CEO Investment Cycles

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This paper documents the existence of a CEO investment cycle, in which disinvestment decreases over a CEO's tenure, while investment increases, leading to "cyclical" firm growth in assets and employment. The estimated variation in investment rate over the CEO investment cycle is of the same order of magnitude as the differences caused by business cycles or financial constraints. Results from a number of tests generally support the view that the investment cycle is caused by agency problems, leading to increasing investment quantity and decreasing investment quality over time as the CEO gains more control over his board. (*JEL* G32, G34, M12, M51)

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A central question in both economics and management concerns the extent to which the CEO and top management actually make a difference in the fortunes of companies. The literature has adopted a variety of viewpoints about the role of the CEO and top management, ranging from a first-best world in which the CEO always picks value-maximizing projects, to a principal-agent framework that allows for a variety of types of agency concerns.[1] While any model of

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[1] In the literature on principal-agent problems, CEOs have been accused of providing too little effort, overinvesting, underinvesting, enjoying the "quiet life," investing in projects that maximize their own human capital, delaying recognition of mistakes, building empires that maximize their utility rather than firm value, etc. See Jensen and Murphy (1990), Jensen and Meckling (1976), Myers (1977), Bertrand and Mullainathan (2003), Shleifer and Vishny (1989), Boot (1992), Shivdasani and Yermack (1999), and Bebchuk and Fried (2004).

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the firm is by definition an approximation, how bad of an approximation is it to ignore management and to assume investment is first best? If in fact management does affect firm behavior, does it do so because of agency problems or an efficient allocation of resources? More generally, how can one determine the quantitative importance of management to our understanding of corporate investment decisions?

One way to measure the extent to which CEOs matter is to estimate the way that firms' activities vary over their time in office. While there are numerous differences across CEOs and firms, a CEO's incentives and power inside the firm vary systematically over his career, so systematic differences in firm behavior over a CEO's tenure are likely to reflect these changes.

In this paper, we document striking patterns in corporate investment and disinvestment activities over the "CEO cycle" in a large sample of publicly traded U.S. firms. Disinvestments are fairly common in the early years of a CEO's tenure and decrease over time. Investments, on the other hand, are relatively low in the early years of a CEO's tenure and increase over time. The overall effect is "cyclical" firm growth in assets and employment over a CEO's tenure, with the firm growth rate being lower in the early years of a CEO's tenure than in his later years. Both disinvestment and investment vary systematically over the CEO cycle regardless of the way we measure them, using information from firm-level financial statements, corporate announcements, acquisition data, or segment-level data. The cyclical behavior of investment and growth over a CEO's tenure appears to be a general phenomenon in publicly traded corporations.

The magnitude of the changes in firm investment and growth over the CEO cycle is substantial. For example, a one-standard-deviation increase in the number of years since the CEO took office is associated with a 2-percentage-point increase in the annual investment rate (investment-to-asset ratio) and a 13.2-percentage-point increase in the asset growth rate. Given that the mean investment rate in our sample is 9.4% and the mean asset growth rate is 18.4%, the differences in investment and growth over the CEO cycle are clearly nontrivial. The effect of the CEO cycle on investment is of the same order of magnitude as the effects of other factors known to influence investment, such as the business cycle, political uncertainty, and financial constraints.

The correlation between the CEO cycle and firm investment could occur either because the CEO's choices about investment vary over the CEO cycle or because CEO turnovers tend to occur during periods of high disinvestment and low investment. To evaluate the possibility that the timing of CEO changes explains the CEO investment cycle, we consider several subsamples of turnovers with timing unlikely to be correlated with investment shocks: turnovers in which the departing CEO leaves his job because of death or illness, turnovers in which the departing CEO is close to retirement age, turnovers for which there are no top management changes other than the change of CEO, and turnovers following good firm performance. CEO investment cycles exist

in each of these subsamples and are of comparable magnitude as in the full sample. Further, the CEO investment cycles are present regardless of the new CEO's succession origin, the CEO's time in office, and the industry conditions at the time of turnover. The CEO investment cycle also does not merely reflect changes occurring around CEO turnover, but characterizes investment over the entire CEO's tenure.

Since the observed pattern in investment over the CEO cycle is not driven by the timing of management changes, it likely reflects the impact of management on corporate investment. Management could affect investment in two different ways: investment decisions could deviate from the first best because of agency conflicts, or management changes could lead to efficient investment that varies over the CEO cycle. We perform a series of tests to evaluate these explanations. However, regardless of whether investment is efficient or inefficient, the existence of economically important variation in investment over the CEO cycle implies that, inconsistent with traditional economic models that ignore the roles of managers, management has a large impact on firms' investments.

One possible explanation for the investment cycle is based on agency conflicts with the CEO. For many reasons, CEOs usually prefer their firms to grow, potentially at the expense of shareholder value maximization. The board of directors is an important constraint on CEOs' ability to deviate from the shareholders' interest. However, as a CEO becomes more powerful in the firm over time, he will have more sway over his board and will be able to undertake investments that maximize his utility at the expense of firm value. At the same time, the CEO is reluctant to divest assets that he has acquired, even if the firm is no longer the optimal owner of the assets. CEO turnover can facilitate reoptimization of these bad assets, since the incoming CEO does not necessarily enjoy the same private benefit from assets established by the predecessor. Eventually, the process is repeated during each CEO cycle.

We confirm that a number of predictions of this agency explanation hold in the data. First, since an uncaptured board of directors is an important factor that limits the CEO's ability to overinvest, the agency explanation implies that more direct measures of the CEO's control over the board should be more powerful at explaining the investment increases than the CEO's tenure in office. We measure the CEO's capture of the board by the fraction of the board appointed during his tenure and find that the increasing CEO influence on the board over his tenure explains the positive relation between a CEO's tenure and investment, even when the CEO power exogenously comes through changes in the fraction of directors reaching retirement age over time.

Second, we find that the quality of a firm's investments, measured by the market reaction to acquisition announcements, decreases with the length of tenure and becomes on average negative during the later portion of a CEO's time in office. This deteriorating investment quality also appears to be a function of the CEO's control of the board. These findings suggest that the increases in the quantity and the decreases in the quality of investments over the CEO cycle

are likely driven by the CEO's preference for growth, a preference that becomes more relevant when the CEO gains more control over his board and can exercise more discretion over the firm's investments.

Third, using segment-level data, we show that the poor investment decisions tend to be reversed only after the original CEO steps down and the new CEO takes office. The degree of reversal negatively depends on the prior management's residual influence on the new CEO, even when the residual influence occurs for exogenous reasons.

Alternatively, CEO investment cycles could exist even if investment over a CEO's tenure is efficient at all times. Suppose, for example, a CEO's ability to identify positive NPV projects improves over time, so an optimal investment policy would entail increasing investment over tenure. However, this explanation is not consistent with the deteriorating investment quality (to negative NPV) over a CEO's tenure. Further, we find that the increase in the CEO's capture of the board due to directors reaching retirement age, which is unrelated to a CEO's ability, still leads to an increase in investment level and a decrease in investment quality. Consequently, it appears that the CEO investment cycle is not driven by changes in CEO ability over time.

In addition, efficient changes in investment could occur following turnovers if they reflect the match between the new CEO's skills and firm assets. Such matching predicts high disinvestment right after CEO turnover, since the assets that match well with the outgoing CEO's skills do not necessarily match well with the incoming CEO's skills. However, it does not predict increasing investment over the entire CEO's tenure. In addition, in contrast to this view, we find that the magnitude of the disinvestment cycle does not depend on the degree of fit between the new CEO's prior work experience and the firm's existing asset structure.

We emphasize, however, that it is impossible to rule out all potential explanations based on changing CEO-firm characteristics definitively, especially for the investment portion of the cycle. For example, if managerial overconfidence grows over time and is for some reason related to the CEO's control over the board, then it would be possible for this overconfidence to explain the increasing quantity and decreasing quality of investment with a CEO's tenure, although it does not explain the disinvestment cycle.

The existence of an economically meaningful CEO investment cycle has a number of implications. First, there has been much work on external factors that affect investment, such as the business cycle, political uncertainty, and conditions of the financial markets. Our results suggest that the impact of management-related factors on investment is quantitatively as important as these external factors. Second, our results provide insights on the types of agency problems that are likely to be important for understanding the investment decisions in public companies; they suggest that the empire-building preference is likely an important factor leading to investment inefficiencies in public companies. Although the literature arguing that mangers tend to

build "empires" is enormous and dates back to Baumol (1959), Marris (1964), Williamson (1964), and Donaldson (1984), its empirical relevance has been debated. Third, the results imply that a policy of regular management turnover in public corporations can be potentially valuable. Such a policy will likely minimize overinvestment resulting from a CEO's growing capture of his board, and facilitate reoptimization of investments.

This work is related to the literature that aims to establish and quantify systematic managerial influences on firm policies and value. Several influential studies examine whether CEO-specific styles affect firm policies (see Bertrand and Schoar 2003; Fee, Hadlock, and Pierce 2013). The literature has also drawn inferences about the value of CEOs based on rare events, such as CEO death (Johnson et al. 1985; Bennedsen et al. 2007) and hospitalization (Bennedsen, Pérez-González, and Wolfenzon 2012). Finally, using an approach based on systematic changes in stock return volatility after the CEO takes office, Pan, Wang, and Weisbach (2015) estimate that CEOs contribute a nontrivial amount to firm values. Documenting the way in which firm policies vary over the CEO cycle is an alternative approach to identify and quantify potential systematic managerial effects.

This work also extends the literature on firm behavior around CEO turnovers. Using a much earlier sample than ours, Murphy and Zimmerman (1993) document systematic changes in a number of accounting variables around CEO turnover, which the authors conclude are mainly driven by poor pre-turnover firm performance. Denis and Denis (1995) find that the book value of firms' assets, their number of employees, and their capital expenditures all decrease following forced CEO turnovers. In addition, Denis and Denis document that these restructurings are associated with cost-cutting measures, plant closings, and other corporate refocusing activities. In addition, Weisbach (1995) finds that the likelihood of divesting poorly performing deals is unusually high immediately following CEO turnovers.[2] Our analysis extends this earlier work in a number of ways. We show that the phenomena documented by these papers are only part of a larger process by which investment and growth are related to the CEO cycle.

Finally, our study contributes to the literature on the interaction between CEOs and their boards. Our analysis suggests that a major determinant of CEO investment cycles is the fact that the relationship between the CEO and his board changes over his tenure. The residual influence of the prior leadership on the board could prohibit a new CEO from disinvesting poorly performing assets established by the prior leadership. Thus, board turnovers accompanying CEO turnover can facilitate reoptimization. Over time, however, the board tends to become captured by the CEO and the CEO's ability to overinvest increases.

[2] In addition, there is a large stand of literature in accounting documenting that CEOs manage earnings for career concerns using both accrual manipulation and investments in R&D and advertisement, especially around CEO turnovers (see Dechow, Ge, and Schrand (2010) for detailed discussion and references).

These two effects combine to give investment a cyclical pattern over a CEO's career. Coles, Daniel, and Naveen (2014) document the role of a non-coopted board in corporate governance. Our study further highlights the importance of regular CEO turnover as one of the institutions that allow firms to correct managerial mistakes.

1. Data

1.1 CEO turnover and tenure

Our sample includes 4,219 CEO turnovers in 2,991 firms between 1992 and 2009. We identify CEOs based on the information in the *ExecuComp* database. We use the information on job title, the year in which an individual became CEO, and the CEO annual flag provided in *ExecuComp* to identify CEOs at the firm-year level. For each firm, we compare the designated CEO in each fiscal year with the CEO in the previous year to identify whether there is a CEO turnover in that year.

Panel A of Table 1 describes the distribution of turnovers over time. For each new CEO, the variable "Tenure" equals zero for the fiscal year in which the CEO takes office and increases with each year the CEO is in office. The average tenure in our sample is 5.4 (median 5), and the standard deviation is 4 years. The average age of the incoming CEO at the time of turnover is 54.

1.2 Corporate investment

We consider two major forms of corporate investment: capital expenditures and acquisitions. We define *Capx rate* as capital expenditures scaled by the total book assets at the beginning of the year, and *Acquisition rate* as the value of acquisitions scaled by the total book assets at the beginning of the year. Acquisitions include completed deals covered in the SDC database, either the acquisition of assets or equity interests. For each sample firm, we include both domestic and international acquisitions with disclosed transaction values above \$1 million over the sample period.[3] *Investment rate* is defined to be the sum of *Capx rate* and *Acquisition rate*. Panel B of Table 1 reports that the average *Capx rate* is 5.9% (median 3.6%), the average *Acquisition rate* is 3.8% (median 0%), and the average total *Investment rate* is 9.4% (median 4.6%).

We also examine the intensity of corporate announcements about expansion or acquisition over CEOs' tenure. The business expansion news includes "event 3" ("Seeking acquisitions/investment") and "event 31" ("Business expansion") from the "Key developments" database from *Capital IQ*. We further augment these announcements with the acquisition announcements from the *SDC Platinum*. Based on the announcement date of each event, we define a monthly investment indicator variable $I_{\{\text{investment announcement(s) in the month}\}}$ that equals one

[3] We exclude leveraged buyouts, exchange offers, repurchases, spin-offs, minority stake purchases, recapitalizations, self-tenders, and privatizations.

Table 1
Summary statistics

Panel A: CEO turnovers

	Turnover year distribution				
Year became CEO	1992–1994	1995–1999	2000–2004	2005–2009	Total
Freq.	644	1,284	1,226	1,065	4,219
%	15.3	30.4	29.1	25.2	100

	CEO(-year)-level attributes					
CEO-level attribute	Observations	Mean	SD	25th percentile	Median	75th percentile
CEO age (at turnover)	3,989	53.942	6.999	49.000	54.000	59.000
CEO total time in office	4,219	5.391	3.959	2.000	5.000	8.000
CEO-year-level attribute						
Tenure (in years)	24,992	4.152	3.579	1.000	3.000	6.000

	Reasons for turnovers	
	Freq.	% of sample
1. Turnovers due to death, illness	125	3
2. Turnovers due to death, illness, or retirement	359	9
3. Turnovers due to death, illness, or retirement, at good performance	175	4
4. Turnovers without management shakeup	1,032	24
5. Turnovers with good preturnover performance	795	19
6. 2 or 4 or 5	1,826	43
7. Not classified	2,121	50
8. Outright forced turnover	272	6
Total from 6, 7, and 8	4,219	100

This panel reports the distribution of CEO turnovers in our sample period across different reasons. We use the information on job title, the year in which an individual becomes CEO, and the CEO annual flag, provided in *ExecuComp*, to identify CEOs at the firm-year level. For each firm, we compare the designated CEO in each fiscal year with the CEO in the previous year to identify whether there is a CEO turnover in that year. Summary statistics for some CEO or CEO-year-level attributes are also provided. "CEO Total Time in Office" is the entire length of a CEO's tenure. This is different from the variable "Tenure (in years)," which counts the t-th year that the CEO is in office.

