on management turnover has been concerned with (i) factors associated with turnover and (ii) the incentives of incoming and outgoing CEOs. Papers addressing the first issue include Coughlan and Schmidt (1985), Warner et al. (1988), Weisbach (1988), Gibbons and Murphy (1990), and Jensen and Murphy (1990). These studies document poor firm performance in years immediately preceding CEO turnover, and also find turnover is related to the age of the CEO. The literature has established empirical support for the following model of CEO turnover:

\[
\Pr(\text{CEO turnover}_t) = f(\text{Firm performance}_t, \text{CEO age}_t, \ldots) + u_t, \quad (3)
\]

where \( f \) denotes some function and \( u \) is a random error term. CEO turnover in year \( t \) is negatively related to firm performance and positively related to CEO age, both in year \( t \). However, mandatory retirement policies make the age-turnover relation nonlinear.

The papers addressing the second issue (the incentives of incoming and outgoing CEOs) analyze a particular financial variable such as R&D, accounting earnings, or accruals as a way to test whether incoming or outgoing CEOs exercise discretion. For example, Dechow and Sloan (1991) conclude that outgoing CEOs cut R&D and advertising. They argue that the horizon problem causes the outgoing CEO to boost accounting earnings and thereby to increase executive compensation in his last year(s).\(^{14}\)

\(^{14}\)Using less powerful research methods, Butler and Newman (1989) are unable to document that departing executives reduce R&D in their final year.
While the horizon problem predicts R&D and CEO turnover are related. R&D spending and firm performance are likely structurally related. If the firm is doing well, the net present value of future payoffs to current R&D expenditures are likely to be high. That is, if an increase in the demand for the firm's products leads to both higher profits and higher marginal productivity of R&D, then R&D spending is likely correlated with firm performance. In addition, if the firm is doing well, internally generated cash is available to fund current R&D projects, thus lowering the cost of R&D projects. Therefore, R&D is likely associated with both CEO turnover (due to the horizon problem) and firm performance (given the structural relation between R&D and firm performance). This suggests the following model of a discretionary variable (e.g., R&D or accruals):

\[
\text{Discretionary variable,} = g(\text{CEO turnover}, \text{Firm performance}, \ldots) + v, \tag{4}
\]

where \( g \) denotes some function and \( v \) denotes an error term.

Eqs. (3) and (4) illustrate the relation among firm performance, CEO turnover, and discretionary variables. Firm performance is a right-side variable in both eqs. (3) and (4). A negative simple correlation between CEO turnover and the discretionary variable can be due to one of two reasons. First, the horizon problem predicts a negative relation between turnover and the discretionary variable. Second, since firm performance and turnover are negatively associated [eq. (3)] and performance and the discretionary variable are positively correlated [eq. (4)], then turnover and the discretionary variable are likely negatively correlated. This negative association between turnover and the discretionary variable results because turnover is a proxy variable for performance, and not from the outgoing CEO exercising discretion. Therefore, one cannot conclude that a negative association between the discretionary variable and turnover is consistent with outgoing CEOs exercising discretion. Such an inference is valid only after controlling for the structural relation between firm performance and the discretionary variable. Omitting firm performance from eq. (4) results in the usual correlated omitted variables problem, causing the coefficient on turnover to be biased.

3.2. Empirical results – Simultaneous-equation models

Eqs. (5) and (6) below represent the simultaneous equation model where CEO turnover is the endogenous variable:
CEO turnover\(_{it} = a + b\left(\text{Market-adjusted stock return}\right)_i + c\left(\text{Market-adjusted stock return}\right)_{i-1} + d\left(\text{Change in earnings}\right)_i + e\left(\text{Change in earnings}\right)_{i-1} + f\left(\text{CEO age}\right)_i + g\left(\text{CEO age} = \text{64 or 65}\right)_i. \tag{5}

\text{Growth (Variable}_{it} = a' + b'\left(\text{CEO turnover}\right)_i + c'\left(\text{Market-adjusted stock return}\right)_i + d'\left(\text{Market-adjusted stock return}\right)_{i-1} + e'\left(\text{Change in earnings}\right)_i + f'\left(\text{Change in earnings}\right)_{i-1}. \tag{6}

CEO turnover in eq. (5) is a function of (i) firm performance (measured as current and lagged market-adjusted stock returns and changes in earnings) and (ii) CEO age. (We consider alternative specifications of the CEO-turnover regression in section 3.2.1 below.) Two CEO-age-related variables are included: age of the CEO and a dummy variable indicating whether the CEO is age 64 or 65. The latter variable captures the known empirical regularity that normal retirement policies require CEOs to retire at age 64 or 65. Roughly 30% of our sample CEOs leave office at age 64/65. This makes turnover and CEO age highly nonlinear, and we capture this nonlinearity in eq. (5) by including the age 64/65 dummy variable. In eq. (6), the dependent variable, Growth (Variable\(_{it}\)), is a function of CEO turnover and firm performance. Firm performance is measured as contemporaneous and lagged market-adjusted stock returns and contemporaneous and lagged change in earnings.

A challenge in implementing empirically eqs. (3) and (4) is defining the measure of overall firm performance assumed to influence both CEO turnover and the behavior of discretionary financial variables. Prior research documents that stock-price performance and changes in accounting earnings are useful in predicting CEO turnover [e.g., Weisbach (1988)], and we consequently incorporate current and past realizations of these variables into our measure of overall firm performance. The problem in using these performance measures, however, is that the discretionary variables R&D, advertising, capital expenditures, and accruals are mechanically as well as structurally linked to stock-price performance and accounting earnings. For example, while we predict that poor firm performance – as reflected by poor accounting and stock-price performance – will be structurally associated with lower expenditures on R&D
and advertising, we also acknowledge that R&D and advertising expenditures are *mechanically* linked to earnings (since both R&D and advertising are expensed) and to stock prices (through the market's expectations of the present value of the expenditures upon announcement). Similarly, there is a mechanical link between earnings and accruals (since accruals are defined as earnings less cash flows), although there is not an obvious mechanical link between accruals and *changes* in earnings. Including these firm performance variables in eq. (6) allows us to identify the effect of CEO turnover after controlling for both the structural and mechanical relations. Underlying our interpretations of the empirical results below is the assumption that the control variables, in particular earnings changes, reflect overall firm performance and not managerial discretion.

