

Good and Bad CEOs

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Abstract

This paper analyzes changes in shareholder value and firm performance caused by deaths of incumbent CEOs. We find that CEOs are an important determinant of shareholder value for many firms. The value effects of CEO deaths are heterogeneous. Most sudden deaths, and especially sudden deaths of young and short-tenured CEOs, cause large value losses. Other CEO deaths – non-sudden deaths, and sudden deaths of old and long-tenured CEOs – are on average associated with large value gains. The evidence suggests that many CEO-firm matches generate large surpluses that benefit shareholders. Many other CEOs, however, are either not the optimal match or overpaid.

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Do individual managers matter for firm value and performance? A large part of the cross-sectional variation in firm performance cannot be explained by observable factor or technology inputs. The quality of managerial inputs is an obvious candidate explanation. However, testing and measuring the importance of managers is difficult. Top executives are not randomly allocated to firms, and managerial turnover is at least in part determined by unobservables. This makes it almost impossible to determine whether differences in performance across firms or over time are due to differences in managerial inputs or due to differences in firm and industry characteristics.

In theory, whether individual managers matter for firm outcomes should depend on the importance of managerial inputs in the production process, on the scarcity of managerial talent, on the extent to which top executives differ from each other, and on whether there are frictions in the assignment of managers to firms. If managerial inputs are not important, or if there is a large supply of homogeneous managerial talent, and if the assignment of managers to firms is free of frictions, then shocks to individual managers should have little effect. If, however, managerial inputs are important and managerial talent is scarce, or if there are frictions in the matching of managers to firms, then shocks to managers can have important consequences for firm value and performance.

This paper analyzes changes in firm value and performance caused by deaths of incumbent CEOs. This approach allows us to measure the contribution of the deceased CEO relative to that of her successor. Unlike other CEO turnovers, CEO deaths are largely randomly allocated to firms and are not a decision made by the board of directors.¹ Hence, any effects of CEO deaths on firm value should be due to scarce CEO talent, changes in the division of rents between shareholders and the CEO, or frictions in the matching of CEOs to firms.

¹ We discuss and examine channels through which CEO deaths might be endogenous to firm performance below.

Through a careful search of corporate press releases, news reports, SEC filings, and other sources, we identify 458 CEO deaths in publicly traded U.S. firms between 1980 and 2012. We collect detailed information on 162 sudden deaths and 296 non-sudden deaths. A non-sudden death is preceded by at least some indication that the CEO suffers from ill health. In the remainder of this paper, for lack of a better term, we label non-sudden deaths as slow deaths.

Our evidence shows that CEOs are an important determinant of shareholder value for many firms, and that the allocation of CEOs to firms is not frictionless. Sudden deaths are on average associated with large losses of shareholder value. The average three-day cumulative abnormal announcement return (CAR) for a sudden CEO death is a statistically significant -2.32% . The losses are larger for sudden deaths of young CEOs and short-tenured CEOs. For CEOs in the bottom third of the age distribution (< 59 years), the average three-day CAR is -4.24% , and for CEOs in the bottom third of the tenure distribution (< 8 years), the average three-day CAR is -4.00% . Not all sudden deaths are associated with negative returns. For example, for CEOs in the top tercile of the age distribution (> 65 years), the average three-day CAR is $+3.59\%$.

Slow deaths, on the other hand, are on average associated with substantial gains in shareholder value. The average buy-and-hold abnormal return (BHAR) for a slow death measured over a two-months window ending five days after the event is between $+2.64\%$ and $+3.57\%$. This result is new to the literature, which until now has ignored the shareholder value effects of non-sudden deaths.

Shareholder value reacts most strongly to deaths of founder CEOs. The sudden death of a founder CEO causes an average three-day CAR of -3.25% . If the founder CEO is in the bottom third of the age distribution, the average three-day CAR is -8.82% . If she is in the top third of the age distribution, the average three-day CAR is $+5.26\%$. The slow death of a founder is associated

with an average two-months BHAR of +5.43%. Hence, founders appear to be more important determinants of shareholder value than other CEOs. One likely reason is that founders have more control over their firms than other CEOs, which might amplify the effects of both high-ability founders and entrenched low-ability ones.