(*continued*)

if the company has either expansion or acquisition announcements in the month. Panel B of Table 1 documents that 7.9% of firm-months contain investment announcements.

Further, we identify new business units by examining whether a new segment ID appears in a given year (provided it is not the first year the company appears in the segment data base) and exists for at least 2 years. About 13.6% of all firm-segment-year observations in our sample consist of newly initiated segments.

1.3 Corporate disinvestment

To identify corporate disinvestment activities in a given fiscal year, we use data on both discontinued operations from COMPUSTAT and asset sales from the SDC Platinum Mergers & Acquisitions Database. We consider the firm to have discontinued operations ("$I_{\{\text{discontinued operations}>0\}}$"=1) if the firm reports income or loss from discontinued operations ("DO" in *COMPUSTAT*) and asset sales ("$I_{\{\text{asset sales}>0\}}$"=1) if the firm is indicated by *SDC* as the target company in transactions of "Acquisitions of Assets" or "Acquisitions of Certain Assets." Panel B of Table 1 reports that 9.8% of the firm-year observations have asset

Table 1
Continued

Panel B: Investment and disinvestment variables

Investment	Obs.	Mean	SD	25th percentile	Median	75th percentile
Capx rate	24,636	0.059	0.086	0.015	0.036	0.070
Acquisition rate	24,636	0.038	0.159	0.000	0.000	0.000
Investment rate	24,636	0.094	0.185	0.019	0.046	0.097
R&D rate	13,462	0.070	0.134	0.002	0.026	0.090
$I_{\{\text{expansion announcement(s) in the month}\}}$	195,165	0.079	0.273	0.000	0.000	0.000
$I_{\{\text{segment start}\}}$	122,990	0.136	0.342	0.000	0.000	0.000
Disinvestment						
$I_{\{\text{asset sales}>0\}}$	24,992	0.098	0.298	0.000	0.000	0.000
$I_{\{\text{discontinued operations}>0\}}$	24,992	0.197	0.397	0.000	0.000	0.000
$I_{\{\text{asset sales}>0 \text{ or discontinued operations}>0\}}$	24,992	0.249	0.433	0.000	0.000	0.000
$I_{\{\text{downsizing announcement(s) in the month}\}}$	195,165	0.044	0.205	0.000	0.000	0.000
$I_{\{\text{segment termination}\}}$, Multi−segment Firms	69,609	0.110	0.313	0.000	0.000	0.000
Net effects						
Asset growth rate	24,636	0.184	0.639	−0.014	0.066	0.187
Employment growth rate	23,576	0.079	0.328	−0.040	0.024	0.120

This table reports summary statistics for the investment, disinvestment, and growth variables. "Capx rate" is capital expenditures divided by lagged total assets. "Acquisition rate" is the value of acquired assets (from SDC Platinum) divided by lagged total assets. "Investment rate" is the sum of acquisitions and capital expenditures scaled by lagged total assets. "R&D rate" is R&D expenditure scaled by lagged total assets. "Asset sales" is the absolute value of the total asset sales (from SDC Platinum). "Discontinued operations" is the absolute value of the income from discontinued operations (item "DO" in Compustat). "Asset growth rate" is the annual growth rate of book assets, and "Employment growth rate" is the annual growth rate of the firm's number of employees. The two indicator variables related to announcements are constructed at the firm-month level, and the two indicator variables related to segment start and termination (termination only defined for multisegment firms) are constructed at the firm-segment-year level, while the other variables are constructed at the firm-year level. Downsizing and expansion announcements are from the Capital IQ database with coverage starting after 2000. Segment variables are constructed using Compustat (historical) segment database. Our sample includes S&P 1,500 firms with available data on total assets and identifiable CEOs from Execucomp for the period 1992–2011.

(*continued*)

sales, about 19.7% have discontinued operations, and 24.9% have at least one of these types of disinvestment activities.

An alternative way to identify disinvestment activities is to use corporate announcements obtained from the "Key Developments" database from the Capital IQ database (coverage starting in 2001): "event 1" contains announcements of "Seeking to sell/divest" and "event 21" captures announcements related to "Discontinued operation/downsizing."[4] Based on the announcement date of each event provided by Capital IQ, we define a monthly disinvestment indicator variable $I_{\{\text{downsizing announcement(s) in the month}\}}$ that equals one if the company announces either event 1 or 21 or both in a month. Panel B of Table 1 documents that 4.4% of firm-months contain disinvestment announcements.

Further, we use information from COMPUSTAT "historical segment" data to measure the divestiture or discontinuation of investments at the segment level for all multisegment firms in our sample. We start with all operating/business segments with positive sales over the sample period and track them through

[4] Both event 1 and 21 appear to capture ongoing or intended disinvestment activities. Sample headlines for these events include "ADC Telecommunications to close LeSueur facility" and "BSQUARE Corp. intends to close its information division in San Diego."

Table 1
Continued

Panel C: Other firm-level control variables

Firm attribute (by firm-year)	Obs.	Mean	SD	25th percentile	Median	75th percentile
Ind-adj.ROA	23,680	0.054	0.233	−0.010	0.032	0.113
Ind-adj. return	23,549	0.151	0.730	−0.158	0.037	0.276
MB	24,127	2.943	4.444	1.331	2.069	3.392
Leverage	24,873	0.242	0.224	0.058	0.213	0.358
Div. payer	24,992	0.511	0.500	0.000	1.000	1.000
Log(assets)	24,992	7.334	1.830	6.072	7.306	8.582
Firm age	24,893	20.101	14.714	8.000	16.000	34.000
Cash ratio	24,508	0.103	0.130	0.017	0.053	0.141
% of new directors	12,972	0.453	0.299	0.214	0.417	0.667
Average director age	10,946	59.915	3.958	57.500	60.100	62.500
% of directors reaching retirement age	12,972	0.112	0.196	0.000	0.000	0.143
Manager attribute (by turnover)						
% on board [prior mgt.]	3,236	0.212	0.220	0.000	0.250	0.500
Stay as chairman [prior CEO]	3,379	0.279	0.449	0.000	0.000	1.000
Outsider succession	4,039	0.333	0.471	0.000	0.000	1.000
Fit	2,456	0.591	0.379	0.217	0.625	1.000
Segment attribute (by segment-year), multisegment firms						
Underperforming segment	69,609	0.137	0.344	0.000	0.000	0.000
Original CEO replaced	69,609	0.502	0.500	0.000	1.000	1.000
Segment age	69,609	7.141	6.504	2.000	5.000	10.000
Deal attribute (by deal)						
CAR [-1,1] around acquisition announcements (in percentage)	6,766	0.369	5.267	−1.712	0.217	2.309
CAR [-1,1] around acquisition announcements is negative	6,766	0.484	0.500	0.000	0.000	1.000
Public target	6,766	0.200	0.400	0.000	0.000	0.000
log(deal value)	6,766	3.953	1.715	2.882	4.094	5.252
% of stock	6,766	0.101	0.264	0.000	0.000	0.000

This table reports summary statistics for firm-year-level financial attributes, governance-related variables, segment-level variables, and deal-specific variables (in acquisitions). All variable definitions are provided in Table A1. Firm attributes are constructed using data from Compustat. Board-related variables are constructed using data from ISS Governance Services (which starts from 1996, with comprehensive data for S&P 1500 companies since 1998) and Execucomp. The manager attribute "Fit" is constructed using Boardex data. Segment variables are constructed using Compustat's (historical) segment data for multisegment firms. Deal-specific variables are constructed using data from SDC Platinum. Market-adjusted M&A announcement day returns are constructed using CRSP data and are in percentage.

time using the unique segment ID provided by COMPUSTAT. We identify divestitures or discontinuations of segments ($I_{\{\text{segment termination}\}}=1$) when a distinct segment ID disappears in a particular year and does not reappear in the sample subsequently. The likelihood a segment will be terminated in a particular years is 11.0%. We measure segment performance using segment-year-level operating profit/loss scaled by sales.[5]

[5] The COMPUSTAT segment data are an imperfect measure of firms' lines of business and their profitability (see Maksimovic and Phillips 2007). However, the concerns about the use of segment data to measure segment profitability are unlikely to be systematically correlated with a CEO's tenure. Unreported robustness checks using segment start or termination measures conditional on a contemporaneous increase or decline in the firm's total assets lead to similar results to those reported in the paper.

We also measure the combined effect of disinvestment and investment on a firm. Since both disinvestment and investment can affect the size of the firm's physical assets and labor force, we construct *Asset growth rate* as the annual growth rate of the firm's book assets and *Employment growth rate* as the annual growth rate in the number of employees. The average *Asset growth rate* is 18.4% (median 6.6%). The average *Employment growth rate* is 7.9% (median 2.4%).

1.4 Other firm characteristics

To control for other factors that potentially affect investment or disinvestment intensity, we also include a set of firm characteristics in our econometric specifications. Panel C of Table 1 contains summary statistics of these variables. The average firm in our sample has book assets of about $1.2 billion (=exp(7.334)), 24% leverage (total debt divided by total assets), and a market-to-book equity ratio of 2.9. The average industry-adjusted ROA is 5.4% (median 3.2%), and the average industry-adjusted stock return is 15.1% (median 3.7%). Slightly more than half of the firms pay dividends.[6] All variables described in Sections 2.2–2.4 are winsorized at the top and bottom 1% of the distribution in the COMPUSTAT universe. Table A1 presents definitions of all variables.

2. Measuring the CEO Investment Cycle

2.1 Investment and CEO tenure

We first consider the way in which corporate investment varies with CEOs' tenure from three years prior to turnover (year 0) until 6 years following the turnover. Plot A of Figure 1 graphs the average investment rate by tenure year. This figure suggests that there is no obvious declining trend in the investment rate prior to CEO turnover. During the turnover year, however, the investment rate drops by about 2.5 percentage points and then increases continuously over CEOs' tenure. The total investment rate increases from 8.45% in year 0 to 10.44% in year 6, a 24% increase.

In panel A of Table 2, we estimate equations predicting the investment rate as a function of CEOs' tenure, controlling for firm characteristics that potentially affect investment. We include firm-CEO fixed effects in each equation, so that the estimates can be interpreted as representing the change in investment within a particular CEO's career in a given firm. Within-firm-CEO variation also helps to mitigate the survivorship bias in the estimation. The estimated coefficient on *Tenure* in Column 1 indicates that the annual investment on average increases by 0.5 percentage point a year during the CEO's tenure. If we take the average investment rate in our sample (9.4%) as the "typical" rate, then our result

[6] The average industry-adjusted performance measures are different from zero because we construct the industry averages using the *COMPUSTAT* universe, not just our sample firms.

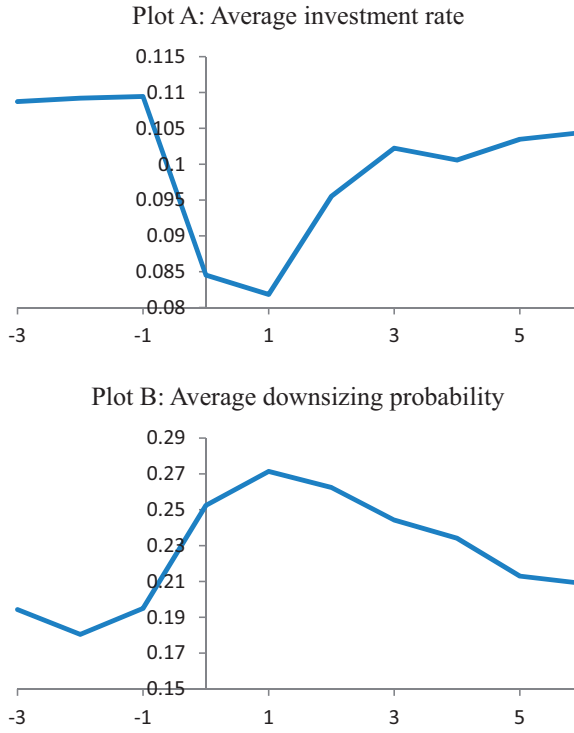

Figure 1
CEO investment cycle
The figures above graph the average investment rate (plot A) and the average downsizing probability (plot B) by tenure years from −3 to 6 (t=0 is the turnover year). We exclude the forced turnovers. For two consecutive CEOs within a firm in our sample period, a firm-year could fall into both a preturnover period for the arriving new CEO (B) and a postturnover period for the departing CEO (A). For example, consider CEO A, who was in office from 2000 (year 0 for A) to 2005, and CEO B, who took office in 2006 (year 0 for B). Then year 2004 is year −2 for CEO B and year 4 for CEO A. To avoid double counting a firm-year as different event years, we treat firm-years that fall into [0, 6] as post-turnover years. In the example above, year 2004 is only counted as year 4 for CEO A. For (really) long-tenured departing CEOs (e.g., the departing CEO had a 10-year tenure), his last few years are classified as the pre turnover years for the next CEO. Also, if the tenure information is missing for the departing CEO, we assign negative event year counts to the pre turnover years. This approach is consistent with our main analysis, where we assign a positive event year count (t=0, 1, 2, …) to each firm-year, and thus is not subject to the double-counting issue.

implies that a one-standard-deviation increase in *Tenure* is associated with an almost 21% (=0.5%*4/9.4%) increase relative to the typical investment rate.

2.1.1 Subsamples of turnovers unlikely to be motivated by performance. An important issue in interpreting the relatively low investment rates and high disinvestment rates in the early years of a CEO's tenure is the extent to which they reflect the timing of turnovers coinciding with times during which it is desirable for firms to cut investment. For this reason, we present estimates of the specification used in Column 1 on the firm-years after the subsamples of

Table 2
Investment rate and CEO tenure

Panel A: Investment rate and CEO tenure

	(1) Full sample	(2) Death/ illness	(3) Death/illness/ retirement	(4) Death/illness/ retirement at good performance	(5) No mgt shakeup	(6) Good preturnover
	Investment rate					
Tenure (in years)	0.005***	0.002**	0.003**	0.005**	0.003***	0.006***
	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.002)
Ind-adj. ROA	0.139***	0.097	0.122**	0.161***	0.175***	0.178***
	(0.023)	(0.072)	(0.050)	(0.060)	(0.048)	(0.057)
Ind-adj. return	0.009***	0.019	0.006	0.001	0.002	0.015
	(0.003)	(0.026)	(0.004)	(0.011)	(0.003)	(0.011)
MB	0.002***	0.001	−0.001	−0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Leverage	0.005	0.019	0.018*	0.056	0.009	−0.014
	(0.007)	(0.048)	(0.011)	(0.037)	(0.010)	(0.013)
Div. payer	−0.140***	−0.237**	−0.045	−0.003	−0.114***	−0.123***
	(0.020)	(0.099)	(0.081)	(0.093)	(0.035)	(0.035)
log(assets)	−0.067***	−0.056***	−0.051***	−0.095***	−0.056***	−0.075***
	(0.006)	(0.022)	(0.017)	(0.026)	(0.009)	(0.011)
Firm-CEO F.E., Year F.E.	x	x	x	x	x	x
Observations	21,915	595	2,567	1,230	7,516	6,608
Adj. R-sqr.	0.277	0.238	0.317	0.229	0.354	0.277

This table reports the trend in the investment rate over CEO tenure. A constant term is included in all models but is omitted for brevity. All control variables are lagged. The definitions of all variables are in Table A1. The standard errors are clustered by firm. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

(*continued*)

CEO turnovers that we believe to be unlikely to coincide with periods of low investment.