Eqs. (5) and (6) are estimated using both ordinary least squares (OLS) and two-stage least squares (2SLS). Data, if available, for the eleven years -5 to +5 surrounding CEO turnover are used in the estimation. The CEO turnover variable (transition-year dummy) is coded as zero in years -5 to -1 and one in year 0. If a CEO is in office for fewer than five years before departing, then observations prior to the CEO's appointment will be missing. If the new CEO leaves office before year +5, then the transition-year dummy is coded as one in those turnover years. The turnover model findings are presented in section 3.2.1 and the simultaneous equation results are presented in section 3.2.2.

### 3.2.1. CEO turnover models

Eqs. (5) and (6) represent the simultaneous-equation model where CEO turnover is the endogenous variable and firm performance is a right-side variable in each equation. A separate turnover model is estimated for each discretionary variable (R&D, advertising, capital expenditures, and accruals). Instead of presenting four separate turnover models, table 1 presents OLS and Logistic models for the entire sample. The separate 2SLS turnover models (not reported) are virtually indistinguishable from the OLS and Logistic models in table 1.

---

15 Different assumptions about the time-series properties of cash flows and accruals can induce a relation between accruals and changes in earnings. For example, if accruals are random and independent of cash flows, then accruals and earnings changes are positively associated. But accruals and earnings changes are negatively correlated if cash flows are a first-order moving average in the first differences and current accruals are a constant negative fraction of the contemporaneous shock to cash flows.

16 Given the structure of the model in eqs. (5) and (6), in particular there are no endogenous variables on the right side of the turnover model, OLS and two-stage least squares yield identical parameter estimates for eq. (5).

17 All of the p-values on the coefficients are slightly higher in the two-stage equations consistent with the smaller sample sizes. All are highly significant except for the change in earnings in period t in the R&D model and in the accruals model.
Table 1
Estimated OLS and Logistic models predicting CEO turnover using market-adjusted stock returns, changes in earnings, sales growth, and CEO age.*

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>OLS regressions</th>
<th>Logistic regressions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
</tr>
<tr>
<td>Intercept</td>
<td>-0.5437</td>
<td>-0.5423</td>
</tr>
<tr>
<td></td>
<td>(-14.1)</td>
<td>(-14.2)</td>
</tr>
<tr>
<td>Market-adjusted stock return in period t</td>
<td>-0.0473</td>
<td>-0.0455</td>
</tr>
<tr>
<td></td>
<td>(-2.5)</td>
<td>(-2.6)</td>
</tr>
<tr>
<td>Market-adjusted stock return in period t - 1</td>
<td>-0.0467</td>
<td>-0.0473</td>
</tr>
<tr>
<td></td>
<td>(-2.5)</td>
<td>(-2.5)</td>
</tr>
<tr>
<td>Market-adjusted stock return in period t - 2</td>
<td>-0.0292</td>
<td>-0.0207</td>
</tr>
<tr>
<td></td>
<td>(-1.5)</td>
<td>(-1.4)</td>
</tr>
<tr>
<td>ΔEarnings in period t</td>
<td>-0.3952</td>
<td>-0.3744</td>
</tr>
<tr>
<td></td>
<td>(-3.3)</td>
<td>(-3.4)</td>
</tr>
<tr>
<td>ΔEarnings in period t - 1</td>
<td>-0.7191</td>
<td>-0.6702</td>
</tr>
<tr>
<td></td>
<td>(-5.3)</td>
<td>(-5.5)</td>
</tr>
<tr>
<td>ΔEarnings in period t - 2</td>
<td>-0.1266</td>
<td>-0.1134</td>
</tr>
<tr>
<td></td>
<td>(-0.9)</td>
<td>(-0.9)</td>
</tr>
<tr>
<td>Sales growth in period t</td>
<td>-0.0096</td>
<td>-0.00873</td>
</tr>
<tr>
<td></td>
<td>(-0.3)</td>
<td>(-0.3)</td>
</tr>
<tr>
<td>Sales growth in period t - 1</td>
<td>0.0291</td>
<td>0.2413</td>
</tr>
<tr>
<td></td>
<td>(0.8)</td>
<td>(0.9)</td>
</tr>
<tr>
<td>Sales growth in period t - 2</td>
<td>-0.0036</td>
<td>0.0040</td>
</tr>
<tr>
<td></td>
<td>(-0.1)</td>
<td>(0.0)</td>
</tr>
<tr>
<td>CEO age in period t</td>
<td>0.01166</td>
<td>0.01164</td>
</tr>
<tr>
<td></td>
<td>(17.8)</td>
<td>(17.8)</td>
</tr>
<tr>
<td>Dummy variable = 1 if age 64 65 in period t</td>
<td>0.2268</td>
<td>0.2268</td>
</tr>
<tr>
<td></td>
<td>(18.7)</td>
<td>(18.8)</td>
</tr>
<tr>
<td>R²</td>
<td>0.1173</td>
<td>0.1168</td>
</tr>
</tbody>
</table>

* t-statistics (OLS) and asymptotic t-statistics (Logit) in parentheses. Sample size is 8,548 for all regressions. Dependent variable equals 1 if the CEO is in the transition year, and 0 otherwise.