The evidence in this paper shows a striking level of heterogeneity in the shareholder value effects of CEO deaths. The large value losses associated with most sudden deaths, and especially sudden deaths of young and short-tenured CEOs, suggest that their firms are worth a lot more under the incumbent CEO than under the best alternative candidate, and that a large part of the CEO-firm match surplus accrues to not just the CEO but to shareholders.

The large value gains associated with other CEO deaths – slow deaths, especially slow deaths of founders, and sudden deaths of old and long-tenured CEOs – suggest that these firms are worth more under the successor than under the incumbent CEO. There are two reasons why a CEO death might increase shareholder value. First, the successor might be a better match than the deceased CEO, in which case the board of directors should have already replaced the incumbent with the successor. Second, the incumbent might have been the best match but extracted more compensation than justified by the surplus she generates. In either case, the evidence suggests that, for many firms, the board of director's treatment of the CEO does not maximize shareholder value.

Our results have implications for the debate about the appropriate level of executive pay. The rapid rise in CEO compensation since the early 1980s has led to a contentious debate about whether CEO pay is justified by CEOs' contributions to firm value.² The evidence in this paper suggests that both sides of this debate have a point: The stock price declines associated with certain CEO deaths suggest that their firms are worth more under the incumbent CEO than under the best

² See, for example, Bebchuk and Fried (2004), Kaplan (2008), Edmans and Gabaix (2009), and Jenter and Frydman (2010).

alternative, and that the incumbents are not extracting all of the surplus generated by the CEO-firm match. On the other hand, the stock prices gains associated with other CEO deaths suggest that these CEOs extract more than the surplus generated by the CEO-firm match. Hence, their compensation is too high, and shareholders would have been better off had the board renegotiated the compensation contract or, if this was not possible, replaced the CEO.

We find no evidence that CEO deaths have any effect on operating performance, profit margins, or growth in sales or assets. There is limited evidence that CEO deaths have a small positive effect on firm survival over the subsequent one to five years. However, the changes in survival rates do not correspond in an obvious manner to the categories of CEO deaths associated with large changes in shareholder value. This non-result is surprising and raises the question why shareholder value reacts to CEO deaths. Investors apparently expect CEO deaths to affect future firm performance. Either investors are mistaken, or we have failed to identify the relevant dimension of operating performance.

This paper is far from the first one to examine CEO deaths. A small literature, starting with Johnson, Magee, Nagarajan, and Newman (1985), uses event studies to measure the announcement effects of top executive deaths on stock prices. By necessity, these studies examine only sudden deaths and drop all events in which the death was preceded by any sign of ill health. The evidence from these papers shows average announcement returns that are close to zero and insignificant, with some studies finding significant excess returns for subsets of CEOs.³ For example, Johnson et al. (1985) document positive abnormal returns for founder CEOs and negative abnormal returns

³ See, among others, Johnson et al. (1985), Worrell, Davidson, Chandy, and Garrison (1986), Chandy and Garrison (1991), Slovin and Sushka (1993), Combs and Skill (2003), Borokhovich, Brunarski, and Skill (2004), Borokhovich, Brunarski, Donahue, and Harman (2006), Salas (2010), and Nguyen and Nielsen (2014).

for other top executives. However, the cross-sectional analyses in all these studies are severely constrained by small sample sizes.⁴

We extend the analysis of CEO death effects to a larger number of firms and a broader definition of CEO death events. The larger sample size allows us to uncover cross-sectional differences in the effects of CEO deaths that change our view of the assignment process of CEOs to firms. While slow deaths, which the prior literature ignored, do not permit event study analyses, they do allow analyses of shareholder value and performance changes over longer windows. For the vast majority of slow deaths, the death is preceded by only a short illness, and the shareholder value effect can be measured with reasonable precision. Moreover, there are good reasons to expect that firms react differently to sudden compared to slow deaths. This expectation is confirmed in the data, in which slow deaths are associated with on average positive value changes and sudden deaths with negative ones.