One group of turnovers that are unlikely to coincide with bad investment shocks are those caused by death or illness of the departing CEOs. We use Factiva news search to identify such a subsample of turnovers and form our first subsample consisting of these death/illness motivated turnovers.[7] In addition, we follow Jenter and Lewellen (2015) and classify all turnovers occurring when the outgoing CEO is between age 64 and 66 as retirements. We group these likely retirements together with the death/illness turnovers to form a second subsample of turnovers that are unlikely to coincide with bad investment shocks. To mitigate the incidence of "suspicious retirements," following Fee, Hadlock, and Pierce (2013), we also create a modified version of the second subsample by additionally requiring that death, illness, and retirements be preceded by above industry-year median ROA in the year prior to the turnover.

Turnovers for which the CEO change is not accompanied by other changes in the top management team, which we refer to as the "no management shake-up" subsample, are also likely not to coincide with poor firm performance and low investment. Finally, because performance-driven turnovers tend to

[7] We thank Ted Fee, Charlie Hadlock, and Joshua Pierce for kindly providing us with their classification of illness, death-related, and outright forced turnovers.

Table 2
Continued

Panel B: Shape of the investment-tenure curve

	(1)	(2)
	Investment rate	
Dummy (years [3,5])	0.006**	
	(0.003)	
Dummy (year 6 and after)	0.008**	
	(0.003)	
Spline (years [0,2])		0.008***
		(0.002)
Spline (years [3,5])		0.004**
		(0.002)
Spline (year 6 and after)		0.004***
		(0.001)
Ind-adj. ROA	0.135***	0.139***
	(0.019)	(0.023)
Ind-adj. return	0.009***	0.009***
	(0.003)	(0.003)
MB	0.002***	0.002***
	(0.000)	(0.001)
Leverage	0.008	0.005
	(0.005)	(0.007)
Div. payer	−0.106***	−0.140***
	(0.014)	(0.020)
log(assets)	−0.053***	−0.066***
	(0.004)	(0.006)
Year and firm-CEO F.E.	x	x
Observations	21,915	21,915
Adj. R-sqr.	0.277	0.277

This table reports the speed of the investment increase over different time periods in a CEO's tenure. We break a CEO's entire tenure length into three periods: years [0,2], years [3,5], and year 6 and after. The specification in Column 1 includes period indicators, and that in Column 2 is a spline regression. "Dummy (years [3, 5])" is an indicator variable for the second three-year period in CEO tenure. "Dummy (year 6 and after)" indicates the period after the first 6 years. "Spline (years [0,2])" is the spline for the first three years of tenure, "Spline (years [3,5])" is for the next three-year period, and "spline (year 6 and after)" is for the years after the first 6 years. A constant term is included in all models but omitted for brevity. All control variables are lagged. The definitions of all variables are in Table A1. The standard errors are clustered by firm. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

(*continued*)

be preceded by high stock return volatility or poor stock and accounting performances, we consider the subsample of turnovers that are preceded by both good performance (both stock return and ROA above industry-year median) and low idiosyncratic volatility (below industry-year median) as another subsample of turnovers unlikely to have been performance motivated.

Panel A of Table 1 reports the number of turnovers in each subsample. We have 125 turnovers occurring because of death or health issues of outgoing CEOs, 359 because of death or health issues or retirements, 175 when we further condition on the death, illness, or retirement occurring following good performance, 1,032 turnovers that are not accompanied by top management shakeups, and 795 turnovers preceded by good performance and low volatility. The union of these subsamples accounts for 1,826 turnovers, accounting for 43% of the 4,219 turnovers in our sample.

Table 2
Continued

Panel C: Expansion announcements and segment starts

	(1)	(2)	(3)	(4)
	$I_{\{expansion\ announcement(s)\ in\ the\ month\}}$		$I_{\{segment\ start\}}$	
	Full sample	Death/illness/ retirement	Full sample	Death/illness/ retirement
Tenure (in months)	0.001***	0.001***		
	(0.0002)	(0.0002)		
Tenure (in years)		0.018***	0.008*	
			(0.006)	(0.004)
Ind-adj. ROA	0.021*	0.030	0.055**	−0.068
	(0.013)	(0.039)	(0.025)	(0.059)
Ind-adj. return	0.003**	0.012**	0.001	−0.0003
	(0.001)	(0.005)	(0.003)	(0.009)
MB	0.0003	−0.0002	0.0003	−0.001
	(0.0001)	(0.001)	(0.001)	(0.001)
Leverage	−0.042***	−0.044	0.019*	0.023
	(0.009)	(0.029)	(0.011)	(0.028)
Div. payer	0.015***	0.013	−0.014	0.039
	(0.006)	(0.011)	(0.025)	(0.069)
log(assets)	0.014***	0.020	−0.015**	0.015
	(0.004)	(0.013)	(0.007)	(0.020)
# of segments		−0.103***	−0.101***	
			(0.003)	(0.006)
Firm-CEO F.E., Year F.E.	x	x	x	x
Observations	183,054	19,043	122,990	12,787
Adj. R-sqr.	0.159	0.158	0.318	0.284

In Columns 1 and 2, the dependent variables are the expansion announcement indicator $I_{\{\text{ expansion announcement(s) in the month}\}}$, and the observations are at the firm-month level. Expansion announcements are from the Capital IQ database and acquisition announcements are from SDC Platinum. The sample period is 2001–2009, since the Capital IQ coverage begins after 2000. In Columns 3 and 4, the dependent variables are the segment start indicator $I_{\{segment\ start\}}$. The data source is the Compustat "historical segment" database. In Columns 2 and 4, we use the subsample of turnovers due to death, illness, or retirement of the departing CEOs. The definitions of all variables are in Table A1. The Huber-White robust standard errors are clustered by firm and reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

(*continued*)

Columns 2–6 in panel A of Table 2 present estimates of the equation predicting investment as a function of CEO tenure in each of these subsamples. In each column, the coefficient on *Tenure* is positive and statistically significant. In addition, the magnitudes of the estimated CEO cycle effect in these subsamples of likely non-performance-driven turnovers are all close to the estimate obtained using the full sample of turnovers in Column 1, suggesting that changes in the investment rates over a CEO's tenure are unlikely to be driven by shocks to investment opportunities coinciding with the departures of the outgoing CEOs.

2.1.2 The shape of the investment-tenure relation. The rate at which the investment rate increases is not necessarily constant over CEOs' tenure. To evaluate potential nonlinearities in this relation, we estimate two specifications that allow for changing investment rates over tenure. We present the results in panel B of Table 2. In each specification, we break the CEO's entire tenure

Table 2
Continued
Panel D: Benchmarking investment rate on peer firms

	(1)	(2)
	Investment rate	
Dummy (tenure> 3 years)	0.013**	
	(0.005)	
Dummy (tenure> 6 years)		0.014**
		(0.006)
Ind-adj. ROA	0.064***	0.075***
	(0.018)	(0.022)
Ind-adj. return	0.016***	0.013**
	(0.005)	(0.005)
MB	0.004***	0.003***
	(0.001)	(0.001)
Div. payer	−0.057***	−0.062***
	(0.006)	(0.007)
Leverage	−0.093***	−0.111***
	(0.015)	(0.014)
Observations	25,008	12,370
Adj. R-sqr.	0.038	0.039

This table estimates the investment rate as a function of CEO tenure in the cross-section. We construct a sample consisting of firm-years with CEO tenure longer than three years (sample median) (Dummy (tenure>3 years) equals 1) and matching firm-years with below median tenure in the same (two-digit SIC) industry with the closest firm size (total book assets) (Dummy (tenure>3 years) equals 0). We then compare the investment rates in firm-years with long-tenured CEOs and in peer firm-years in a multivariate regression, controlling for Industry-adj. ROA and return, MB, Div. payer, and leverage. In Column 2, we change the tenure threshold to 6 years (75th percentile of the sample) and repeat the analysis in Column 1. Dummy (tenure>6 years) is an indicator variable that equals one for the firm-years with CEO tenure longer than 6 years, and 0 for the peer firm-years. A constant term is included in all models but is omitted for brevity. The definitions of all variables are in Table A1. The standard errors are clustered by firm and reported in parentheses. *** indicates significance at the 1% level.

into three time periods: years [0,2], years [3,5], and years [6 and after]. The cutoff points, 3 and 6, correspond to the median and 75th percentile of the firm-year level tenure distribution. In Column 1, we replace the continuous *Tenure* variable with two time period dummies for years [3,5] and years [6 and after] (with the dummy for years [0,2] being the omitted one). The estimates imply that the investment rate in years [3,5] is about 0.6 percentage points higher than that in years [0,2], and the investment rate in years [6 and after] is 0.8 percentage points higher than in years [0,2]. In Column 2, we use a spline specification that separately measures the speed of investment increase for each time period. The estimates from this specification imply that investment increases the fastest in the first three years at the average speed of 0.8% per year and then slows to an average increase of 0.4% per year in the two later periods. Overall, the results in panel B of Table 2 suggest that investment increases throughout the CEO's tenure and that the increase is fastest during the first three years.

2.1.3 Alternative measures of investment. In most of our analyses, we combine capital expenditures and acquisitions. In panel A of Table IA.1 in the Internet Appendix, we estimate the CEO investment cycle using capital expenditures and acquisitions separately. The results suggest that capital expenditure and acquisition rates each increase significantly over CEOs' tenure.

However, the magnitude of the increase for acquisitions is larger than that for capital expenditures.

Next, we estimate corporate investment using two different data sources: corporate announcements of business expansion and acquisitions and establishment of new segments. The results using corporate announcements are presented in Columns 1 and 2 of panel C of Table 2. The likelihood of a company announcing an expansion or acquisition increases by 0.1 percentage point per month or 1.2 percentage points per year during a CEO's tenure, consistent with the results reported in panel A using financial statement information. The same pattern holds after turnovers due to death, illness, or retirement of the outgoing CEO. In Columns 3 and 4 of panel C of Table 2, we estimate the likelihood of starting a new segment in a particular year. Again, the probability of establishing a segment is significantly lower in the early years of a CEO's tenure than in his later years.[8]

2.1.4 Alternative benchmark investment rate. The baseline specification of the investment-tenure regression includes firm-CEO fixed effects, so the tests we present effectively compare the investment rate later in a CEO's tenure to that during the same CEO's earlier years in office in the same firm. An alternative approach is to compare investment across firms and measure whether, holding other factors constant, investment in a firm with a CEO in his later years of tenure is larger than that in a comparable firm with a CEO in his earlier years of tenure. To implement this approach, we match each firm-year for which the CEO has been in office for more than three years (the sample median) to a peer firm with below-median CEO tenure in the same two-digit SIC industry-year with the closest firm size, measured by total book assets. After this matching process, the difference in the average firm size between matched firms is less than 4% and is not statistically significant.

We then compare the investment rate of firms with CEOs having greater than three years of tenure and that of their matched peer firms in a multivariate regression, controlling for other firm characteristics that are likely to be related to the firms' investment opportunities. We present the estimated equation in Column 1 of Table 2, panel D. The estimates indicate that investment rates of firms with CEOs who have been in office for more than 3 years are significantly higher than those in peer firms by 1.3% per year. This effect is economically meaningful given that the average investment rate in the sample is 9.4% (median 4.6%). In Column 2, we restrict the sample to those firms with CEOs

[8] There was a change in how segments were reported from 1997–1999 (SFAS 131). This rule could have potentially led some firms to disaggregate segment data, which would have looked like an expansion in our specification. In unreported analysis, we reestimate the equations reported here on the subsample of turnovers occurring after 1999 and obtain results similar to those reported here. In another unreported analysis, we define segment starts conditional on a contemporaneous increase in the firm's total assets and segment termination conditional on a contemporaneous decrease in the firm's total assets. All the results using the segment data are robust to this modification.

Table 3
Disinvestment probability and CEO tenure

Panel A: Disinvestment probability and CEO tenure

	(1) Full sample	(2) Death/illness	(3) Death/illness/ retirement	(4) Death/illness/ retirement at good performance	(5) No mgt. shakeup	(6) Good preturnover
	$I\{asset\ sales > 0\ or discontinued\ operations > 0\}$					
Tenure (in years)	−0.025**	−0.024*	−0.027**	−0.029**	−0.008*	−0.024***
	(0.012)	(0.012)	(0.012)	(0.013)	(0.005)	(0.009)
Ind-adj. ROA	−0.126***	−0.600***	−0.022	0.096	−0.217***	−0.212***
	(0.030)	(0.143)	(0.168)	(0.172)	(0.070)	(0.071)
Ind-adj. return	−0.011***	−0.003	−0.036*	−0.003	−0.004	0.001
	(0.004)	(0.028)	(0.020)	(0.023)	(0.008)	(0.009)
MB	−0.0003	0.0004	0.0002	−0.002	−0.002	−0.0002
	(0.001)	(0.002)	(0.003)	(0.005)	(0.002)	(0.002)
Leverage	−0.022	0.061	0.050	−0.017	0.021	−0.032
	(0.020)	(0.102)	(0.067)	(0.087)	(0.036)	(0.044)
Div. payer	0.091**	0.185	0.180	0.059	0.128*	0.132
	(0.038)	(0.211)	(0.138)	(0.117)	(0.069)	(0.082)
log(assets)	0.016	0.050	−0.016	−0.004	0.043*	0.039**
	(0.010)	(0.055)	(0.044)	(0.051)	(0.022)	(0.019)
Firm-CEO F.E., Year F.E.	x	x	x	x	x	x
Observations	21,915	595	2,567	1,230	7,626	6,608
Adj. R-sqr.	0.398	0.417	0.388	0.430	0.376	0.382

The dependent variables are the disinvestment indicator variable $I_{\{\text{asset sales}>0 \text{ or discontinued operations}>0\}}$. A constant term is included in all models but is omitted for brevity. All control variables are lagged. The definitions of all variables are in Table A1. The standard errors are clustered by firm. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

(*continued*)

who have been in office for more than 6 years (the 75th percentile of the sample distribution) together with their matched peer firms. In this equation, the estimated effect of longer tenure is 1.4% higher investment per year. These results suggest that CEOs in the later years of their tenure invest not only more than they do in their own early years of tenure but also more than comparable firms with CEOs who are in the early years of their tenure.

2.2 Disinvestment and growth over CEOs' tenure

Plot B of Figure 1 graphs the average probability of disinvestment by tenure years. There is no obvious trend in the likelihood of disinvestment prior to year 0. The disinvestment probability jumps by 5.8 percentage points in the turnover year, becoming as high as 27% in year 1, and monotonically decreases subsequently. By year 6, the likelihood of disinvestment decreases to 20.9%, a 23% reduction relative to year 1.