The first two columns of table 1 report single-equation OLS models of CEO turnover [eq. (5)]. The first column is the complete model and the second column is a restricted model after deleting second-lag terms for stock return and earnings and deleting sales growth, variables that were not significant in the larger model. Consistent with Coughlan and Schmidt (1985), Warner et al. (1988), and Weisbach (1988), the results in the first two columns indicate that the likelihood of CEO turnover is higher when contemporaneous and lagged stock returns and earnings changes are lower. Also, the likelihood of CEO turnover is
higher as CEO age increases and when the CEO age is 64 or 65. The \( t \)-statistics on the coefficients for accounting earnings are larger than those on stock returns. The models in table 1 differ from Weisbach (1988, table 5) in that additional performance variables are included (lagged terms from two years before the turnover and sales growth) but are not significant.\(^{18}\)

Technically, eq. (5) should be estimated in a simultaneous system as a Logistic model to reduce heteroscedasticity and to constrain the predicted values to lie between zero and one. To see if the results of eq. (5) are distorted by using OLS instead of Logit, we estimate eq. (5) as a single-equation logistic model and compare the results to those obtained from the OLS models in columns 1 and 2. Columns 3 and 4 of table 1 report the corresponding Logistic regressions of CEO turnover [eq. (5)]. The \( t \)-statistics are virtually identical between the Logistic and OLS models. However, while the \( t \)-statistics are very similar between OLS and Logit, the simultaneous-equation estimates of (6) might differ from those reported below if Logit was used instead of 2SLS.

3.2.2. Discretionary spending models

Tables 2 and 3 report the results of the OLS and 2SLS models for eq. (6). Four discretionary variables are examined: R&D, advertising, capital expenditures, and accounting accruals. Table 2 presents the results for the discretionary financial variables before adjusting for contemporaneous market factors, and table 3 presents the results for market-adjusted variables using eq. (2). The 2SLS estimate of eq. (6) is equivalent to the OLS estimate obtained after replacing the dichotomous transition-year dummy variable with the predicted departure probability from eq. (5). The transition-year coefficient in the 2SLS therefore indicates the relation between discretionary spending and predicted CEO turnover.

The OLS and 2SLS regressions in columns 1 and 2 of table 2 show that unadjusted R&D is significantly positively associated with lagged stock returns and contemporaneous and lagged earnings changes. But R&D is not statistically significantly associated with contemporaneous stock returns. R&D is negatively but insignificantly related to CEO turnover (column 1, with a \( t \)-statistic of \(-1.2\)) or predicted CEO turnover (column 2, with a \( t \)-statistic of \(-1.0\)). Very similar results obtain in table 3, where market-adjusted R&D is the left-side variable. Although the point estimates are negative, the \( t \)-statistics on CEO turnover are only \(-0.1\) and \(-1.3\) in the OLS and 2SLS regressions, respectively.

The growth in advertising expenditure is significantly lower in the transition year (columns 3 and 4 of table 2). Similar to R&D expenditures, advertising

\(^{18}\)Weisbach (1988) includes variables for whether the board is composed of inside or outside directors and excludes CEOs retiring at age 64 or 65.
<table>
<thead>
<tr>
<th>Independent variable</th>
<th>OLS (1)</th>
<th>2SLS (2)</th>
<th>OLS (3)</th>
<th>2SLS (4)</th>
<th>OLS (5)</th>
<th>2SLS (6)</th>
<th>OLS (7)</th>
<th>2SLS (8)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>0.0227</td>
<td>0.0273</td>
<td>0.0331</td>
<td>0.0359</td>
<td>0.0191</td>
<td>0.0079</td>
<td>-0.0550</td>
<td>-0.0518</td>
</tr>
<tr>
<td>Transition-year dummy</td>
<td>-0.0049</td>
<td>-0.0233</td>
<td>-0.0430</td>
<td>-0.0589</td>
<td>-0.0383</td>
<td>0.0256</td>
<td>-0.0046</td>
<td>-0.0236</td>
</tr>
<tr>
<td>Market-adjusted stock return in period t</td>
<td>-0.0161</td>
<td>-0.0180</td>
<td>-0.0023</td>
<td>-0.0037</td>
<td>0.0600</td>
<td>0.0637</td>
<td>-0.0148</td>
<td>-0.0158</td>
</tr>
<tr>
<td>Market-adjusted stock return in period t - 1</td>
<td>0.0649</td>
<td>0.0633</td>
<td>0.0626</td>
<td>0.0616</td>
<td>0.2455</td>
<td>0.2480</td>
<td>0.0099</td>
<td>0.0091</td>
</tr>
<tr>
<td>ΔEarnings in period t</td>
<td>0.3584</td>
<td>0.3545</td>
<td>0.3725</td>
<td>0.3629</td>
<td>1.640</td>
<td>1.662</td>
<td>0.2464</td>
<td>0.2443</td>
</tr>
<tr>
<td>ΔEarnings in period t - 1</td>
<td>0.4439</td>
<td>0.4272</td>
<td>0.3749</td>
<td>0.3577</td>
<td>2.195</td>
<td>2.235</td>
<td>0.2833</td>
<td>0.2718</td>
</tr>
<tr>
<td>Sample size</td>
<td>3317</td>
<td>3317</td>
<td>2668</td>
<td>2668</td>
<td>5538</td>
<td>5538</td>
<td>4959</td>
<td>4959</td>
</tr>
<tr>
<td>R²</td>
<td>0.0234</td>
<td>0.0215</td>
<td>0.0268</td>
<td>0.0199</td>
<td>0.1158</td>
<td>0.1139</td>
<td>0.0345</td>
<td>0.0350</td>
</tr>
</tbody>
</table>

* t-statistics in parentheses. The two-stage least squares results are obtained by combining the model in each column with the model in table 1, column 4.
Table 3

Estimated coefficients from ordinary least squares (OLS) and two-stage least squares (2SLS) regressions showing the relation between market-adjusted discretionary financial variables and CEO transitions.