In an important paper, Bennedsen, Perez-Gonzalez, and Wolfenzon (2010) study CEO deaths in the universe of Danish limited liability companies between 1992 and 2003. They find that CEO deaths are associated with significant declines in operating profitability, investment, and sales growth.⁵ Because the Bennedsen et al. sample consists mostly of unlisted firms, they do not examine stock price changes associated with CEO deaths. Stock prices have the advantage of being forward looking and of reflecting investors' assessments of firm value under both the old and the new CEO. Stock price changes thus provide a more informative signal of whether shareholders view a CEO death as positive or negative. Moreover, there are good reasons to suspect that stricter

⁴ For example, Johnson et al. (1985) have 33 CEOs and 20 other top executives in their sample, Slovin and Sushka (1993) have 133 CEOs, and Salas (2010) has 195 events that combine CEOs, presidents, and chairmen.

⁵ They do not make a distinction between sudden and slow deaths. Bennedsen, Perez-Gonzalez, and Wolfenzon (2012) show that CEO hospitalizations have effects similar to CEO deaths.

U.S. governance rules, and especially the stricter governance rules for publicly traded U.S. firms, affect the role and importance of CEOs.

Our study also relates to recent papers that link corporate decisions to CEO characteristics and histories (Bertrand and Schoar (2003), Malmendier and Tate (2005 and 2008), Perez-Gonzalez (2006), Malmendier and Nagel (2011), and Schoar and Zuo (2015)). The main conclusion from this literature is that CEOs differ from each other in their beliefs, preferences, and talents, and that these differences affect corporate outcomes. However, while this result is a necessary precondition for CEO deaths to affect firm outcomes, it does not imply it. If there is a sufficiently large supply of top executives of different types, and if firms frictionlessly match with their optimal CEO at any point in time, then a CEO death simply causes the firm to hire a replacement CEO who is very similar to the deceased one, with minimal effects on the firm. Our results, however, suggest that this idealized view is not a good description of reality.

The remainder of this paper is organized as follows. Section I provides a brief discussion of the theoretical literature on CEO-firm matching. Section II describes the data collection and reports summary statistics. Section III presents the empirical results. The final section summarizes and concludes.

I. Theoretical Background

A useful benchmark for thinking about the effects of CEO deaths on firm value are models in which labor markets are frictionless and competitive and in which the matching between executives and firms is efficient. Competitive assignment models have long been used in labor

economics (Jovanovic (1979), Sattinger (1979), Rosen (1982)) and have recently become popular in the CEO compensation literature (Gabaix and Landier (2008), Terviö (2008)).⁶

In a frictionless and competitive assignment model, firms try to hire the CEO that maximizes firm value net of compensation costs, and CEOs join the firm that offers the highest expected compensation. In equilibrium, the assignment of CEOs to firms maximizes the aggregate value of all firms and each CEO receives at least her outside option. This outside option is given by what the CEO could earn at the next best firm that would prefer to hire her instead of the firm's actual CEO. Importantly, each firm-CEO match generates a non-negative match surplus, which is the difference between the firm's value under the actual CEO and the firm's value under the next best CEO the firm could hire. How this surplus is divided between the CEO and the firm's shareholders is determined outside the assignment model.⁷

What is the effect of a CEO death in a competitive and frictionless assignment model? Because the assignment of CEOs to firms is efficient, a CEO death cannot improve firm value. If there were another CEO candidate who would improve firm value net of the compensation required to hire him, he would have already been hired. Whether and to what extent a CEO death lowers firm value depends on the size of the match surplus and its division between shareholders and the CEO.

⁶ For other recent applications of competitive assignment models to CEOs, see Edmans, Gabaix, and Landier (2009), Baranchuk, MacDonald, and Yang (2011), Edmans and Gabaix (2011), Eisfeldt and Kuhnen (2013), Matveyev (2015), and Pan (2015).

⁷ A positive match surplus only emerges if there are discrete differences in firm and CEO characteristics. If the distributions of firm characteristics and CEO abilities are continuous, no equilibrium match produces a surplus because the outside option is to match with the next best CEO, who is indistinguishable from the current match. This is the assumption in the models of Gabaix and Landier (2008) and Terviö (2008). Empirically, we observe large effects of exogenous CEO departures on firm values, which is inconsistent with continuous distributions and leads us to favor models with discrete differences in CEO abilities and firm characteristics.