Panel A of Table 3 presents estimates of multivariate equations predicting the likelihood of disinvestment as a function of CEOs' tenure and CEO and firm characteristics. We first estimate an equation predicting the likelihood of disinvestment as a function of CEOs' tenure in Column 1. The negative and significant estimated coefficient on tenure implies that a one-standard-deviation increase in CEOs' tenure is associated with a ten-percentage-point decline in the

Table 3
Continued

Panel B: Downsizing announcements and segment termination

	(1)	(2)	(3)	(4)
	$I_{\{downsizing\ announcement(s)\ in\ the\ month\}}$		$I_{\{segment\ termination\}}$	*Multisegment*
	Full sample	Death/illness/ retirement	Full sample	Death/illness/ retirement
Tenure (in months)	−0.001***	−0.001**		
	(0.0002)	(0.0005)		
Tenure (in years)		−0.007**	−0.009*	
			(0.003)	(0.005)
Ind-adj. ROA	−0.011**	−0.0004	−0.002***	−0.001
	(0.005)	(0.020)	(0.001)	(0.001)
Ind-adj. return	−0.004***	0.002	−0.026***	−0.026***
	(0.001)	(0.005)	(0.003)	(0.008)
MB	−0.0004**	−0.0002	0.006***	0.007***
	(0.0001)	(0.0002)	(0.0004)	(0.001)
Leverage	−0.0004	0.007	−0.043*	−0.134**
	(0.007)	(0.022)	(0.026)	(0.062)
Div. payer	0.016***	0.025***	−0.002	−0.002
	(0.004)	(0.009)	(0.003)	(0.010)
log(assets)	0.017***	0.030***	0.001	0.001
	(0.002)	(0.007)	(0.001)	(0.001)
Segment performance			0.009	0.055**
			(0.009)	(0.027)
# of segments			0.036*	−0.041
			(0.020)	(0.059)
Segment age			0.006	0.028
			(0.006)	(0.017)
Firm-CEO F.E., Year F.E.	x	x	x	x
Observations	195,165	19,414	69,609	6,787
Adj. R-sqr.	0.153	0.144	0.183	0.199

In Columns 1 and 2, the dependent variables are the downsizing announcement indicator $I_{\{\text{downsizing announcement(s) in the month}\}}$. Observations are at the firm-month level. Downsizing announcements are from the Capital IQ database with coverage starting after 2000. In Columns 3 and 4, the dependent variables are the segment termination indicator $I_{\{segment\ termination\}}$. Observations are at the segment-year level. The data are from Compustat "historical segment" database, and we only include multisegment firm-years. "Segment performance" measures the operating performance of the segment (segment-year level operating profit or loss scaled by segment-year level sales). "Segment age" is the number of years since the establishment of the segment. "# of segments" is the number of segments with unique segment IDs. In models (2) and (4), we use the subsample of turnovers due to death, illness, or retirement of the departing CEOs. The definitions of all variables are in Table A1. Regressions include, but do not report, the constant term. The Huber-White robust standard errors are clustered by firm and reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

likelihood of disinvestment, compared to an average disinvestment probability of 25% (standard deviation 43.3%) in our sample.

Columns 2–6 present estimates of this equation for the subsamples of firms that follow the turnovers, which are unlikely to coincide with high disinvestment. In each case, the disinvestment probability appears to be higher in the early years of the CEO's tenure than in later years. These findings suggest that the empirical finding of decreasing likelihood of corporate disinvestment over the CEO's tenure does not occur because of CEO turnovers coinciding with other factors that lead to high disinvestment.

Panel B of Table 3 considers the likelihood of downsizing-related news announcements and the segment termination/reorganization (for multisegment

Table 4
Net effects of CEO tenure on disinvestment and investment

Panel A: Asset growth rate and CEO tenure

	(1) Full sample	(2) Death/illness	(3) Death/illness/ retirement	(4) Death/illness/ retirement at good performance	(5) No mgt shakeup	(6) Good preturnover
	Asset growth rate					
Tenure (in years)	0.033***	0.028*	0.022***	0.051***	0.026***	0.036***
	(0.003)	(0.015)	(0.007)	(0.013)	(0.004)	(0.004)
Firm-level controls	x	x	x	x	x	x
Firm-CEO F.E., Year F.E.	x	x	x	x	x	x
Observations	21,915	595	2,567	1,010	7,626	6,608
Adj. R-sqr.	0.278	0.098	0.190	0.242	0.306	0.297

Panel B: Employment growth rate and CEO tenure

	Employment rate growth					
Tenure (in years)	0.015***	0.028**	0.014***	0.025***	0.015***	0.020***
	(0.002)	(0.014)	(0.004)	(0.008)	(0.002)	(0.003)
Firm-level controls	x	x	x	x	x	x
Firm-CEO F.E., Year F.E.	x	x	x	x	x	x
Observations	21,499	585	2,541	1,001	7,494	6,467
Adj. R-sqr.	0.205	0.130	0.120	0.130	0.164	0.191

Panel A reports the trend in the asset growth rate over CEO tenure. Panel B reports the trend in the employment growth rate over a CEO's tenure. The usual set of control variables (lagged): Industry-adj. ROA and return, MB, Leverage, Div. payer, log(assets), firm-CEO fixed effects, and year fixed effects, as well as a constant term is included in all models but is omitted for brevity. The definitions of all variables are in Table A1. The standard errors are clustered by firm and reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

firms) over CEOs' tenure. Consistent with the decreasing likelihood of disinvestment over tenure documented in panel A, we find that the probability of downsizing-related corporate news and the likelihood that a segment is terminated or reorganized are also significantly higher in a CEO's earlier years in office than in the later years, both in the full sample and after turnovers due to death, illness, or retirement of the departing CEOs.

An implication of changing investment and disinvestment behavior is that the firm's total asset and employment will also grow over CEOs' tenure. Table 4 documents that both growth rates do indeed increase over CEOs' tenure. The estimates in this table indicate that a one-standard-deviation increase in CEO tenure is associated with a 13.2% increase in the asset growth rate and 6% in the employment growth rate. Given that the average asset growth rate is 18.4% (standard deviation 63.9%) and the average employment growth rate is 7.9% (standard deviation 32.8%), the difference in these growth rates over CEOs' tenure is clearly substantial. The behavior of the growth rates in assets and employment over the CEO cycle is likely reflective of the cyclical disinvestment and investment documented above.

2.3 Robustness

The estimates in Tables 2–4 suggest that the CEO investment cycle is an important characteristic of firms' investments. Next, we discuss the robustness

of these results to a number of alternative specifications and samples. The results are reported in Internet Appendix A.

2.3.1 Alternative scaling of investment and disinvestment. In our estimates of the effect of CEO tenure on investment and disinvestment, we have scaled investment by the book value of assets at the beginning of the year. Alternatively, we could have scaled by a different variable, such as sales, by a variable measured before the CEO turnover rather than at the time of the investment, which is not affected by any actions of the incoming CEO or even not scaled at all, and estimated the equations using the raw investment or disinvestment. Table IA.1 in the Internet Appendix presents estimates of the equations from Tables 2 and 3 using these alternative approaches to scaling investment and disinvestment. The results in each estimated equation are similar to those reported in Tables 2 and 3. These results suggest that the reported relation between CEO tenure and investment/disinvestment does not depend on the way we have chosen to scale these variables.

2.3.2 Nonclassified turnovers, forced turnovers, insider successions. Table IA.2 presents estimates of the equations in Tables 2, 3, and 4 on subsamples constructed to follow turnovers of different types. Panel A reports the results using the subsample for which the turnover reason is unclassified, panel B for the subsample of turnovers that appear to be outright forced, and panel C for insider successions. The estimated CEO investment cycle effects following nonclassified turnovers and insider successions are similar to those in the full sample and those in the various subsamples of likely non-performance-driven turnovers. In contrast, following forced turnovers, disinvestment is larger and the growth rate is lower than in the entire sample.

2.3.3 Excluding turnover years. Another possibility is that the investment cycle could merely reflect short-term changes in investment around the time of the turnover. To evaluate whether the investment cycle is solely a function of behavior surrounding CEO turnovers, or a phenomenon that occurs throughout the CEO's tenure, we reestimate our equations excluding the turnover year and the subsequent year. These results are presented in Table IA.3. Consistent with the notion that the CEO investment cycle is not merely a turnover year occurrence, the estimated magnitudes of CEO investment cycles are comparable to those in the full sample.

2.3.4 CEO career cycle versus CEO life cycle and firm life cycle. Firm investment and growth can also vary with a CEO's age and a firm's age. Yim (2013) finds that younger CEOs are more likely to engage in acquisitions than are older CEOs In addition, younger firms tend to have higher investment and growth rates than do older firms. Because we include firm-CEO fixed effects in the main specifications, we cannot identify the effects of a CEO's age or

the firm's age on investment. For this reason, we present estimates of our main equations in panel A of Table IA4, controlling for both CEO age and firm age but not firm-CEO fixed effects The results in panel A suggest that the CEO tenure effect is the opposite of the life-cycle effects: investment and growth rates increase with CEOs' time in office, but decrease with CEO age and firm age.

Because this specification does not contain firm-CEO fixed effects, we reestimate the main specification (with the usual set of controls and firm-CEO fixed effects) for a subsample of 163 CEOs who change employers during our sample period in panel B, and subsamples with young CEOs (CEOs younger than the sample median age of 52 when taking office), old CEOs (those older than 52 when taking office), young firms (firms that entered our sample younger than the sample median age of 8), and old firms (firms that entered our sample older than 8) in panel C The estimated coefficients on *Tenure* reported in panels B and C of Table IA.4 suggest that the CEO investment cycles exist in all subsamples with similar magnitude and thus are not driven by CEO or firm age.

2.4 Benchmarking the magnitude of the CEO investment cycle

The CEO investment cycle leads to variation in investment likely caused by forces internal to the firm. As a benchmark to assess the magnitude of the CEO investment cycle, it is useful to compare its size to estimates of other factors that are known to affect investment. In particular, the literature has argued that external factors, such as the business cycle, political uncertainty due to the election cycle, and financial constraints, can affect a firm's investment. Table 5 surveys estimates of the extent to which these factors affect investment. To estimate the effect of business cycles on investment, we reestimate equations from Tables 2–4, including an indicator variable for recession years. These estimates are presented in Table IA.6 in Internet Appendix B. For estimates of the effect of political uncertainty on investment, we rely on Julio and Yook (2012), and for estimates of the effect of financial constraints on investment, on Hoberg and Maksimovic (2015). The detailed discussion is in Table 5.

This summary table indicates that the incremental effect of a one-standard-deviation increase in *Tenure* is of the same order of magnitude as being in recession or being in an election year or facing financial constraints during the latest financial crisis. These numbers suggest that the effect of the CEO investment cycle is substantial in magnitude, comparable to other factors that are commonly accepted as being important determinants of investment.

3. Potential Reasons for the CEO Investment Cycle

Because the CEO investment cycle is substantial in magnitude and present in public firms regardless of the circumstances of the turnover, it is important to identify the theories that could explain the existence of this cycle and

Table 5
Comparing the magnitude of the CEO cycle with other factors affecting investment (capital expenditures)

	CapX/Assets	CapX/Sales
One-std.-dev. increase in *Tenure (in years)*	0.4 pts	0.4 pts
Recession versus nonrecession	−0.2 pts	
Election versus nonelection (Julio and Yook 2012)	−0.4 pts	
One-std.-dev. increase in financial constraint during 2008-2009 (Hoberg and Maksimovic 2015)		0 to –0.8 pts

This table compares the CEO cycle effect (*One-std.-dev. change in tenure (in years)* in Column 1 of Table 2, panel B, and in Column 2 of Appendix Table IA.5) with the effects of other external factors that affect firm's capital expenditure: business cycle (*Recession versus nonrecession*; see results presented in Appendix Table IA.5, Column 2), political cycle (*Election versus nonelection*; see Julio and Yook 2012), and financial constraints (*One-std.-dev. increase in financial constraint during 2008−−2009*; see Hoberg and Maksimovic 2014). I/A and I/S are capital expenditures scaled by lagged (beginning-of-period) assets and sales, respectively.

Business cycles: Firm-level and aggregate corporate investment rates tend to vary substantially between expansions and recessions. In Appendix Table IA.5, we compare the magnitude of the business-cycle effect to the CEO invest-cycle effect. To do so, we define *Recession* as an indicator variable that equals one for years 2001 and 2008–2010 and include this variable into the specification predicting changes in disinvestment, investment, and firm growth. Columns 1–3 in Appendix Table IA.5 show that the effects of CEO tenure and the business cycle on corporate investment rates are comparable in magnitude. Column 4 shows that disinvestment is actually less likely to occur in recession years than in expansion years, and thus the business cycle effect on disinvestment intensity is very different from the CEO cycle effect. Columns 5 and 6 show that the effects of CEOs' tenure and the business cycle on asset growth and employment growth are comparable in magnitude as well. The CEO investment-cycle effect on corporate investment is nontrivial compared to the effect of the business cycle.

Political uncertainty: Julio and Yook (2012) estimate the extent to which corporate investment varies over the political election cycle. These authors find that the corporate investment rate (capital expenditures scaled by the beginning-of-year book assets) is on average 0.4 percentage point lower in national election years than in nonelection years, or a 5% reduction relative to the sample median rate (=5.1%). Thus, the CEO investment cycle is comparable to the election-cycle effect documented by Julio and Yook (2012).

Financial constraints: If firms face financial constraints, meaning that their cost of finance exceeds the appropriate risk-adjusted rate of return, then firms' investment is likely to be reduced. Using a text-based approach to measure the existence of financial constraints, Hoberg and Maksimovic (2015) estimate that during the 2008–2009 financial crisis, a one-standard-deviation increase in financial constraint is associated with a decrease in the annual corporate investment rate (CAPX scaled by sales) in the range of 0% to 0.8%, depending on the measure of financial constraint they use. In other years, the estimated effect of financial constraints on investment is smaller than during the financial crisis. Our estimates imply that the magnitude of the CEO investment cycle is in the range that Hoberg and Maksimovic (2015) find for the financial crisis.

to distinguish between them empirically. The traditional economic view, in which the firm is a collection of physical assets that always chooses profit-maximizing actions, clearly is not consistent with the CEO investment cycle. Since management plays no role, this view implies that firm investment and growth should not depend on the CEO's time in office.

To explain the CEO investment cycle, one must incorporate an explicit role for management and the CEO in particular. This role could exist because the CEO is entrusted by the owners to make decisions about the way the firm's resources will be used. However, since the CEO is self-interested, he will sometimes make decisions that maximize his utility rather than the firm's value. As we discuss below, such nonvalue maximization naturally leads to an agency-based explanation for the CEO investment cycle. Alternatively, the CEO himself can be viewed as an asset, providing skills to the firm that can be used to maximize profits. If a new CEO arrives with a set of skills different

from his predecessor or the CEO's ability to invest improves over time, it could be optimal for the firm to change its assets so as to better complement the new CEO's skills. These views are not mutually exclusive and both are probably relevant to some extent. To evaluate their relative importance, we discuss the implications of each for the CEO investment cycle and test these predictions on our sample. We summarize the alternative explanations for the CEO investment cycle and their implications in Table 6, as well as the empirical evidence presented below that evaluates these implications.