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>( \Delta \ln (\text{Mkt-adjusted R&amp;D}) )</th>
<th>( \Delta \ln (\text{Mkt-adjusted advertising}) )</th>
<th>( \Delta \ln (\text{Mkt-adjusted capital expenditures}) )</th>
<th>( \text{Mkt-adjusted accruals, Sales}_{t-1} )</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OLS (1)</td>
<td>2SLS (2)</td>
<td>OLS (3)</td>
<td>2SLS (4)</td>
</tr>
<tr>
<td>Intercept</td>
<td>-0.0015</td>
<td>0.0027</td>
<td>0.0060</td>
<td>0.0066</td>
</tr>
<tr>
<td></td>
<td>(-0.5)</td>
<td>(0.6)</td>
<td>(1.7)</td>
<td>(1.1)</td>
</tr>
<tr>
<td>Transition-year dummy</td>
<td>-0.0006</td>
<td>-0.0265</td>
<td>-0.0276</td>
<td>-0.0311</td>
</tr>
<tr>
<td></td>
<td>(-1.3)</td>
<td>(-3.3)</td>
<td>(-1.1)</td>
<td>(-2.3)</td>
</tr>
<tr>
<td>Market-adjusted stock return in period ( t )</td>
<td>0.0378</td>
<td>0.0359</td>
<td>0.0047</td>
<td>0.0044</td>
</tr>
<tr>
<td></td>
<td>(3.1)</td>
<td>(2.9)</td>
<td>(0.3)</td>
<td>(0.3)</td>
</tr>
<tr>
<td>Market-adjusted stock return in period ( t - 1 )</td>
<td>0.0805</td>
<td>0.0792</td>
<td>0.0635</td>
<td>0.0634</td>
</tr>
<tr>
<td></td>
<td>(6.7)</td>
<td>(6.5)</td>
<td>(4.5)</td>
<td>(4.4)</td>
</tr>
<tr>
<td>( \Delta \text{Earnings} ) in period ( t )</td>
<td>0.2095</td>
<td>0.2065</td>
<td>0.1542</td>
<td>0.1517</td>
</tr>
<tr>
<td></td>
<td>(2.5)</td>
<td>(2.5)</td>
<td>(1.4)</td>
<td>(1.3)</td>
</tr>
<tr>
<td>( \Delta \text{Earnings} ) in period ( t - 1 )</td>
<td>0.3952</td>
<td>0.3795</td>
<td>0.0676</td>
<td>0.0620</td>
</tr>
<tr>
<td></td>
<td>(4.6)</td>
<td>(4.4)</td>
<td>(0.5)</td>
<td>(0.5)</td>
</tr>
<tr>
<td>Sample size</td>
<td>3,239</td>
<td>3,239</td>
<td>2,482</td>
<td>2,482</td>
</tr>
<tr>
<td>( R^2 )</td>
<td>0.0338</td>
<td>0.0342</td>
<td>0.0162</td>
<td>0.0124</td>
</tr>
</tbody>
</table>

*\( t \)-statistics in parentheses. The two-stage least squares results are obtained by combining the model in each column with the model in table 1, column 4.
growth rates are unrelated to contemporaneous stock returns and positively related to lagged stock returns and current and lagged changes in accounting returns. After adjusting for the market (columns 3 and 4 of table 3), advertising growth is negatively and significantly related to CEO turnover (column 3) but insignificantly related to predicted CEO turnover (column 4).

Capital expenditure growth is negatively and significantly related to CEO turnover in the OLS regression in column 5 of table 2, but is unrelated to predicted turnover in the 2SLS regression in column 6 of table 2. These results continue to hold for market-adjusted capital expenditure growth in table 3. Unlike R&D and advertising, capital expenditure growth is positively and significantly related to contemporaneous stock returns.

Accounting accruals (scaled by lagged sales) are negatively related to CEO turnover and predicted turnover in columns 7 and 8 of table 2, respectively. Accruals are negatively related to current stock returns, and positively related to lagged returns and current and lagged changes in accounting earnings. Market-adjusted accruals (table 3) are negatively and significantly related to CEO turnover in the OLS regression in column 7, but insignificantly related to predicted turnover in the 2SLS regression in column 8. Different assumptions about the time-series properties of cash flows and accruals can induce a relation between accruals and changes in earnings. To avoid the potential mechanical relation between changes in earnings and accruals, we re-estimate the accrual regressions in tables 2 and 3 omitting changes in earnings from the performance measure in eqs. (5) and (6). The coefficients on the transition-year dummy variables are similar in magnitude and significance to those reported in tables 2 and 3, suggesting that the results in the tables are not driven by a mechanical relation between accruals and changes in earnings.°

In summary, after controlling for firm performance, there is some evidence that discretionary variables (R&D, advertising, capital expenditures, and accruals) are lower during actual CEO turnover than in years -5 to -2 and years +1 to +5. Six of the eight OLS regressions in tables 2 and 3 report significant transition-year coefficients. However, when 2SLS is used instead of OLS only two of the eight transition-year coefficients are significant. Controlling for firm performance results in insignificant transition-year dummies in the R&D models. Controlling for the endogeneity of CEO turnover (2SLS) further weakens the transition-year effect.

3.3. Inferior versus superior performing CEOs

The specifications in tables 2 and 3 are based on the assumption that transition-year managerial discretion does not vary with firm performance.°

°We also estimated firm-specific OLS accrual regressions. The mean and median coefficients from individual firm-specific OLS models are similar to the cross-sectional results in tables 2 and 3.
Nonetheless, the magnitude of the discretionary behavior discussed above (the horizon problem, the cover-up, and the big bath) is predicted to vary with performance. If outgoing CEOs of troubled firms cover up poor performance, for example, then these CEOs are more likely to take income-increasing accounting accruals when firm performance is poor. Similarly, the prediction that CEOs reduce R&D and advertising expenditures as they approach retirement is weakened if the 'retirement' is triggered by poor firm performance and is not completely anticipated by the CEO in advance; thus we expect evidence supporting the horizon problem to be more pronounced in cases where the CEO departure is not performance-related.