In the limit, if a CEO extracts all her match surplus, then a CEO death has no effect on shareholder value. While the CEO is alive, shareholders receive their outside option, which is the value of the firm under the next best CEO. After the CEO dies, the firm hires the next best CEO, and shareholder value is unchanged. In all other cases, the match surplus is divided between the CEO and shareholders. Hence, a CEO death causes shareholders to lose their portion of the match surplus and shareholder value declines.

Competitive and frictionless assignment models thus predict that a CEO death never increases shareholder value. A CEO death lowers shareholder value more the larger the match surplus, holding the division of the surplus constant, and the larger the shareholders' portion of the surplus. So what determines the match surplus, i.e., the difference in firm value under the current CEO compared to the next best CEO?

In a frictionless world, the incumbent CEO is always a weakly better match than the next candidate, and the size of the surplus is determined by the difference in abilities between the two executives. If the next best candidate is a much worse match than the incumbent, say because the CEO position requires scarce firm- or industry-specific knowledge, then the match surplus is large. In reality, frictions in the form of search or transition costs are likely to be a second important determinant of the match surplus. A firm might be worth less after a CEO death not because the next CEO is much worse, but because it is costly to find the best candidate and to transition the firm's leadership.

Because frictionless assignment models predict that a CEO death can never increase shareholder value, a finding that certain types of CEO deaths do would imply a rejection of the model. Outside the model, there are two reasons why a CEO death might increase shareholder value. First, the successor might be a better match than the deceased CEO, in which case the board

of directors should have already replaced the incumbent with that successor. Second, the incumbent might have been the best match but extracted more compensation than the surplus she generates. In either case, an increase in shareholder value due to a CEO death suggests that the board of directors' decisions did not maximize shareholder value.

II. Data and Descriptive Statistics

A. Data collection

We collect a comprehensive sample of CEO death events through an extensive search of news sources, press releases, company reports, company filings with the SEC, and various other sources. We start by searching all news articles published by the Wall Street Journal, Dow Jones Newswires, PR Newswire, and Business Wire for the years 1980 to 2012. In addition, we also search all electronically available 8-Ks, 10-Ks, and proxy statements firms filed with the SEC between 1994 and 2012.

Since the top executive is not always referred to as the CEO, especially in earlier years of our sample, we use the following keywords to identify top executives: “chief executive”, “CEO”, “president”, “founder”, and “chairman”. Using these keywords together with keywords related to death results in a large number of hits, the vast majority of which are false positives. We manually screen all these news articles, press releases, and company filings and keep only those events for which we can verify that the person who died was the top executive and was in office at the time of death.

For all these events, we collect the date of death and the date when the death was first announced by the firm (through a press release or an 8-K filing) or by any other available news source. We also collect detailed information on the cause of death, which allows us to distinguish

between sudden deaths and slow deaths. We define a sudden death as a death that was unexpected and not preceded by any indication of poor health. Typical examples of sudden deaths are car accidents and plane crashes. Heart attacks, heart failures, and strokes are also frequent causes of sudden deaths. However, these events can be preceded by reports of ill health, in which case they are classified as slow deaths. We define slow deaths as deaths that are preceded by poor health and therefore to some extent foreseeable. Many slow deaths are caused by cancer but also include immediate deaths (e.g., heart failures) that are preceded by reports of health problems.

We also determine whether the deceased CEO is the founder of the firm. Founder status is often explicitly given in firms' press releases announcing a CEO death. Comparing the year when a firm was founded to the start year of the CEO further identifies many CEOs as not a founder. The remaining events we research in detail and decide case-by-case whether the CEO is the founder. We classify CEOs as founders if (a) the CEO inherited a family business and significantly expanded it (three cases in the final sample), (b) the CEO is the founder of a firm that took over another firm and continues as the CEO of the combined firm (five cases), and (c) the CEO bought the existing business (20 cases).⁸ Finally, we collect information on the age of the CEO and the CEO's tenure, defined as the number of years the CEO has been in office. This information is collected directly from corporate press releases as well as from proxy statements, annual reports, executive bios, and various online sources.