3.1 Management as a decision-making agent: Implications for the CEO investment cycle

There are many reasons why CEOs could prefer to grow their firms rather than to shrink them: a CEO's pay and prestige are generally positively correlated with firm size, adding units that diversify the firm can lower the risk of a CEO's personal financial position in the firm and his human capital, a CEO can purchase "glamorous" divisions that are fun to manage, a CEO can create new positions for favorite employees through growth, or a CEO with "hubris" could overestimate his ability to add value to a line of business.[9] These arguments imply that a CEO is likely to prefer the firm to grow more than is optimal from the shareholders' perspective. Consequently, factors that constrain management from taking as many investments as it wants are important contractual elements of the firm. For example, Jensen (1986) focuses on the role of debt in constraining managers' propensity to overinvest. The board of directors is another potential constraint on management's ability to invest.

The board of directors is particularly relevant for understanding CEO investment cycles, since the CEO's influence over the board is likely to increase over time. As emphasized by Hermalin and Weisbach (1998), so long as a CEO is inframarginal relative to a potential replacement, he will have some influence over the director selection process and will have incentives to use this influence to appoint directors who are less likely to oppose his will. Over time, boards will evolve toward ones who are loyal to the CEOs that appoint them and thus less likely to constrain the CEOs from undertaking whichever investments they want. Therefore, the dynamics of the board and its loyalty to the CEO, together with the CEO's preference for investments even if they are not value maximizing, could potentially lead to the increase in investment with CEO tenure that we document in Table 2.

Implication 1: CEO power and investment. Holding other factors constant, the increase in investment over CEOs' tenure should come through the CEO's control over the board of directors. Therefore, controlling for the CEO's influence on the board should lessen the estimated effect of CEO tenure on investment.

[9] The literature arguing that managers tend to build "empires" is enormous, but we partially summarize it prior to Section 1. See also Roll (1986), Morck, Shleifer, and Vishny (1990), and Jensen (1993).

Table 6
Summary of explanations for CEO investment cycles and their empirical support

Explanation	Empirical implications	Empirical findings about investment	Empirical findings about disinvestment
Management irrelevance: Management plays no role in determining firms' investments.	CEO investment cycles could exist in this world if CEO turnovers happen to coincide with investment shocks that lead to high disinvestment and low investment.	[Inconsistent]: CEO investment cycles exist even after turnovers due to death or illness of the departing CEOs, which are unlikely to be related to investment shocks. [Inconsistent]: CEO investment cycles exist following other turnovers that are also unlikely to coincide with periods of high disinvestment and low investment: • Turnovers due to normal retirement of the departing CEOs • Turnovers with no shakeups in the top management team • Turnovers preceded by good preturnover performance and low preturnover volatility	[Inconsistent]: The same as those listed in the previous column.
Agency explanation: CEO investment cycles reflect the changing equilibrium in a world in which managers' incentives are not perfectly aligned with shareholders. CEOs prefer their firms to grow, potentially at the cost of shareholders. This preference leads to overinvestment in the later part of a CEO tenure's as the CEO becomes more powerful over the board. The private benefits from growth make CEOs reluctant to divest assets they have established, even if the firm is no longer the optimal owner of the assets. CEO turnover facilitate investment reoptimization, leading to high disinvestment after turnover.	Increasing investment over a CEO's tenure: • Holding other factors constant, the increase in investment over a CEO's tenure should come through the CEO's power over the board. • Investment quality decreases with a CEO's tenure, and is also related to the CEO's power over the board. Decreasing disinvestment over a CEO's tenure: • The residual influence of the prior management negatively affects the postturnover disinvestment intensity of poorly performing assets.	[Consistent]: Investment quality (measured by acquisition announcement returns) decreases over a CEO's tenure, and are significantly more likely to be negative in later periods of a CEO's tenure. [Consistent]: Both the increase in the investment level and the decrease in quality are driven by the CEO's increasing capture of the board over time, even when the board capture results exogenously from directors reaching retirement age.	[Consistent]: The residual influence of the prior management negatively affects the disinvestment intensity of poorly performing assets post turnover, even when the residual influence occurs for exogenous reasons (in the presence of a staggered board).

(*continued*)

Table 6
Continued

Explanation	Empirical implications	Empirical findings about investment	Empirical findings about disinvestment
Efficiency explanations: The CEO's ability to identify positive NPV projects improves over his tenure, leading to increasing investment. The new CEO's skills do not fit with the firm's existing asset structure, leading to high disinvestment immediately after turnover.	Increasing investment over a CEO's tenure: • Increasing investment level is not associated with a change in investment quality. Decreasing disinvestment over a CEO's tenure: • The intensity of post-turnover disinvestment negatively depends on the fit between the new CEO's skills and the firm's assets.	[Inconsistent]: Variation in CEO power due to factors unrelated to CEO ability (i.e., director aging) still leads to increase in investment. [Inconsistent]: Investment quality decreases (to negative) over a CEO's tenure.	[Inconsistent]: The CEO investment cycles exist even after turnovers due to death or illness of the departing CEOs (when the boards do not necessarily have desire to select new CEOs with different skills). [Inconsistent]: The magnitudes of the CEO investment cycles when single-industry firms hire insider CEOs (when the new CEOs' skills are more likely to fit firms' assets) are comparable to those in the full sample. [Inconsistent]: In multi-industry firms, the magnitudes of the CEO investment cycles are similar no matter whether the firm hires a generalist CEO or a specialist CEO. [Inconsistent]: The magnitude of the CEO investment cycle is similar regardless of whether or not there is an industry productivity shock at the time of the turnover (when the new CEO's skills are less likely to fit the firm's assets).

This table summarizes three explanations for CEO investment cycles and their empirical implications. It also summarizes the main findings that either support or contradict the implications of each explanation.

Implication 2: Quality of investments over CEOs' tenure. Holding other factors constant, the quality of firms' investments should decrease with the CEO's tenure and should also be related to the CEO's control of the board.

If CEOs enjoy private benefit from growing the firm and tend to overinvest as they gain more control of the board, then they are unlikely to divest the assets that they have acquired, even if the assets are less profitable than expected.[10] In addition, the market sometimes views divestitures as essentially an admission of a mistake and divesting poorly performing assets can reflect poorly on the CEO (see Kanodia, Bushman, and Dickhaut 1989; Boot 1992). When a new CEO arrives, he does not necessarily enjoy the same private benefits from these assets and could be less averse to admitting his predecessor's mistakes. Therefore, a new CEO is likely to sell poorly performing assets at a higher rate than the outgoing CEO. Moreover, a natural additional testable implication of this agency view of postturnover disinvestment is as follows.

Implication 3: The influence of prior management. The influence that the old management has on the new CEO after turnover should negatively affect his willingness to divest poorly performing assets acquired by the prior management.

This view of the CEO as a decision-making agent who sometimes puts his personal agenda ahead of the firm's, can therefore explain both portions of the CEO investment cycle. When a new CEO takes office, he will tend to disinvest poorly performing assets established by the predecessor. As the CEO becomes more powerful over time, he will have more sway over his board and will be able to undertake and hold onto investments that maximize his own utility. When this CEO steps down, the pattern of investment is repeated over the next CEO's tenure.

3.2 Management as an asset: Implications for the CEO investment cycle

When a CEO is viewed as an asset rather than as a decision maker, his ability should be an important determinant of not only the level of the firm's investment but also the composition of its assets. Maksimovic and Phillips (2002) provide a skills-based explanation for the high disinvestment rate following management changes. In this model, conglomerate firms choose their asset structure based on the relative productivity of its business segments. This in turn depends on the CEO's relative skill in managing assets in different industries. In such a world, if the CEO changes and the incoming CEO has a skill set different from the outgoing one, then it is possible that the optimal set of assets the firm should own will change, leading to divestitures. Applying the Maksimovic and Phillips (2002) logic to CEO turnover yields the following implication.

Implication 4: The fit of the incoming CEO's skills with the firm's assets. Holding other factors constant, the more that the new CEO's skills differ from

[10] The discussion of private benefits of control goes back at least to Berle and Means (1932), and private benefits have become a key element of many models of corporate governance (see, for example, Tirole (2006), 16–17).

the firm's current asset structure, the more divestitures will be observed after CEO turnover.

The skills-based arguments, however, do not predict that divested units should have unusually bad performance beyond being hit by negative shocks outside of the management's control, because the firm should be the optimal owner of the asset prior to the CEO change. In addition, this argument does not predict increasing investment levels over CEOs' tenure, and it does not predict that the CEO's control of the board should explain the investment over a CEO's tenure. To explain the increase in investment over CEOs' tenure in a world in which all investment is first best, something like the CEO's ability to identify positive NPV projects must systematically improve over time, possibly through learning by doing. But in contrast to the agency explanation, investment quality should not deteriorate (to negative) over time, since investment is always efficient under this view.

A variant on the CEO skills explanation is that uncertainty about a CEO's ability could create additional risk for the firm, which in turn could affect the firm's cost of capital (see Pan, Wang, and Weisbach 2016 for evidence consistent with this view). Changes in this uncertainty could potentially lead to a pattern in investment similar to what we report above. However, similar to the CEO skills explanation, it does not imply that investment quality would decline to negative over time.

4. Distinguishing between the Explanations for the Existence of CEO Investment Cycles

4.1 CEO power and investment

4.1.1 The CEO's capture of the board and investment. To test Implication 1, that the increase in investment over CEOs' tenure is a function of the CEO's growing power over his board, we construct a variable that is likely to be highly correlated with the CEO's power over the board, as well as his tenure, and evaluate the extent to which this variable explains the relation between CEO tenure and corporate investment. Specifically, we calculate the fraction of "co-opted" directors, who are appointed after the CEO takes office ("*% of new directors*"). The idea, formalized in Hermalin and Weisbach (1998), is that the CEO will use his influence to ensure that the firm appoints directors who are unlikely to oppose any actions he wishes to take. Existing empirical studies also provide evidence that co-opted boards are indeed associated with less board monitoring.[11]

[11] Morse, Nanda, and Seru (2011) and Coles, Daniel, and Naveen (2014) document that board co-option is associated with a higher level of managerial pay, but fewer incentives are provided to managers and there is a lower level of turnover-performance sensitivity. In addition, similar to some of the results reported below, Coles, Daniel, and Naveen (2014) independently find that a firm's rate of capital expenditures is increasing with the level of the board's cooption.

Table 7
Agency explanations for the investment cycle

Panel A: CEO Capture of the Board and Investment

	(1)	(2)	(3)	(4)
	Investment rate		*CapX Rate*	*Acquisition rate*
Tenure (in years)	0.005***	0.001	0.0004	0.001
	(0.001)	(0.001)	(0.0004)	(0.001)
% of new directors		0.064***	0.011*	0.052**
		(0.020)	(0.006)	(0.023)
Ind-adj. ROA	0.152***	0.161***	0.079***	0.083***
	(0.040)	(0.031)	(0.009)	(0.029)
Ind-adj. return	0.010*	0.011**	0.003***	0.007
	(0.006)	(0.005)	(0.001)	(0.005)
MB	0.001	0.001**	0.001***	0.001
	(0.001)	(0.001)	(0.000)	(0.001)
Leverage	−0.179***	−0.161***	−0.056***	−0.106***
	(0.028)	(0.021)	(0.007)	(0.020)
Div. payer	0.008	0.009	−0.003	0.012**
	(0.008)	(0.006)	(0.003)	(0.005)
log(assets)	−0.109***	−0.089***	−0.018***	−0.072***
	(0.010)	(0.007)	(0.002)	(0.007)
Firm-CEO F.E., Year F.E.	x	x	x	x
Observations	12,972	12,972	12,972	12,972
Adj. R-sqr.	0.318	0.315	0.729	0.192

This table reports the effect of the percentage of directors appointed during the incumbent CEO's tenure on firm investment. All control variables are lagged. Firm-CEO fixed effects and year fixed effects are included in all models. The definitions of all variables are in Table A1. The Huber-White robust standard errors are clustered by firm and reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

(*continued*)

We construct this variable using data from ISS Governance Services, which provides the starting and ending years for each director in the S&P 1500 firms during 1996 to 2011, with comprehensive data for S&P 1500 firms starting from 1998. For each firm-year in our sample, we count the number of directors who start their directorship since the current CEO took office and scale it by the total number of directors on the board in that year. By construction, *% of new directors* is highly correlated with the CEO's time in office: the correlation between the two is 0.64, which is much higher than the correlations between CEO tenure and other proxies of CEO power (e.g., 0.13 with CEO ownership, and 0.23 with CEO being Chairman).

In panel A of Table 7, we test Implication 1 by including *% of new directors* in our investment equations. Even though tenure and *% of new directors* are highly correlated with one another, *% of new directors* directly reflects the CEO's control over the board. Therefore, if the effect of tenure on investment only occurs because of the increase in the CEO's control of the board over his tenure, then the tenure effect should be picked up by *% of new directors*. Alternatively, if there is some other reason why tenure is related to investment, then estimates of the effect of tenure on investment should be relatively unaffected by including *% of new directors* into the equation.

Since the inclusion of *% of new directors* reduces the sample size, in Column 1 of panel A we first reproduce the baseline results in the relevant subsample and

Table 7
Continued

Panel B: Instrumental variables estimates of the effect of CEO power on investment

	First-stage *% of new directors*	Second-stage *Investment rate*
% of directors reaching retirement age	0.475***	
	(0.042)	
% of new directors		0.061**
		(0.030)
Avg director age	−0.017***	0.0002
	(0.002)	(0.001)
Ind-adj. ROA	0.085*	0.143***
	(0.045)	(0.036)
Ind-adj. return	0.011***	0.006
	(0.004)	(0.005)
MB	−0.001	0.001*
	(0.001)	(0.001)
Leverage	0.011	−0.171***
	(0.036)	(0.024)
Div. payer	−0.018	0.004
	(0.018)	(0.006)
log(assets)	0.016	−0.092***
	(0.012)	(0.008)
Firm-CEO F.E., Year F.E.	x	x
Observations	10,742	10,742
First-stage F-statistics	108.63***	
Anderson-Rubin Wald test		5.74**

This table reports the results with the instrumented "% of new directors," using the cumulative number of directors reaching retirement age during the incumbent CEO's tenure until the current fiscal year, scaled by the current board size. All control variables are lagged, including the average age of the directors. Firm-CEO fixed effects and year fixed effects are included. The definitions of all variables are in Table A1. The Huber-White robust standard errors are clustered by firm and reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively. The F-statistics for the first-stage and the Anderson-Rubin Wald tests are reported at the bottom of the table.

obtain similar estimates to those reported above. In Column 2, we control for *% of new directors* and find that CEO tenure no longer has any effect on investment, suggesting that the channel through which CEO tenure affects investment is indeed the control over the board that the CEO acquires over time.[12] The estimate implies that a one-standard-deviation increase in *% of new directors* would lead to an increase in the investment rate by about 2 percentage points (=0.061*0.3), which suggests that a CEO's control over his board has a substantial effect on a firm's investment decisions. Columns 3 and 4 separately estimate the effect of *% of new directors* on capital expenditures and acquisitions. These estimates suggest that the effect of *% of new directors* is stronger for acquisitions (coefficient = 0.052) than for capital expenditures (coefficient = 0.011), but the effect on each is significantly positive. The larger effect for acquisitions than for capital expenditures likely reflects that large

[12] In unreported analysis, we find that CEO ownership or a CEO being the chairman of the board does not explain the effect of CEO tenure on investment and disinvestment. We also include all three measures of CEO power in one equation and obtain results similar to those reported in panel A of Table 7. These findings suggest that measures of growing CEO power over time can better explain the CEO investment cycles than other more static/dichotomous measures of CEO power.

and nonrecurring investments, such as acquisitions, are more subject to board scrutiny than to routine capital expenditures.