In order to allow discretion to vary with firm performance, we partition the sample into those cases where the CEO is likely being terminated for poor performance versus cases where the departure is unlikely to be related to performance. Two ways of partitioning the sample are used: (i) an index of actual firm performance in the transition year and (ii) routine vs. nonroutine retirements based on the CEO's age at departure. Partitioning the sample based on actual firm performance in the transition year requires a specific measure of performance. From the turnover models in table 1, we know that both stock returns and earnings changes are associated with turnover. We construct the following performance index in the transition year for each CEO in our sample:

\[
\text{Performance index}_i = 0.4382 \left( \text{Market-adjusted stock return} \right)_{iT} + 0.3535 \left( \text{Market-adjusted stock return} \right)_{iT-1} + 2.343 \left( \text{Change in earnings} \right)_{iT} + 5.467 \left( \text{Change in earnings} \right)_{iT-1},
\]

where \( T \) is the transition year (year 0). In eq. (7) earnings and stock returns are weighted based on the coefficients estimated in the Logistic turnover model (column 4 of table 1) on the assumption that these are the weights attached to earnings and returns by boards of directors in their turnover decision. These performance index numbers are then ranked and those CEOs ranked above the median are classified as 'superior' performance (they have
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a low probability of performance-related turnover) and those below the median are classified as 'inferior' performers.²⁰

Fig. 3 presents the market-adjusted growth rates of the four discretionary variables (R&D, advertising, capital expenditures, and accounting accruals) for the inferior- and superior-performing CEOs. (Below, we report results from an alternative method of partitioning the sample.) As in fig. 2, the significance levels are based on regression t-statistics. Specifically, eq. (1) is re-estimated with interaction dummy variables included that take the value of one if the CEO is ranked superior (above the median). The right-side set of graphs represents the superior performers. These CEOs are less likely terminated for poor performance and are therefore more likely to reduce R&D and advertising if the horizon problem is empirically important. However, R&D and advertising growth rates are not significantly different in years -1 to +5 compared to years -5 to -2 (as denoted by the lack of shading on the bars in the right-hand charts in panels A and B).

Capital expenditure growth rates for superior performers (right-hand side of panel C, fig. 3) are significantly higher in year +1, and accruals for superior performers (right-hand side of panel D) are significantly higher in the transition year and years +1 and +2, compared to growth rates of the same variable in years -5 to -2.

The left-side graphs in fig. 3 are the inferior performers. Here, all the discretionary variables' growth rates are significantly smaller in the transition year (year 0) compared to years -5 to -2. Again, we see the strong positive association between firm performance and the discretionary variables. When firm performance is poor in the transition year, all the discretionary financial variables' growth rates are negative in years 0 and +1.

An asterisk (*) in the right-side panels indicates that the growth rate for the specific financial variable for the superior-performing CEOs is significantly different from the growth rate in the corresponding year(s) for the inferior-performing CEOs.²¹ For example, in panel A R&D is significantly lower in years -5 to -2 for the superior-performing CEOs than for the inferior-performing CEOs over the same years. Likewise, the superior-performing CEOs have higher R&D growth in years -1, 0, +1, and +4 than the inferior-performing CEOs.

²⁰The method of calculating the performance index described above gives identical rankings to using all the coefficients in column 4 in table 1 and substituting in the sample mean for average age (63.2 years) and the average value of the 64 65 dummy (0.36). Using all the variables produces a median cut-off of 0.2501 which implies that the inferior performing CEOs have a greater than 25% chance of leaving office in the transition year. For comparison purposes, Gilson (1989) reports management-change probabilities of 52% in financially distressed firms, compared to 19% for nondistressed firms.

²¹The bracketed asterisks covering years -5 through -2 indicate that the regression intercept for the superior-performing subsample is significantly different from the intercept in the inferior-performing subsample.
A. Research & Development:
Performance Index less than median (Non-Routine)

Performance Index exceeds median (Routine)

B. Advertising
Performance Index less than median (Non-Routine)

Performance Index exceeds median (Routine)
C. Capital Expenditures:
- Performance Index exceeds median (Non-Routine)
- Performance Index exceeds median (Routine)

D. Accounting Accruals:
- Performance Index less than median (Non-Routine)
- Performance Index exceeds median (Routine)

** and * indicate differences from the Low Performance Index group at the 1% and 10% levels, respectively.

Fig. 3. Market-adjusted growth rates by firm performance at departure.
C. Capital Expenditures:
CEOs leaving at age 63 or younger (Non-Routine)

D. Accounting Accruals:
CEOs leaving at age 63 or younger (Non-Routine)

** and * indicate differences from the 63 and younger group at the 1% and 10% levels, respectively.

Fig. 4. Market-adjusted growth rates by CEO age at departure.
C. Capital Expenditures:
Non-routine departure, Inferior performer

Routine departure, Superior performer

D. Accounting Accruals:
Non-routine departure, Inferior performer

Routine departure, Superior performer

- Not significantly different from years -5 to -2
- Significantly different from years -5 to -2 at 10% level
- Significantly different from years -5 to -2 at 1% level

** and * indicate differences from the Non-routine-inferior group at the 1% and 10% levels, respectively

Fig. 5. Market-adjusted growth rates by firm performance and age at departure.
The second method of partitioning the sample to control for CEOs who were terminated for poor performance is based on whether the CEO departure was routine or nonroutine. Many firms have explicit policies requiring mandatory retirement when the CEO reaches age 64 or 65. The dummy variable for routine retirement takes the value of one if the CEO retires at 64 or older, and equals zero if he leaves at age 63 or younger. We interpret turnovers at prior to age 64 as nonroutine, unanticipated departures, most likely for poor performance. Eq. (1) is re-estimated with interaction dummy variables for routine retirement.