We match firms that experienced a CEO death with Compustat and CRSP and link each firm to its electronic SEC filings on EDGAR. For a small number of firms, we manually collect missing accounting, stock price, and other information from these SEC filings. This data collection

⁸ CEOs are classified as no founders when a) the CEO of the firm was the head of unit that was spun off (two cases in the final sample); b) the CEO was the founder of a firm that was taken over by a larger firm and continues as the CEO in the new firm (one case); and c) the CEO bought a small stake in the firm (14 cases).

process results in a final sample of 458 firms that experienced a CEO death and for which we know at least the firm's book assets at the end of the fiscal year prior to the death. Out of the 458 CEO death events, 162 are sudden deaths and 296 are slow deaths.

B. Descriptive Statistics

Table 1 presents summary statistics for the 458 event firms and their CEOs. All values are from the fiscal year-end before the CEO death. The average market capitalization of the event firms is \$1.8bn and average annual sales are \$1.2bn. Many event firms are small – the median market capitalization is \$63m and median annual sales are \$89m. However, the sample spans a wide range of firm sizes. The standard deviation of the market capitalizations is \$14.2bn and the standard deviation of the annual sales is \$4.7bn. The largest and most prominent firms in the sample are Apple, Coca Cola, AT&T, and McDonalds.

Unsurprising for a paper on CEO death, the CEOs are relatively old. The average and median CEO age are both 62. The average CEO tenure is almost 17 years, with a median of 14 years. However, 25% of the CEOs are of age 55 or younger, and 25% of the CEOs have tenure of six or fewer years. Almost 40% of the CEOs are founders.

III. Empirical Results

This section documents the effects of CEO deaths on firm values and performance. *Section A* analyzes the announcement returns caused by sudden CEO deaths. *Section B* examines long-term shareholder value effects of all types of CEO deaths. *Section C* documents the impact of CEO deaths on profitability, growth, and firm survival.

A. Stock price reactions to sudden CEO deaths

The stock price reaction to an unexpected CEO death reflects investors' assessment of the difference in firm values between the old and the new CEO. In this section, we restrict the analysis to sudden and thus likely unexpected deaths. This allows to measure the stock price reaction in a short window around the announcement date and produces a relatively clean measure of the CEO death effect on shareholder value. Table 2 reports the causes of death for the 162 sudden deaths in our sample. The majority of the sudden deaths are due to heart attacks and accidents.

A.1. Full sample results

Table 3 presents daily abnormal returns starting five trading days before and ending five trading days after the announcement date. The announcement date is the earliest date the sudden death is reported by the firm (through a press release or 8K filing) or by any other available news source. We use two different benchmarks to calculate abnormal returns. The first benchmark is the predicted return from a market model estimated over trading days $[-230, -30]$ before the event. The second benchmark is simply the return on the value-weighted market portfolio.

Table 3 shows a large negative stock price reaction to the announcement of a sudden CEO death. Focusing on market-model adjusted returns, the average abnormal return on the announcement day is -2.49% , with a median of -1.07% . Both are highly statistically significant. There is also a significant abnormal return of -0.70% on the day before the announcement date, which suggests that some information about the deaths has already reached the market.

Table 4 reports cumulative abnormal returns (CARs) for several windows starting up to two trading days before the announcement day and ending up to five trading days after the announcement. Consistent with the evidence in Table 3, information about the event seems to be

incorporated into stock prices in a short window around the announcement day. Longer windows produce lower and noisier abnormal returns. However, the average (median) CAR over the entire [-2,+5] window is still -2.33% (-1.58%) and statistically significant.

The second important result in Table 3 is that the standard deviation of the abnormal returns is twice as high on the announcement day as on any of the preceding days (and stays elevated for two trading days after the announcement). This indicates substantial heterogeneity in the stock price reactions to sudden CEO deaths, which we will explore further below. Despite this heterogeneity, 67.6% of the abnormal returns on the announcement day are negative, and the 75th percentile of the abnormal return distribution is only $+0.57\%$.