4.1.2 Instrumental variable estimates. One potential concern is that our measure of the CEO's capture of the board is jointly endogenous with the firm's investment. For example, a CEO's ability could affect both investment and his capture of the board (Hermalin and Weisbach 1998). Such endogeneity would lead the coefficients reported in panel A of Table 7 to be biased. In particular, if a CEO's ability were positively related to both his control over the board and the level of investment, then the OLS estimate would be biased upward.

To address this concern, we rely on the custom of directors resigning when they reach a predetermined retirement age to identify the demand for new directors that is not a function of CEO ability or the firm's conditions. Most companies have a mandatory retirement age of 72 for outside directors, and inside directors' mandatory retirement age is usually around 65 (see Larcker (2011) for a discussion of directors' retirement policies). The fraction of directors that have reached the retirement age in a given year ("*% of directors reaching retirement age"*) is unlikely to be correlated with the CEO's ability or the firms' investment policies and therefore would represent a valid instrument for *% of new directors.*[13] Because the age of the directors could potentially be related to investment independently of their monitoring, we also control for the average age of the directors.

Panel B of Table 7 reports the estimates of the instrumental variable specification. The first-stage results, as well as the F-statistics, indicate that our instrument is positively and significantly related to *% of new directors*. The second-stage results suggest that the exogenous variation in *% of new directors* due to director aging still leads to higher corporate investment. Consequently, there appears to be a causal effect of CEO capture over the board on investment and growth, and the increase in investment over a CEO's tenure is not driven by improvement in CEO ability over time.

4.2 Investment quality over a CEO's tenure

An implication of the agency-based interpretation of the CEO investment cycle is that the quality of the firm's investments should decrease (to negative NPV) over the CEO cycle (Implication 2). We evaluate this implication using the stock market reaction to announcements of the firm's acquisitions, which has been

[13] This instrument is valid since it is highly correlated with the number of directors who actually retire and thus the fraction of new directors appointed by the CEO. In our sample, among the directors who have reached the retirement age, about 75% of them indeed resign around the mandatory age. This percentage is calculated as the fraction of directors who left the company in a one-year window around the retirement age (65 for inside directors and 72 for outside directors). This instrument also satisfies the exclusion restriction because changes in the instrumented *% of new directors* over a CEO's tenure is driven solely by the aging of directors, which is unrelated to changes in the CEO's ability, and director aging should predict increasing investment only through the channel of CEO capture of the board. Note that we do not condition on a director's actual departure (due to retirement), as departure is a choice, while aging is not.

Table 8
Investment quality

Panel A: Quality and timing of investment

	Deals made in years[0,2]	Deals made after years[0, 2]	Difference
% of CAR [-1, 1] around acq. announcements < 0	44%	57%	−13%**
Average CAR [-1, 1]	0.642	−0.360	−1.002***

This panel reports the percent of negative announcement abnormal returns and the average announcement abnormal returns, for deals made in the first three years of a CEO's tenure versus in later years. *** and ** indicate significance at the 1% and 5% level, respectively.

(*continued*)

commonly used as a measure of the firm's acquisition quality (e.g., Masulis, Wang, and Xie 2007; Harford, Humphery, and Powell 2012; Fracassi and Tate 2012). The quality of acquisitions is particularly relevant to our tests for two reasons. First, the acquisition rate increases on average by 40% after three years and by two-thirds six years after a CEO took office, accounting for a large fraction of the investment increases over the CEO cycle. Second, prior literature argues that corporate mergers and acquisitions are often motivated by non-value-maximizing reasons (e.g., Jensen 1993; Grinstein and Hribar 2004; Harford and Li 2007).

Panel A of Table 8 documents that during the first three years of a CEO's tenure, the fraction of acquisitions with negative three-day cumulative market-adjusted announcement returns is 44%, rising to 57% after the third year. At the same time, the average announcement return decreases from 0.64 in the first three years to −0.360 in later periods.[14]

The market reaction to acquisition announcement reflects not only the quality of the acquisition but also certain firm characteristics, such as firm size, and deal characteristics, such as the payment method. For this reason, in panel B of Table 8 we present equations predicting whether the three-day market-adjusted return to acquisition announcements is negative, controlling for relevant firm and deal characteristics. Column 1 documents that acquisition announcement returns decrease with CEO tenure. However, in Column 2, when we include *% of new directors* into the equation, CEO tenure does not affect announcement returns any more. These results suggest a CEO's ability to undertake value-decreasing acquisitions comes from his influence over the board of directors.

If *% of new directors* partially reflects the CEO's ability and higher ability corresponds to both higher investment quality and more CEO power over the board, then the OLS estimate in Column 2 is biased upward. For this reason, we use *% of directors reaching retirement age* as an instrument for *% of new*

[14] A concern when comparing announcement returns over tenure is that returns are both conditional on the market's estimate of a CEO's ability and also reveal information about his ability. A CEO who has made it to a longer tenure will on average be of higher quality and thus the market's expectation of his decisions will be higher (Hermalin and Weisbach 1998). However, as long as the projects have positive NPV, the market reaction should not be systematically negative in the later years of a CEO's tenure, unless the market systematically overestimates the CEO's ability.

Table 8
Continued

Panel B: Market reaction to acquisitions and CEO power

	(1)	(2)	(3)	(4)	(5)	(6)
	CAR [−1, 1] is negative		% of new directors	CAR [−1, 1] is negative	CAR [−1, 1] in bottom quartile	
	OLS		IV 1st stage	IV 2nd stage	OLS	
Tenure	0.003*	0.001			0.004*	
	(0.002)	(0.003)			(0.002)	
% of new directors		0.249**	0.457***	0.172**		
		(0.121)	(0.076)	(0.085)		
Dummy (years [3,5])						0.010*
						(0.005)
Dummy (year 6 and after)						0.056*
						(0.032)
Avg director age	−0.002	−0.001	−0.023***	0.002	−0.003	−0.001
	(0.003)	(0.003)	(0.003)	(0.006)	(0.003)	(0.004)
Public target	0.034**	0.031**	0.005	0.001	0.045***	0.041***
	(0.015)	(0.015)	(0.007)	(0.021)	(0.015)	(0.016)
log(deal value)	0.007*	0.007**	0.003**	−0.000	0.007**	0.007**
	(0.004)	(0.004)	(0.002)	(0.005)	(0.003)	(0.003)
% of stock	0.073***	0.072***	0.001	0.077***	0.067***	0.063**
	(0.025)	(0.026)	(0.011)	(0.030)	(0.023)	(0.026)
Cash ratio	0.072	0.072	0.010	−0.075	0.013	−0.061
	(0.117)	(0.119)	(0.086)	(0.146)	(0.112)	(0.135)
MB	0.002	0.001	−0.001	0.001	0.002	0.003
	(0.002)	(0.002)	(0.003)	(0.003)	(0.002)	(0.002)
Leverage	−0.030	−0.031	0.031	0.136	0.001	0.003
	(0.081)	(0.083)	(0.082)	(0.100)	(0.075)	(0.097)
log(assets)	0.042**	0.041**	0.011	0.036	0.026	0.025
	(0.019)	(0.020)	(0.025)	(0.026)	(0.018)	(0.023)
Firm and year FE	x	x	x	x	x	x
Observations	6,425	6,425	6,425	6,425	6,425	6,425
Adj. R-sqr.	0.067	0.068	0.135		0.081	0.096

This table reports the effect of CEO tenure and the CEO's capture of board on the likelihood of having a negative three-day cumulative market-adjusted return (in percentage points) around acquisition announcements. The market return is constructed using the value-weighted market portfolio. Columns 1 and 2 report the results using OLS. Columns 3 and 4 report the first- and second-stage results of the instrumental variable approach, in which the measure for CEO power (% of new director) is instrumented using the cumulative number of directors reaching retirement age during the incumbent CEO's tenure until the current fiscal year, scaled by the current board size. The dependent variable in Columns 5 and 6 is an indicator variable that equals one if the three-day cumulative market-adjusted return is in the bottom quartile of the distribution (less than -2%). Control variables include deal-specific variables (deal size, % of stock as the source of the fund, and an indicator variable for public target) and lagged firm-specific variables (cash ratio, M/B, firm size, average age of the directors, and leverage). Firm and year fixed effects and a constant term are included in all models. The Huber-White robust standard errors are clustered by firm and reported in parentheses. ***, **, and * indicate significance at the 1%, 5% and 10% level, respectively.

directors. Column 3 reports the first-stage regression, and Column (4) reports the second stage. The estimates in Column 4 imply that the instrumented *% of new directors* still negatively predicts the acquisition announcement returns, suggesting that the CEO's capture of the board, which increases over time, is the reason for the decline in acquisition quality over a CEO's tenure.

To further address the concern that a negative announcement return potentially does not imply bad quality of the acquisition, we examine the probability of an extremely poor acquisition announcement return (in the bottom quartile of the sample distribution, lower than −2%) over CEOs' tenure.

The results in Column 5 suggest that the probability of such a poor acquisition also increases with CEOs' tenure. The results in Column 6 show that such probability is almost six percentage points higher when CEOs have been in office for more than 6 years relative to when they are in their first 3 years of office.[15]

Overall, the results in Sections 5.1 and 5.2 are consistent with the agency view of the CEO investment cycle, which states that as a CEO's power grows in a firm, he will tend to increase corporate investment, and that the incremental investments tend to be of lower quality. Both the increase in investment level and the decrease in investment quality appear to be more related to a direct measure of the CEO's control of the board than simply his time in office. The findings that exogenous variation in CEO tenure that is unrelated to CEO ability leads to increasing investment levels and deteriorating investment quality are not consistent with the efficiency-based view in which a CEO's time in office reflects improvement in the CEO's ability.

4.3 Residual influence of the old management and disinvestment

The agency explanation for disinvestment implies that CEO turnovers facilitate the divestiture of poorly performing assets established under the prior leadership. However, the residual influence from the prior management on the new CEO should negatively affect the intensity of such error correction.

To test this implication, we rely on COMPUSTAT (historical) segment data, which offers two advantages over other potential data sources. First, these data allow us to identify the CEO and year in which a segment is established and is divested or discontinued. Second, they allow us to capture industry- or firm-specific shocks that could affect disinvestment intensity by including (segment) industry-year or firm-year fixed effects. The inclusion of these fixed effects implies that any measured segment underperformance does not occur because of industry-wide or firm-specific economic shocks, but instead reflects (idiosyncratic) decisions by the previous management.

We define "*Underperforming segment*" to be an indicator variable that equals one if the industry-adjusted segment profitability (operating profits/loss over sales) is in the bottom tercile of the sample distribution for two consecutive years prior to the CEO turnover. Panel C of Table 1 reports the summary statistics of this indicator. In addition, "*Original CEO replaced*" is an indicator variable that equals one for all firm-year observations after the CEO who established the segment steps down.

In panel A of Table 9, we use these two indicator variables, as well as their interaction, to predict the likelihood that a given segment is terminated in a given year for both the sample of multisegment firms and the subsample of turnovers due to death, illness, or retirement of the departing CEOs. We also

[15] In Table IA.5 in the Internet Appendix, we provide further evidence of deteriorating investment quality over a CEO's tenure using long-term segment performance as the proxy for investment quality.

Table 9
Agency explanations for the disinvestment cycle

Panel A: Segment termination

	$I_{\{segment\ termination\}}$			
	(1)	(2)	(3)	(4)
	Death/illness/retirement			
Original CEO replaced	0.005	0.012*	0.003	0.010
	(0.004)	(0.007)	(0.015)	(0.008)
Original CEO replaced x Underperforming segment	0.106***	0.062***	0.067**	0.084***
	(0.018)	(0.010)	(0.028)	(0.024)
Underperforming segment	0.026*	0.001	0.004	0.001
	(0.014)	(0.002)	(0.016)	(0.007)
Segment age	−0.001***	−0.001***	−0.001***	−0.001***
	(0.000)	(0.000)	(0.000)	(0.000)
Industry-Year F.E.	x		x	
Firm-Year F.E.		x		x
Observations	69,609	69,609	6,787	6,787
Adj. R-sqr.	0.102	0.323	0.230	0.261

This table reports the OLS estimation of the probability of a segment being terminated, using the segment data from the Compustat "historical segment" database, for multisegment firms in our sample. The dependent variable is an indicator variable that equals one if the segment is divested or discontinued in a given year. "Underperforming segment" is a dummy variable that equals one if the industry-adjusted segment performance is in the bottom tercile of the sample distribution for two consecutive years. The observations are at the segment-year level for the entire life of each segment. In models (1) and (3), we control for industry-year fixed effects. In models (2) and (4), we control for firm-year fixed effects. In models (3) and (4), we use the subsample with original CEOs replaced (if replaced) after turnovers due to death, illness, or retirement of the departing CEOs. A constant term is included in all models. All variables definitions are in Table A1. The Huber-White robust standard errors are clustered by firm and reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

(*continued*)

control for the segment's age and the segment's industry shocks or firm-specific shocks by including industry-year or firm-year fixed effects. We find that the effects of *Original CEO replaced* and *Underperforming segment* are small in magnitude and statistically insignificant, and the coefficient on the interaction of the two variables is positive and significant, both economically and statistically. These estimates imply that CEO turnover facilitates the disinvestment of poorly performing units established by the previous leadership.[16]

To evaluate Implication 3, that the disinvestment of poorly performing assets by the new CEO is negatively affected by the residual influence of the prior management, we construct four measures of the residual influence of the previous CEO (or management) on the new CEO. The first measure is "*Staggered board*," which is a dummy variable equal to one if the company has a staggered board. The existence of a staggered board is determined historically, rather than at the discretion of the current management. Thus, the cross-sectional variation in *Staggered board* provides variation in the residual influence from prior management that is unrelated to the firm's current conditions. In addition, we define "*Prior CEO stays as chairman*" as a dummy

[16] These results are consistent with those of Weisbach (1995). However, they are based on a much larger sample than in the earlier study and the empirical design better allows us to address alternative interpretations of the findings. Therefore, these results constitute a substantial extension of Weisbach (1995).