Fig. 4 reports the average market-adjusted growth rates in the eleven years surrounding CEO turnover for routine and nonroutine CEO departures. The left side of panel A (R&D) corresponds to using market-adjusted variables [eq. (2)] and all CEOs leaving before their 64th birthday. In all years -1 to +5 (except +3), the growth in R&D is below that in years -5 to -2 (as denoted by the shading on the bars in the graph). For routine retirements (right side of panel A), only year +3 R&D growth is significantly less than years -5 to -2. In the left-side graphs of panels B-D (the nonroutine subsample), all the discretionary variables are lower in the transition year, compared to their values in years -5 to -2. These results closely mimic those reported in fig. 3 using the performance index to partition the sample.

The asterisks in panel A indicate that firms with routine CEO changes have significantly lower growth in R&D in years -5 to -2 (and higher growth of R&D in years -1, +1, +4, and +5) than firms with nonroutine CEO changes. There are no significant differences in advertising (panel B) and accruals (panel D) between routine and nonroutine departures in any years. Similar to the results for R&D expenditures, firms with routine CEO changes have lower capital expenditures (panel C) in years -5 to -2 (and higher expenditure growth in years -1, 0, +1, and +4) than firms with nonroutine CEO changes.

Fig. 5 combines both the firm performance index and CEO age at turnover to partition the sample. In particular, routine retirements (age 64 or greater) with superior performance (above median performance index) form one subsample: 'routine-superior'. The second subsample – 'nonroutine-inferior' – are all CEOs retiring early with inferior performance. We discard about half the sample observations involving nonroutine-superior performers and routine-inferior performers. In fig. 5, panel A, the nonroutine-inferior subsample again has significantly negative R&D growth in all years -1 to +5 (except year +3) compared to years -5 to -2. Also, we observe the nonroutine-inferior

\footnote{Gibbons and Murphy (1992) report survey evidence indicating that 59 of 113 surveyed firms have mandatory retirement at age 65 for the CEO. Two additional surveyed firms had mandatory retirement at age 70. The remaining 52 firms had no mandatory retirement policy affecting the CEO. Other studies have used CEO age at turnover as a proxy variable for normal retirements [Coughlan and Schmidt (1985), Weisbach (1988), Jensen and Murphy (1990), Dechow and Sloan (1991), and Gibbons and Murphy (1992)].}
subsample having higher R&D in years -5 to -2 and lower R&D in -1, 0, +1, and +4 (denoted by the asterisks) compared to the routine-superior subsample. These findings are similar to those reported in figs. 3 and 4. Panels B–D of fig. 5 closely parallel those of figs. 3 and 4.

In summary, our results are invariant to whether the sample is partitioned based on firm performance or routine versus nonroutine turnovers (using CEO retirement age) or both criteria. Only for inferior-performing CEOs or those leaving before age 64 is there any evidence of systematic differences in the discretionary variables surrounding CEO turnover. All the discretionary variables are significantly lower in the transition year compared to years -5 to -2. Among superior-performing CEOs and those retiring at 64 or older, there is no evidence that the discretionary variables are lower in the transition year.

3.4. Consistency of results with the prior literature

The prior literature describes three nonmutually exclusive reasons why CEOs exercise discretion: the horizon problem, big bath, and to cover up poor operating performance. This section documents that the evidence presented in sections 3.2 and 3.3 is inconsistent with each explanation for managerial discretion. Testing a particular reason requires an assumption as to which CEO has control of the financial variables in the transition year. In discussing each reason below, a joint test is conducted: the specific explanation considered and the assumption of which CEO controls the firm in the transition year.

**Horizon Problem.** This explanation predicts that outgoing CEOs have incentives to reduce discretionary spending (R&D and advertising) in their last year(s) to boost accounting earnings and their compensation. Moreover, CEOs who are not unexpectedly terminated are more likely to cut discretionary spending because they know their horizon further in advance, thereby giving them more opportunity to reduce discretionary expenditures. Assuming the outgoing CEO controls the transition year, the negative point estimates on the transition-year dummies in columns 1–4 in tables 2 and 3 weakly support the prediction. The OLS and 2SLS transition-year coefficients for R&D, however, are statistically insignificant, before and after adjusting for the market. Transition-year advertising growth is significantly negative in the OLS regressions, but at best marginally significant in the 2SLS regression. The negative and significant transition-year OLS coefficients for capital expenditures (column 5 in tables 2 and 3), coupled with the insignificant coefficients for R&D, are inconsistent with the horizon problem prediction, since cuts in capital expenditures lead to smaller increases in earnings than do cuts in R&D. The significantly negative coefficients on the transition-year dummies for accruals in columns 7 and 8 of table 2 are inconsistent with the outgoing CEO seeking to increase earnings by
inflating accruals. In summary, our evidence suggests that declines in R&D and advertising preceding CEO turnover are driven primarily by poor firm performance and not horizon problems, assuming the outgoing CEO controls the transition year.

The preceding results on R&D are inconsistent with those reported by Dechow and Sloan (1991), who estimate regressions similar to column 1 in table 2 for 58 CEO turnovers in R&D-intensive industries. They control for firm performance by including the firm's contemporaneous abnormal stock return in the regression and report an insignificant negative coefficient on abnormal returns but a negative and significant coefficient on the transition-year dummy [Dechow and Sloan (1991, table 10)]. They conclude that reductions in R&D spending are not explained by poor firm performance. Our results in tables 2 and 3 suggest another interpretation: current stock returns anticipate future firm performance but do not adequately control for the structural relation between firm performance and current R&D expenditures. This interpretation is based on finding that R&D expenditure growth is unrelated to current market-adjusted returns, but strongly related to lagged stock returns and to current and lagged changes in earnings (table 2, columns 1 and 2).