In sum, the announcement return evidence shows that investors view most sudden CEO deaths as bad news. This result stands in contrast with the prior literature, which finds either insignificant announcement returns or, in some cases, announcement returns that are significantly positive.⁹

A.2. Subsample results

Investors' reaction to a sudden CEO death is likely to depend on the characteristics of the deceased CEO, and especially on her importance to the firm and her level of entrenchment. To explore these cross-sectional differences, Table 5 reports CARs for different categories of CEOs over the [-1,+2] trading day window around the announcement date.

We first split the sample based on whether the CEO is a founder. The average CAR for founders is -3.25% and significant, while the CAR for other CEOs is -1.82% and just

⁹ For example, Johnson et al. (1985) find insignificant excess returns of 40bp on the announcement day and 34bp on the next day, while Salas (2010) finds insignificant excess returns of -16bp on the announcement day and significantly positive excess returns of 84bp on the next day.

insignificant. The stronger negative stock price reaction to the sudden death of a founder contradicts the results of Johnson et al. (1985), who find a significantly positive stock price reaction to founder deaths. On the other hand, our result is consistent with studies that link founder-CEOs to better firm performance and suggests that this relationship is causal (Villalonga and Amit (2006), Fahlenbrach (2009), and Adams, Almeida, and Ferreira (2009)).

The next sample split in Table 5 is based on CEO age. We observe a strong relationship between CEO age and the stock price reaction to sudden CEO deaths. For CEOs in the bottom tercile of the age distribution (< 59 years), the average $[-1,+2]$ CAR is -4.24% and highly significant. For CEOs in the top tercile of the age distribution (> 65 years), the average CAR is $+3.59\%$ and again highly significant. Hence, investors react negatively to the death of a young CEO and positively to the death of an old CEO. This pattern is even stronger for founders: For young founders, the average CAR is -8.82% and for old founders the average CAR is $+5.26\%$.

There are several possible explanations for these stark differences. The death of a young person is more surprising than the death of an old one, so firms are likely to be less prepared when a young CEO suddenly dies. Young CEOs might also be less powerful and extract a smaller fraction of the surplus generated by the CEO-firm match. Old CEOs, on the other hand, appear to be entrenched and on average extract more than the surplus they generate. In a frictionless world, stock prices should never react positively to a CEO death. Thus, the finding that they do suggests either that firms have CEOs who are not the value-maximizing choice or, if they are the right match, that firms pay these CEOs more than the surplus they generate. In either case, these results suggest that some boards act against shareholders' interests.

The next sample split in Table 5 is based on CEO tenure. Broadly similar to the age results, there is a strong relationship between tenure and the stock price reaction to sudden CEO deaths.

For CEOs in the bottom tercile of the tenure distribution (< 8 years), the average $[-1,+2]$ CAR is -4.00% , while for CEOs in the top tercile of the tenure distribution (> 18 years) it is $+1.46\%$. The difference between these two CARs is highly significant. Investors react negatively to the death of CEOs with short tenure and insignificantly positively to the death of CEOs with long tenure. This difference in the stock price reactions is again larger for founders. For founders with short tenure, the average CAR is -9.81% , while for founders with long tenure it is -0.41% .

The large cross-sectional differences in announcement returns documented in this section offer a potential explanation for the differences between our results and the results of prior studies. Most prior studies collect samples using obituaries and news report in the Wall Street Journal and a small number of other major publications. This results in samples that are biased towards larger and better known firms, which are likely to have older and longer-tenured CEOs. Our evidence shows that deaths of exactly these types of CEOs are associated with positive stock price reactions. Hence, our larger sample with many more small firms might explain why we find significantly negative average stock price reactions to CEO deaths, while most prior studies find insignificant reactions or, in a few cases, significantly positive ones.

B. Shareholder value effects of sudden and slow deaths

We next analyze the shareholder value effects of both sudden and slow CEO deaths. Slow deaths, for which the information about the CEO departure is likely to be gradually revealed, are not suited to short-term event studies, which require a specific announcement date. However, for the vast majority of slow deaths, the death is preceded by only a short illness and the shareholder value effects should be realized over a relatively short period of a few months.