Table 9
Continued

Panel B: Residual influence of old CEO on postturnover downsizing

	$I_{\{segment\ termination\}}$			
	Under new regime in years [0,2]			
	(1)	(2)	(3)	(4)
Underperforming segment (prior to turnover)	0.069***	0.055***	0.062***	0.043***
	(0.013)	(0.010)	(0.012)	(0.008)
Staggered board x Underperforming segment (prior to turnover)	−0.036**			
	(0.016)			
Prior CEO stay as chairman x Underperforming segment (prior to turnover)		−0.015*		
		(0.008)		
% of prior mgt. on board x Underperforming segment (prior to turnover)			−0.026*	
			(0.013)	
Outsider succession x Underperforming segment (prior to turnover)				0.035**
				(0.016)
Segment age	−0.003***	−0.004***	−0.004***	−0.004***
	(0.000)	(0.000)	(0.000)	(0.000)
Firm-Year F.E.	x	x	x	x
Observations	24,778	29,521	30,095	35,739
Adj. R-sqr.	0.281	0.276	0.282	0.291

The analysis in this table uses the segment data from the Compustat "historical segment" database, for multisegment firms in our sample. The dependent variable is an indicator variable that equals one if a segment established during the outgoing CEO's tenure is divested or discontinued during the first three years of the incoming CEO's tenure. We only include segments that are established during the departing CEO's tenure. "Underperforming segment (prior to turnover)" is a dummy variable that equals one if the industry-adjusted segment performance is in the bottom tercile of the sample distribution for two consecutive years prior to the CEO turnover. Information on "Staggered board" is from the governance (and governance-legacy) database from ISS Governance Services, which starts from 1990. Information on "% of prior mgt. on board" is from the director (and director-legacy) database from ISS Governance Services, which starts from 1996 (with comprehensive data for S&P 1,500 firms from 1998). The observations are at the segment-year level. In all models, we control for firm-year fixed effects and use the first three years after the original CEO was replaced ("under new regime"). A constant term is included in all models. All variables definitions are in Table A1. The Huber-White robust standard errors are clustered by firm and reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

variable equal to one if the outgoing CEO serves as the Chairman of the Board during the first year of the new CEO's tenure, "*% of prior mgmt. on board*" as the fraction of the four most highly paid non-CEO executives under the previous management who sit on the board after turnover, and *"Outsider succession"* as a dummy variable equal to one if the new CEO comes from outside the company.[17]

We expect the residual influence from the old management to be stronger if the firm has a staggered board, or the previous CEO stays as the Chairman of the Board, or a larger fraction of the previous management stays on the board after turnover, or the new CEO is an insider (likely on the prior management team before the promotion).[18]

[17] We classify CEOs who have been with the firm for less than three years when becoming CEO as outsider CEOs. Based on this classification, about 33% of new CEOs in our sample are considered as outsider CEOs.

[18] We acknowledge that the latter three proxies of the residual influence of the outgoing CEO could reflect unobservable performance under his leadership and thus are potentially endogenous.

In panel B of Table 9, we consider only the segments established during the outgoing CEO's tenure and examine the probability of them being divested or reorganized immediately following CEO turnover (i.e., during the first three years of the incoming CEO's tenure). Segment performance is measured before the CEO turnover to ensure that the performance reflects decisions made by the prior management rather than the new, which mitigates the concern that the new CEO manipulates the performance of the terminated segment downward to justify the decision or to blame his predecessor.

The estimate on "*Staggered board* x *Underperforming segment*" in Column 1 implies that the probability of downsizing a poorly performing segment is reduced by 52% (=0.036/0.069) in the presence of a staggered board. Staggered boards are determined historically but do increase the residual influence of the prior management on the new CEO, since an incoming CEO cannot change the board composition quickly. The finding that a staggered board reduces the likelihood of a new CEO divesting a poorly performing segment is consistent with the agency explanation for the high disinvestment rate in the early years of a CEO's tenure. However, it is not consistent with the skills-based explanation, which argues that the postturnover disinvestment intensity depends on the match between the new CEO's skills and the firm's existing assets (Implication 4), because the historically determined staggered board is unlikely to be correlated with current productivity shocks or the quality of match between the CEO's skills and the firm's assets.

The results in panel B of Table 9 also suggest that the postturnover disinvestment of poorly performing assets negatively depends on the residual influence of the prior leadership, regardless of how we measure such influence—by the existence of a staggered board, by whether the departing CEO remains as the chairman of the board, by whether other executives from the previous leadership remain on the board, or by whether the incoming CEO is an insider. All these findings are consistent with Implication 3 of the agency arguments, that the residual influence of the outgoing management has a substantial effect on the magnitude of postturnover disinvestment.

4.4 The fit of the incoming CEO's skills with the firm's assets

The final set of tests concerns Implication 4, which states that the rate of postturnover divestitures will be higher when the incoming CEO's skills differ more from the firm's asset structure, thus leading to the disinvestment cycle. To test this implication, we construct a variable "*Fit*" intended to measure the fit between new CEO's experience and the existing business scope of the firm prior to the turnover.[19] This measure is a weighted average of a CEO's prior experience in a firm's industries as of the year before turnover, with the weight being the percentage of firm's sales in an industry. For example, suppose the

[19] We thank Claudia Custódio for providing the data on the prior work experiences of a CEO in different industries, which was used to construct the general ability measure used in (2013).

Table 10
CEO investment cycles in Single- versus Multi-industry firms

	(1)	(2)	(3)
	All firms with data on CEO prior experience	Single-industry firms	Single-industry firms/ Industry insider succession
Tenure (in years)	−0.022**	−0.021**	−0.024**
	(0.010)	(0.010)	(0.011)
Tenure*Fit	0.006		
	(0.008)		
Ind-adj. ROA	−0.124***	−0.108***	−0.134***
	(0.041)	(0.031)	(0.048)
Ind-adj. Return	−0.008	−0.011***	−0.013**
	(0.006)	(0.004)	(0.006)
MB	0.0004	−0.002	−0.001
	(0.001)	(0.001)	(0.001)
Leverage	−0.011	−0.016	−0.026
	(0.024)	(0.022)	(0.030)
Div. Payer	0.087*	0.050	0.089
	(0.047)	(0.041)	(0.059)
log(Assets)	0.018	0.009	−0.005
	(0.013)	(0.011)	(0.014)
Firm-CEO F.E., Year F.E.	x	x	x
Observations	12,294	15,902	10,455
Adj. R-sqr.	0.329	0.398	0.401

This table estimates the probability of disinvestment as a function of CEO tenure. Model (1) reports results for all firms with available data on CEOs' prior experience before becoming their CEOs. "Fit" measures the fit between new CEO's experience and the existing business scope of the firm prior to the turnover. It multiplies the percentage of CEO's prior experience in an industry with the percentage of firm's sales in that industry, both measured as the year before turnover and then summed at the firm-year level. For example, suppose the new CEO worked for three industries (A, B, and C). As of the year before turnover, he worked for 2 years in A, 3 years in B, and 5 years in C. The firm's business spans two industries (A and B), with 50% of sales in each. Then the fit measure is [2/(2+3+5)]*50% + [3/(2+3+5)]*50%=0.25. Models (2) and (3) report results for the subsample of firms with segment(s) in only one industry at the CEO turnover year, defined by four-digit segment SIC in Compustat (historical) segment data base. Firms that did not report segment data are classified as single-industry firms. A constant term is included in all models. All explanatory variables, except for Tenure and General ability, are lagged by one year. The definitions of all variables are in Table A1. The Huber-White robust standard errors are clustered by firm and reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

new CEO worked for three industries (A, B, and C) before becoming CEO. Suppose that he worked for 2 years in A, 3 years in B, and 5 years in C and the firm's business spans in two industries (A and B), with 50% of sales in each. Then the fit measure is [2/(2+3+5)]*50% + [3/(2+3+5)]*50%=0.25.

Column 1 of Table 10 examines whether the magnitude of the CEO disinvestment cycle depends on the firm-CEO fit. The coefficient on the interaction between the fit measure and CEO tenure is small and not statistically significant, suggesting that the decline in divestiture over a CEO's tenure does not vary significantly across firm-CEO pairs with different degrees of fit between new CEO's industry experience and the firm's business scope.

Next, we identify situations in which the new CEO's skills are more likely to fit (or not) the firm's assets and compare the magnitude of the postturnover disinvestment in these situations with that in the full sample. One such situation is when the outgoing CEO departs because of death, illness, or retirement. Presumably, since the board did not fire the CEO, it was satisfied with the

departing CEO's skills and would be happy to find a new CEO with a similar set of skills. The fact that we find a similar investment cycle after these turnovers as in the full sample suggests that the changing management skills are not a main driver of the CEO investment cycle.

In addition, single-industry firms are less likely to have an incoming CEO with different skills from his predecessor than are conglomerates, so skills-motivated divestitures following turnovers are less likely in single-industry firms than in conglomerates. In addition, a replacement CEO who is a company or industry insider is likely to have a similar set of skills to the outgoing CEO in these firms. Therefore, a comparison of whether there is less postturnover disinvestment in single-industry firms than in conglomerates, and even less if these firms hire firm or industry insiders as CEOs, would represent a test of Implication 4.

We classify firms as operating in a single industry using the COMPUSTAT historical segment database and four-digit SIC. Column 2 of Table 10 presents estimates of the equations from Table 3 using the subsample of single-industry firms. These estimates indicate that the CEO disinvestment cycle for these firms is comparable to that for the full sample. Column 3 further restricts the sample to be single-industry firms that hired company or industry insiders.[20] The estimated magnitude of the CEO disinvestment cycle for this subsample is again similar to those reported in Column 2 and the full sample. Overall, the results in Table 10 do not support Implication 4 and therefore suggest that the skills matching explanation is unlikely to be a main driver for the abnormally high disinvestment rate immediately following CEO turnover.

The model of Eisfeldt and Kuhnen (2013) provides additional predictions of the skills-matching-based explanation for postturnover disinvestment. In this model, a shock to the productivity of physical capital can change the optimal set of managerial skills, leading to management turnovers. Thus, CEO turnovers that follow significant industry shocks are more likely to have incoming CEOs possessing different skills from outgoing CEOs and are also more likely to be followed by significant changes in investment and disinvestment. Consequently, this argument predicts that there should be larger CEO investment cycles when CEO turnovers follow industry shocks.

However, this argument cannot explain the existence of the CEO investment cycles after exogenous CEO turnovers, which are unlikely to coincide with industry productivity shocks. We further provide direct tests of the impact of industry productivity shocks on the magnitudes of the CEO cycles in Table IA.7 in Internet Appendix C. These tests suggest that the existence and

[20] The data on industry background of CEOs is taken from Camelia Kuhnen's website (http://public.kenan-flagler.unc.edu/faculty/kuhnenc/).

the magnitudes of the CEO investment cycles are not sensitive to the industry conditions at the time when new CEOs take office.

It is impossible to rule out all possible explanations for the investment and disinvestment cycles based on changing CEO skills and/or preferences. However, the results from the tests we have presented generally support the agency-based arguments and do not support the versions of the efficiency-based arguments that we have presented, which appear to us to be the most plausible.

5. Summary and Implications

One of the most important things we study in business schools is the role of management in public companies. Much of what we teach presumes that managerial decisions make a difference and that firms in reality are not in the "first-best" world described by many economic models. Yet identifying systematic influences of management empirically is challenging because of heterogeneity across CEOs and firms, as well as the endogenous matching between CEOs and firms.

Our paper addresses this issue by documenting a systematic relation between CEO tenure and the firm's investment and growth, which we refer to as the CEO investment cycle. Shortly after a new CEO takes office, the firm's disinvestment rate rises sharply, while the firm's investment and growth rate are relatively low. As the CEO's tenure lengthens, the disinvestment rate declines and the investment rate and growth rate increase continuously and substantially. The cyclical pattern of investment over a CEO's tenure exists regardless of the reasons for the predecessor CEO's departure, and regardless of the background of the incoming CEO. The effect of the CEO cycle on investment is of the same order of magnitude as the effects of other well-known factors, such as the business cycle, political uncertainty, and financial constraints.

Our analysis suggests that the CEO investment cycle is best explained by a combination of agency-related factors. CEOs have many reasons to prefer more investment than is optimal from a value-maximization perspective. As a CEO acquires more influence over the board, his ability to overinvest increases, leading to increasing investment quantity but decreasing quality over the CEO's tenure. The poor investment decisions tend to be reversed only after the CEO steps down and his successor takes office, and the intensity of the reversal is negatively affected by the residual influence of the previous management on the new CEO. Eventually, the process is repeated during each CEO cycle.

In contrast, arguments based on differing CEO skills, productivity shocks, or CEO tenure endogenously reflecting the firm's investment opportunities or CEO ability do not explain the nature and magnitude of the CEO investment cycles. One cannot definitively rule out that investment changes over the CEO cycle could occur in some firms because the first-best set of investments

varies systematically with the identity and tenure of the CEO. However, all the evidence presented in this paper favors the view that in most firms, the change in investment over the CEO cycle occurs because of agency problems.

The evidence in this paper implies that factors internal to the firm appear to affect investment in a consequential way. Much attention in the economics literature has been paid to the effect of economy-wide variables, such as tax policies, business cycles, and financial constraints on firms' investments. Yet the governance-related effects that we document in this paper are of the same order of magnitude as these often-studied external factors. While much attention has been given to corporate governance in the academic literature lately, its impact on investment likely has been understated and should be incorporated into models of investment.

Analysis of changes in investment over the CEO cycle provides a way to identify the role of management in corporations. While the results we present here favor agency-based explanations for investment, much more remains to be done. Our analysis focuses mainly on the quantity and quality of investment, ignoring other factors as its risk, horizon, etc. There are a number of theories that characterize the manner in which principal-agent problems can lead to distortions away from the first-best investments along these dimensions. Quantifying the nature of these distortions is likely to be a fruitful direction for future research. In addition, more sophisticated theories in which management cycles interact with productivity could lead to different empirical interpretations, potentially reconciling the results presented here with first-best investment, or with other types of agency problems.

Finally, although our analysis focuses on investment in physical assets, our empirical framework also provides a way to examine the management's role in investment in intangibles. Interestingly, our initial investigation suggests that unlike investment in physical capital, there is no robust pattern in R&D expenditures over the CEO cycle (see panel B of Table IA.8 in the Internet Appendix), and the CEO's control over the board does not seem to impact the R&D rate (see panel C of Table IA.8). These results suggest that investment in intangible capital and in physical capital could be subject to different agency incentives. For example, a CEO's preference to grow his firms beyond what is optimal for shareholders could be more relevant for physical rather than intangible investments. Exploring the extent to which investment in intangibles varies over the CEO cycle and the differences in agency motivations for intangible and physical investments would be excellent topics for future research.