Figs. 3, 4, and 5 split the sample into those cases where CEO turnover is unlikely related to poor performance (right-side graphs) and those cases where CEO turnover is likely related to performance (left-side graphs). The evidence in the right-side graphs of figs. 3–5 is inconsistent with the horizon problem prediction that normally retiring CEOs cut discretionary spending to boost accounting earnings. In the right-side graphs of figs. 3–5 where the outgoing CEO is unlikely being fired for poor performance, there is no evidence that these CEOs are cutting R&D or advertising in years −1 or 0. Under the assumptions that (i) the outgoing CEO controls transition-year accruals and (ii) there is sufficient remaining accounting discretion that allows the CEO to increase accruals in the transition year, then the horizon problem predicts that routinely departing CEOs make income-increasing accruals in the transition year. In panel D of fig. 4, however, there are no significant differences in accruals between routine and nonroutine departures in any years. Also inconsistent with the horizon problem predictions are the results in panel C of figs. 3–5 for capital expenditures. In years −1 and 0, nonroutinely departing CEOs reduce capital expenditures more than routinely departing CEOs. But presumably, it is the routinely departing CEOs who face a known departure date and have more time to cut spending. Figs. 3–5, panel C, are consistent with poor firm performance.

One specification difference is that Dechow and Sloan set the transition-year dummy to one in the transition year and also in the outgoing CEO's last full fiscal year.

Kothari and Sloan (1992), for example, report that stock returns anticipate accounting earnings by up to three years.

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driving declines in capital expenditures preceding CEO turnover (years -1 and 0).

**Big Bath.** If incoming CEOs take a big bath in current earnings to increase their future compensation, income-reducing accruals should follow CEO turnover. Moreover, a big bath is more likely to occur if the outgoing CEO is terminated for poor performance since in these situations it is more credible for the new CEO to blame the old CEO for the current write-offs. Under the assumption that the transition year is controlled by the incoming CEO, the big bath will occur in year 0, followed by increases in accruals in year +1. The evidence on accruals in figs. 3–5, panel D, partially supports this prediction. Accruals are significantly negative in the transition year for nonroutine, inferior departing CEOs (left-side graphs of figs. 3–5). However, accruals in year +1 remain negative and below the levels observed in years -5 to -2 in the left-side panels of figs. 3–5.

If the outgoing CEO controls accruals in the transition year, then the big bath would be observed in year +1 with a rebound in year +2. The evidence in figs. 3–5 is inconsistent with the big bath explanation and the outgoing CEO controlling performance in the transition year. Accruals are not lower in year +1 compared to years -1, 0, and +2 and there is no rebound in year +2.

**Cover Up Poor Performance.** If CEOs are fired for poor performance and seek to delay their termination, they select income-increasing accounting accruals as performance deteriorates. The evidence in tables 2 and 3 and figs. 3–5 is generally inconsistent with the joint test: (i) outgoing CEOs cover up bad performance, (ii) they have enough remaining accounting discretion to increase accruals, and (iii) the outgoing CEO controls the financial variables in the transition year. Unadjusted accruals (columns 7 and 8 in table 2) are lower, not higher in year 0. CEOs in poorly performing firms or those terminated non-routinely (before age 64) show income-reducing, not income-increasing accounting accruals in the transition year (panel D, figs. 3–5).

Because it is difficult to predict when CEOs will be fired for poor performance and thus when they begin choosing income-increasing accruals, we examine accruals in years -5 to -2. In fig. 3, accruals are higher in years -5 to -2 for inferior-performing CEOs than superior-performing CEOs, suggesting they are covering up (asterisk above the bars -5 to -2 in the right-side graph of fig. 3). But accruals are not significantly higher in years -5 to -2 for nonroutine than routine departures (figs. 4 and 5). Thus, the evidence in figs. 3–5 does not consistently support CEOs choosing income-inflating accruals in years -5 to -2. However, it is premature to conclude that income-inflating accruals are not occurring in years -5 to -2. Given our inability to specify when manipulation begins, constructing an appropriate benchmark for 'normal' accruals is difficult.
Pourciau (1993) also fails to find that a cover-up rationale fits nonroutine CEO departures. She reports that for 73 unexpected (nonroutine) CEO changes, accruals and earnings are lower in the last full year compared to the year earlier. She always assigns the transition year to the incoming CEO because she reasons the new CEO always has control of the financial statements in the transition year. In the tests above, we assigned the transition year to the outgoing CEO. Therefore, rejecting the cover-up explanation (assuming it occurs in years -1 and 0) is not sensitive to differing treatments of the transition year nor to restricting the sample to nonroutine CEO changes. However, it is difficult to construct a convincing test that rejects the proposition that CEOs exercise discretion to cover up their poor operating performance. CEOs can be covering up poor performance, but such behavior is not observed in our samples. Those CEOs who are successful at covering up poor performance, and thereby are not fired, are not in our subsamples of inferior performers or nonroutine retirements.

To summarize this subsection, there is substantial documentation inconsistent with each particular reason why CEOs exercise discretion. Any conclusion that CEOs exercise discretion is conditional on an assumption regarding whether the incoming or outgoing CEO controls the financial variables in the transition year. The current (arbitrary) method of assigning the transition year to the outgoing or incoming CEO introduces measurement error. Until a more accurate way of determining which CEO has control of the transition year is found (and we suspect that it varies from case to case), the power of the tests to detect managerial discretion and our ability to distinguish among the various explanations is compromised.

4. Sensitivity analysis

This section presents additional tests to determine if the earlier results are robust to omitted correlated variables and alternative variable definitions. Section 4.1 reports that our previous inferences are insensitive to controlling for CEOs who leave early in the transition year. Section 4.2 reports that our conclusions are not sensitive to different definitions of accruals.

4.1. CEO departures early in the transition year

Previous discussions have indicated the importance of determining whether the incoming or outgoing CEO has control of the firm during the transition year. Pourciau (1993) argues that CEOs appointed in the first few months of a fiscal year will control not only transition-year reported performance but also that for the prior year (because the new CEO oversees both the final-quarter and annual financial statements for the year). Therefore, the big bath for CEOs
starting early in the fiscal year will occur in year \(-1\), followed by a rebound in earnings and accruals in the transition year. CEOs starting later in the fiscal year will take a big bath in the transition year, and earnings and accruals will rebound in year \(+1\).