B.1. Full sample results

Table 6 reports buy-and-hold abnormal returns (BHARs) measured over periods of one to six months, starting before the CEO death and ending five trading days after the event. Event firms are matched to two sets of ten control firms, one matched on industry and market capitalization, and the second one matched on industry, the book-to-market ratio, and market capitalization. The matching is done six months before the CEO death. BHARs are calculated as the difference between the buy-and-hold returns of the event firm and the corresponding control firms.

The first panel in Table 6 shows that, for the full sample, the buy-and-hold abnormal returns are small and insignificant. This changes in the next two panels where we divide the sample into sudden and slow deaths. For sudden deaths, average BHARs are negative and significant over one, two, and three months. Depending on the control group, the average one-month BHAR is either -2.22% or -3.32% . These negative abnormal returns around sudden CEO deaths correspond directly to the event study results in Table 3. For slow deaths, average BHARs are positive and significant over one, two, and three months windows. Depending on the control group, the average two-months BHAR is either $+3.57\%$ or $+2.64\%$. Hence, sudden CEO deaths are associated with abnormal declines in shareholder value, while slow CEO deaths are associated with abnormal gains. The latter result is new to the literature, which until now has ignored the shareholder value effects of non-sudden deaths.

B.2. Subsample results

The shareholder value effects of CEO deaths should depend on the CEO's importance to the firm, her ability to extract any match surplus, and on her level of entrenchment. Motivated by

the event study evidence that stock prices react more strongly to the deaths of founder CEOs, we first divide the sample into founder and other CEOs.

The results in Table 7 show that the average BHAR for founder CEOs is not significantly different from the average BHAR for other CEOs. However, this changes when we distinguish sudden from slow deaths. Shareholder value declines much more due to the sudden death of a founder CEO than due to the sudden death of a non-founder (average one-month BHAR of -4.39% for founders vs. -1.19% for others). Shareholder value also increases much more due to the slow death of a founder than due to the slow death of a non-founder (average two-month BHAR of 5.43% for founders vs. 2.30% for others). This reinforces the notion that founder CEOs are more important determinants of shareholder value than other CEOs, both on the positive and on the negative side. One likely reason is that founders have more control over their firms than other CEOs, which amplifies the effects of both high-ability founders and entrenched low-ability ones.

We next divide the sample based on CEO age and report BHARs for a two-months window ending five trading days after the event. The results in Table 8 reveal a strong relationship between CEO age and the shareholder value effect of CEO deaths. Depending on the control group, the average BHAR for CEOs in the bottom tercile of the age distribution (< 59 years) is either -1.55% or -3.54% . For CEOs in the top tercile of the age distribution (> 65 years), the corresponding BHARs are $+3.47\%$ and $+2.79\%$. These age-group differences are highly significant, and are mostly due to sudden deaths. Sudden deaths of young CEOs produce average BHARs of -7.01% and -8.22% , while sudden deaths of old CEOs produce average BHARs of -0.51% and -0.41% . The age-group differences are also more pronounced for founders than for other CEOs. As suggested by the event-study evidence, sudden deaths of young CEOs are highly detrimental to shareholder value, and even more so if the young CEO is a founder. Slow deaths, on the other

hand, tend to increase shareholder value in all age groups, with the largest increase for old founders.

Table 9 divides the sample based on CEO tenure. The results are broadly similar to the ones for CEO age in Table 8 but are slightly weaker and less significant. Depending on the control group, the average BHAR for CEOs in the bottom tercile of the tenure distribution (< 8 years) is either -1.37% or -1.95% . For CEOs in the top tercile of the tenure distribution (> 18 years), the corresponding BHARs are $+3.06\%$ and $+1.96\%$. These differences are slightly larger for sudden than for slow deaths, and the differences are much larger for founders than for other CEOs. Losing a young founder causes a large loss of shareholder value. In contrast, losing an old founder, and especially losing an old founder through a slow death, is highly beneficial to shareholder value.