Appendix

Table A1
Variable definitions

Tenure (in years) or (in months)	CEO's tenure is the number of years (or months) starting from the year (or month) when he took office (based on the variable *becameceo* in *Execucomp*), that is, (year-became CEO year).
Dummy (years [3,5])	An indicator variable that equals to one if the CEO's tenure year is between 3 and 5, and 0 otherwise
Dummy (year 6 and after)	An indicator variable that equals to one if the CEO's tenure year is after year 5, and 0 otherwise
Dummy (tenure> 3 years)	An indicator variable that equals to one if CEO's tenure is great than 3 years, and 0 for peer firms with short-tenure-year CEOs matched based on firm size (total book assets) in the same two-digit-SIC industry-year
Dummy (tenure> 6 years)	An indicator variable that equals to one if CEO's tenure is great than 6 years, and 0 for peer firms with short-tenure-year CEOs matched based on firm size (total book assets) in the same two-digit-SIC industry-year
CEO age	The age of the CEO in the fiscal year
Fit	This variable measures the fit between new CEO's experience and the existing business scope of the firm prior to the turnover. It multiplies the percentage of CEO's prior experience in an industry with the percentage of firm's sales in that industry; both measured as the year before turnover, and then summed up at the firm-year level. For example, suppose the new CEO worked for 3 industries (A, B, C). As the year before turnover, he worked for 2 years in A, 3 years in B, and 5 years in C. The firm's business spans in two industries (A and B), with 50% of sales in each. Then the fit measure is: $[2/(2+3+5)]*50\%+[3/(2+3+5)]*50\%=0.25$.
Turnovers due to death/illness	Includes turnovers in which (1) news searches revealed that the CEO departure was related to a health condition or death or (2) turnover reason provided in Execucomp is "deceased"
Turnovers due to death/illness/retirement	This sample includes turnovers due to death/illness of the departing CEOs, or his retirement (i.e., departing CEOs between 64 and 66; see Jenter and Lewellen 2014).
Turnovers due to death/illness/retirement at good performance	This sample includes turnovers cases in which (2) the turnovers are due to death/illness of the departing CEOs, or (2) departing CEOs between 64 and 66 (Jenter and Lewellen 2014). We exclude the "suspicious" retirements by focusing on retirements at good performance, that is accounting performance (ROA) exceeding the sample annual median (Fee, Hadlock, and Pierce 2013).
Turnovers with no management shakeup	CEO turnovers not accompanied by management (top 4 highest paid non-CEO executives) changes during the turnover year
Cum. ind.-adj. return month[-12,-1]	Cumulative industry (Fama-French 49)-adjusted return during the 12 months before the inauguration month
Median monthly IVOL month[-12,-1]	The median of the monthly industry (Fama-French 49)-adjusted idiosyncratic volatility during the 12 months before the inauguration month

(*continued*)

Table A1
Continued

Turnovers with good pre-turnover performance	Turnovers that satisfy the following three conditions: (1) the median of the monthly industry-adjusted idiosyncratic volatility during the 12-months before the inauguration month (see the variable definition for *Median Monthly IVOL month[-12,-1]* above) is less or equal to 0. (2) The cumulative monthly industry-adjusted stock return during the 12-months before the inauguration month (see the variable definition for *Cum. Industry-adj. Return month[-12,-1]* above) is no less than 0 and (3) the ind-adj. ROA in the fiscal year prior to the inauguration month is no less than zero ROA is defined as the earnings before interest, tax, and depreciation scaled by the beginning of fiscal year total book assets.
Acquisition rate	Value of acquisitions/lagged total book assets. Acquisitions include completed deals covered in *SDC* with the deal form of "Acquisitions of Assets," "Acquisitions of certain Assets," "Acq. Maj. Int.," "Acq. Part. Int.," "Acq. Rem. Int.," "Acquisition," or "Merger" (as the acquirer")
CapX rate	Capital expenditure/lagged total book assets, with missing or negative Capx set to zero
Investment rate	(Value of acquisitions + Capital expenditure)/lagged total book assets
R&D rate	R&D expenditure/lagged total book assets
$I_{\{\text{expansion announcement(s) in the month}\}}$	An indicator variable that equals to one if the company makes expansion announcements (events 3 or 31 in Capital IQ) in a month
$I_{\{\text{segment start}\}}$	An indicator variable that equals one if the segment is newly established in the fiscal year, 0 otherwise
$I_{\{\text{asset sales}>0 \text{ or discontinued operations}>0\}}$	An indicator function that equals one of the firm either has asset sales or reports discontinued operations (inflow/outflow of funds due to discontinuation of operations (item "DO" in *Compustat*) in the fiscal year
$I_{\{\text{downsizing announcement(s) in the month}\}}$	An indicator variable that equals to one if the company makes downsizing announcement (events 1, 21 in Capital IQ) in a month.
$I_{\{\text{segment termination}\}}$	An indicator variable that is equal to one if the segment is divested or discontinued in the fiscal year, and 0 otherwise.
Asset growth rate	Total assets in the fiscal year – total assets last fiscal year/total assets last fiscal year
Employment growth rate	Total employment in the fiscal year – total employment last fiscal year/total employment last fiscal year
Ind-adj. return	Industry (Fama-French 49)-adjusted return
Ind-adj. ROA	Industry (Fama-French 49)-adjusted ROA. ROA is defined as the earnings before interest, tax, and depreciation scaled by the beginning of fiscal year total book assets.
M/B	Market value of equity (closing price at the fiscal year-end times shares outstanding) divided by book value of equity
Leverage	(Long-term debt + debt in current liabilities)/total assets
Div. payer	An indicator variable that equals one if the firm pays out dividend to common stock holders in a year
Log(assets)	Logarithm of the total book assets
# of segments	The number of segments (defined by segment id) in a firm-year
Firm age	Age of the firm since IPO, using the first day appear in *CRSP* (or the IPO date in *Compustat* if missing)
Cash ratio	Cash divided by total assets
% of new directors	The percentage of directors on the board appointed during the incumbent CEO's tenure, using *ISS Governance Services'* director database

(*continued*)

Table A1
Continued

% of directors reaching retirement age	The cumulative number of directors reaching retirement age (72 or above when service ends for outsider directors; 65 for insider directors) during the incumbent CEO's tenure up until the current fiscal year, scaled by the current board size, using *ISS Governance Services'* director database
Avg director age	The average age of directors in a firm-year
Staggered board	An indicator variable that equals to one if the board of directors is divided, for the purpose of election, into separate classes. In most instances there are three classes, with the directors in each class serving overlapping three-year terms. With a classified board, also known as a staggered board, the change in the makeup of the board is limited because it would take at least two elections to replace a majority of the board. This variable is constructed using *ISS Governance Services'* governance database
Prior CEO stay as chairman	An indicator that equals if the prior CEO stays as the Chairman of the Board during the first year of the new CEO's tenure
% of prior mgmt. on board	The percent of the prior management (top 4 highest paid executives besides CEO) that serves as directors on the board during the first year of the new CEO's tenure
Outsider succession	An indicator variable that equals one if the incoming CEO comes from another company.
Segment performance	Segment operating performance, measured as segment-year level operating profit or loss scaled by segment-year level sales
Underperforming segment	An indicator variable that equals one if the industry-adjusted segment performance is in the bottom tercile for two consecutive years
Underperforming segment (prior to turnover)	An indicator variable that equals one if the industry-adjusted segment performance is in the bottom tercile of the distribution for two consecutive years right before the CEO turnover. This variable is only defined for segments established under prior leadership.
Original CEO replaced	An indicator variable that equals one if the reigning CEO is different from the original CEO who established the segment
Segment Age	Time (in years) since the segment was established
CAR [-1,1] around acquisition announcement	Three-day cumulative market-adjusted return (CAR) in percentage points around acquisition announcements. The market-adj. Return is calculated as daily stock return minus the (value-weighted) market return on the same day.
CAR [-1,1] is negative	An indicator variable that equals one if the three-day CAR around acquisition announcements is negative
CAR [-1, 1] in bottom quartile	An indicator variable that equals one if the three-day CAR around acquisition announcements is in the bottom 25% of the distribution (<-2%)
Public target	An indicator variable that equals one if the target is a public target, using *SDC Platinum* data
Log(deal size)	Logarithm of the value of transaction (in Millions, from *SDC Platinum*)
% of stock	Percentage of stock used to fund an acquisition, using "ofstock" from *SDC Platinum* if non-missing, and replaced with 1-"ofcash" if the previous variable is unavailable, and then replaced with 0 if SDC indicated that the source of fund is neither from common stocks nor from preferred stocks
Recession	An indicator variable that equals one if the fiscal year falls into one of the recession years: 2001, 2008, 2009, and 2010

References

Baumol, W. J. 1959. *Business behavior, value and growth*. London: The Macmillan Company.

Bebchuk, L., and J. Fried. 2004. *Pay without performance: The unfilled promise of executive compensation*. Cambridge, MA: Harvard University Press.

Bennedsen, M., F. Pérez-González, K. Nielsen, and D. Wolfenzon. 2007. Inside the family firm: The role of families in succession decisions and performance. *Quarterly Journal of Economics* 122:647–91.

Bennedsen, M., F. Pérez-González, and D. Wolfenzon. 2012. Estimating the value of the boss: Evidence from CEO hospitalization events. Working Paper, Columbia University.

Berle, A. and G. Means. 1932. *The modern corporation and private property*. New York: Macmillan.

Bertrand, M., and S. Mullainathan. 2003. Enjoying the quiet life? Corporate governance and managerial preferences. *Journal of Political Economy* 111:1043–75.

Bertrand, M., and A. Schoar. 2003. Managing with style: The effect of managers on firm policies. *Quarterly Journal of Economics* 118:1169–208.

Boot, A. 1992. Why hang on to losers? Divestitures and takeovers. *Journal of Finance* 47:1401–23.

Coles, J., N. Daniel, and L. Naveen. 2014. Co-opted boards: Costs, benefits, causes and consequences. *Review of Financial Studies* 27:1751–96.

Custódio, C., M. Ferreira, and P. Matos. 2013. Generalists vs. specialists: Lifetime work experience and chief executive officer pay. *Journal of Financial Economics* 108:471–92.

Dechow, P., W. Ge, and C. Schrand. 2010. Understanding earnings quality: A review of the proxies, their determinants and their consequences. *Journal of Accounting and Economics* 50:344–401.

Denis, D. J., and D. K. Denis. 1995. Performance changes following management dismissals. *Journal of Finance* 50:1029–57.

Donaldson, G. 1984. *Managing corporate wealth*. New York: Praeger Publishers.

Eisfeldt, A. L., and C. M. Kuhnen. 2013. CEO turnover in a competitive assignment framework. *Journal of Financial Economics* 109:351–72.

Fee, C. E., C. J. Hadlock, and J. R. Pierce. 2013. Managers with and without style: Evidence using exogenous variation. *Review of Financial Studies* 26:567–601.

Fracassi, C., and G. Tate. 2012. External networking and internal firm governance. *Journal of Finance* 67: 153–94.

Grinstein, Y., and P. Hribar. 2004. CEO compensation and incentives: Evidence from M&A bonus. *Journal of Financial Economics* 73:119–143.

Harford, J., M. Humphery, and R. Powell. 2012. The sources of value destruction in acquisitions by entrenched managers. *Journal of Financial Economics* 106:247–61.

Harford, J., and K. Li. 2007. Decoupling CO wealth and firm performance: The case of acquiring CEOs. *Journal of Finance* 62:917–49.

Hermalin, B. E., and M. S. Weisbach. 1998. Endogenously chosen boards of directors and their monitoring of the CEO. *American Economic Review* 88:96–118.

Hoberg, G., and V. Maksimovic. 2015. Redefining financial constraints: A text-based analysis. *Review of Financial Studies* 28:1312–52.

Jensen, M. C. 1986. The agency costs of free cash flow: Corporate finance and takeovers. *American Economic Review* 76:323–29.

———. 1993. The modern industrial revolution, exit and the failure of internal control systems. *Journal of Finance* 48:831–80.

Jensen, M. C., and W. H. Meckling. 1976. Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics* 3:305–60.

Jensen M. C., and K. J. Murphy. 1990. Performance pay and top-management incentives. *Journal of Political Economy* 98:225–64.

Jenter, D., and K. Lewellen. 2015. CEO preferences and acquisitions. *Journal of Finance* 70:2813–52.

Johnson, B. W., R. Magee, N. Nagarajan, and H. Newman. 1985. An analysis of the stock price reaction to sudden executive death: Implications for the management labor market. *Journal of Accounting and Economics* 7:151–74.

Julio, B., and Y. Yook. 2012. Political uncertainty and corporate investment cycle. *Journal of Finance* 67:45–84.

Kanodia, C., R. Bushman, and J. Dickhaut. 1989. Escalation errors and the sunk cost effect: An explanation based on reputation and information asymmetries. *Journal of Accounting Research* 27:59–77.

Larcker, D. 2011. Board of directors: Selection, compensation, and removal. Working Paper, Stanford University.

Maksimovic, V., and G. Phillips. 2002. Do conglomerate firms allocate resources inefficiently across industries? Theory and evidence. *Journal of Finance* 67:721–67.

———. 2007. Conglomerate firms and internal capital markets. In *Handbook of corporate finance: Empirical corporate finance*, Chapter 8. Ed. B. Espen Eckbo. Amsterdam: Elsevier/North-Holland.

Masulis, R. W., C. Wang, and F. Xie. 2007. Corporate governance and acquirer returns. *Journal of Finance* 62:1851–89.

Marris, R. 1964. *The economic theory of managerial capitalism*. Glencoe, IL: Free Press of Glencoe.

Morck, R., A. Shleifer, and R. W. Vishny. 1990. Do managerial objectives drive bad acquisitions? *Journal of Finance* 45:31–48.

Morse, A., V. Nanda and A. Seru. 2011. Are incentive contracts rigged by powerful CEOs? *Journal of Finance* 66:1779–821.

Myers, S. C. 1977. Determinants of corporate borrowing. *Journal of Financial Economics* 5:147−75.

Murphy, K. J., and J. L. Zimmerman. 1993. Financial performance surrounding CEO turnover. *Journal of Accounting and Economics* 16:273–315.

Pan, Y., T. Y. Wang, and M. S. Weisbach. 2015. Learning about CEO ability and stock return volatility. *Review of Financial Studies* 28:1623–66.

———. 2016. Management risk and the cost of borrowing. Working Paper, Ohio State University.

Roll, R. 1986. The hubris hypothesis of corporate takeovers. *Journal of Business* 59:197–216.

Shivdasani, A., and D. Yermack. 1999. CEO involvement in the selection of new board members: An empirical analysis. *Journal of Finance* 54:1829–53.

Shleifer, A., and R. W. Vishny. 1989. Management entrenchment: The case of manager-specific investments. *Journal of Financial Economics* 25:123–39.

Tirole, J. 2006. *The theory of corporate finance*. Princeton, NJ: Princeton University Press.

Weisbach, M. S. 1995. CEO turnover and the firm's investment decisions. *Journal of Financial Economics* 37:155–88.

Williamson, O. E. 1964. *The economics of discretionary behavior: Managerial objectives in a theory of the firm*. Englewood Cliffs, NJ: Prentice-Hall.

Yim, S. 2013. The acquisition of youth: CEO age and acquisition behavior. *Journal of Financial Economics* 108:250–73.