The *Forbes* surveys identify CEOs who leave between the fiscal year-end and the *Forbes* publication deadline (approximately May 1). Roughly one-third (30%) of the CEO transitions in our sample occurred during the first four months of the fiscal year, suggesting little clustering of transition dates. We constructed a dummy variable equal to one for CEOs departing in the first three months of a fiscal year and zero otherwise. This dummy variable was interacted with the event-year dummy variables and eq. (1) re-estimated.

Although most of the interaction coefficients were insignificant, we obtained several interesting results. Transition-year assets, accruals, and earnings were significantly higher for CEOs who departed in the first three months; accruals in year \(+1\) were significantly lower surrounding early departures. In addition, capital expenditures in year \(-1\) were significantly higher for early CEO departures. These results lend support for Pourciau's speculation that control over financial statements is an important determinant of the timing of big baths.

### 4.2. Alternative definitions of accruals

This subsection reports that alternative definitions of accruals and earnings do not alter the previous inferences. Besides using the DeAngelo et al. (1994) definition of accruals, we replicated all the previous tests using Healy's (1985) definition both before and after extraordinary items and using net income less funds from operations [Compustat data item 110; see Bowen et al. (1986)]. There are few differences between the accrual results we reported and those of the other three measures. In general, the other three measures yield slightly more significant t-statistics on the dummy variables, but none of our previous inferences change.

### 5. Summary and conclusions

This paper joins an established literature describing the behavior of financial variables surrounding CEO departures. We depart from prior studies by explicitly analyzing simultaneous changes in several variables and by explicitly

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25Prior to 1988, *Forbes* reported transition dates for CEOs leaving after the end of the prior fiscal year but before the May *Forbes* publication deadline. In 1988 and after, *Forbes* reports the CEO at publication date and not the CEO at the end of the previous fiscal year. We collected the proxy statements for all firms with CEOs listed after 1988 'with less than 6 months of service' to determine exact transition dates.
incorporating the endogeneity of CEO turnover. Existing studies of managerial discretion surrounding CEO departures have ignored both the endogeneity of performance-related turnover and the structural relation between the discretionary financial variable and firm performance. After controlling for both firm performance and endogenous CEO turnover, we find little evidence to support the hypothesis that outgoing CEOs exercise their discretion over accounting or investment variables to increase their earnings-based compensation in years -1 and 0. Rather, the declines in the growth rate of R&D, advertising, and capital expenditures preceding departures are better explained by the overall performance of the firm. We find some evidence consistent with the hypothesis that incoming CEOs take a big bath: after controlling for firm performance, market-adjusted accounting accruals are lower in the fiscal year in which the incumbent CEO is replaced by his successor.

Most studies of managerial behavior in accounting, finance, and economics begin with implicit or explicit assumptions regarding which variables are exogenous and make predictions about changes in choice variables based on changes in these exogenous variables. In addition to CEO turnover, other potentially endogenous variables routinely assumed to be exogenous include ownership structure (including shares held by blockholders and by managers), the composition of the board of directors, and the firm's compensation policies. Our results show that allowing CEO turnover to be endogenously determined affects the inferences made regarding managerial discretion over financial variables. Similarly, extending prior work to allow for endogenously determined ownership, board composition, and compensation will likely alter our existing interpretations of the evidence and expand our understanding of managerial behavior in organizations.

Appendix: Forbes sample selection bias

Several papers, including this one, use the Forbes magazine annual survey of CEO compensation as a source of CEO compensation and turnover data [e.g., Coughlan and Schmidt, (1985), Murphy (1986), Gibbons and Murphy (1990), Weisbach (1988)]. These surveys, which cover approximately 800 CEOs annually, are based on the Forbes 500 that includes CEOs whose firms ranked among the 500 largest U.S. companies on at least one of four criteria: sales, profits, assets, and market value of equity.

To be included in our sample, described in section 2, the corporation must be ranked in the Forbes 500 in both the CEO's last full fiscal year and in his transition year. This sample selection criterion biases our sample towards large surviving firms, since CEOs whose firms drop out of the Forbes sample before the end of their tenure are not included in the sample. In addition, this selection criterion also biases the sample towards growing firms since we require the firm to
be ranked in the *Forbes 500* at the end of the CEO's tenure but not at the beginning of his tenure. Similar biases are likely to exist in other data sources as well. For example, if libraries' collections of proxy statements are based on firm-size criteria, then growth rates of firms prior to entering the collection are likely to be high and will fall after entry.

We examine the effect of these potential selection biases by computing the average inflation-adjusted sales growth rate for all firms entering the *Forbes 500* list between 1972 and 1989; our results are depicted in fig. 6. To minimize the impact of firms who remain on the *Forbes 500* list for only a year or two, we restrict the sample to 307 firms remaining on the *Forbes* lists for at least five years. The average growth rate for year 0, the first year the firm appears on *Forbes*, is 20.2%, substantially higher than in any prior or succeeding year. Real growth rates taper off in years after making the *Forbes* list; the average sales growth for years +1 to +10 is 7.3%, compared to 13.4% for years -10 to -1.

The results in fig. 6 indicate that (1) sales growth rates are highest in the year firms enter the *Forbes 500* and (2) growth rates prior to *Forbes* entry are higher

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**Note:** Sample size depends on data availability, and ranges from 307 for year +5 to 137 for year -10. Firms remaining in Forbes sample for fewer than five years from 1972-1989 are excluded. Sales growth rate defined as $\Delta \ln(\text{Sales})$.

Fig. 6. Average inflation-adjusted growth rates in sales relative to year entering *Forbes* sample.
than growth rates following Forbes entry. The paper's inferences, however, are insensitive to replicating the tests after controlling for this bias by excluding firms that are 'new' to the Forbes sample.

References


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