The evidence in Tables 6 through 9 shows a striking level of heterogeneity in the shareholder value effects of CEO deaths. Sudden deaths are on average associated with large losses of shareholder value. This is especially the case for sudden deaths of young CEOs, short-tenured CEOs, and founder CEOs. These large value losses suggest that the firms are worth a lot more under the incumbent CEO than under the best alternative candidate, and, crucially, that a large part of the CEO-firm match surplus accrues to shareholders.

Slow deaths, on the other hand, are on average associated with substantial gains in shareholder value. These gains are largest for slow deaths of old CEOs, long-tenured CEOs, and founder CEOs. These value gains suggest that the firms are worth more under the successor than under the incumbent CEO. This might be because the value generated by the incumbent CEO is lower than the value generated by the successor, suggesting that the incumbent CEO should have already been replaced. Or it might be because the incumbent CEO extracts more compensation than justified by the surplus she generates. In either case, the evidence shows that for many firms,

the board of director's treatment of the CEO does not maximize shareholder value. The finding that the positive value gains are concentrated among CEOs most likely to be entrenched – founders, old CEOs, and long-tenured CEOs – is unsurprising.

C. The effects of CEO deaths on firm performance, growth, and firm survival

We next analyze the effects of CEO deaths on operating performance, growth in assets and sales, and firm survival. Given the strong evidence of shareholder value effects of CEO deaths, we expect to find that CEO deaths have both positive and negative effects on firm performance. Specifically, we expect that categories of CEO deaths associated with abnormal declines in shareholder value – for example, sudden deaths of young CEOs, short-tenured CEOs, and founders – are also associated with declines in operating performance and growth. We expect that categories of CEO deaths associated with abnormal gains in shareholder value – for example, slow deaths of old CEOs, long-tenured CEOs, and founders – are also associated with improvements in operating performance and growth.

C.1. The effects of CEO deaths on operating performance

Table 10 reports abnormal changes in operating return on assets (ROA) and profit margins between fiscal years $t-1$ and $t+2$, where fiscal year t is the year in which the CEO death occurs. Each event firm is matched to ten control firms by industry, book assets, ROA, and the change in ROA between years $t-4$ and $t-1$. The table reports the mean and median differences between the change in ROA (change in profit margin) of the event firms and the corresponding control firms.

Counter to our expectations, there appears to be no abnormal change in the operating performance of the event firms compared to the control firms. This is the case for all categories of

CEO deaths in Panel A of Table 10 – sudden deaths, slow deaths, deaths of founders, and deaths of non-founders. It continues to be the case when we divide the sample into CEO age terciles in Panel B and into CEO tenure terciles in Panel C. Even though the previous analyses show that some categories of CEO deaths are associated with large gains or losses of shareholder value, we fail to find any significant abnormal changes in operating performance or profit margins in those categories. In untabulated results, we have examined whether CEO deaths are associated with abnormal increases in the time-series volatility of ROA or profit margins, again with no results.¹⁰

The lack of any effect of CEO deaths on operating performance is surprising. It is, however, consistent with the evidence in Fee, Hadlock, and Pierce (2012), who find no abnormal changes in operating performance and operating policies around 109 health- and death-induced CEO departures. This non-result raises the question why shareholder value changes in response to CEO deaths. Investors apparently expect CEO deaths to affect firm performance going forward. Either investors are mistaken, or we have failed to identify the relevant dimension of operating performance.

C.2. The effects of CEO deaths on asset and sales growth

Table 11 analyzes abnormal growth in book assets and sales between fiscal years $t-1$ and $t+2$, where year t is again the year in which the CEO death occurs. Each event firm is matched to ten control firms based on industry, book assets, and the growth rate of book assets between $t-4$ and $t-1$. The table reports the mean and median differences between the asset (sales) growth rates of the event firms and the corresponding control firms.

¹⁰ Murphy and Zimmerman (1993), Denis and Denis (1995), Huson, Malatesta, and Parrino (2004), Perez-Gonzales (2006), and Bennedsen, Nielsen, Perez-Gonzalez, and Wolfenzon (2007) documented significant changes in operating performance around CEO turnovers. This suggests that CEO deaths are different from the endogenous CEO turnovers examined in these studies.

Similar to the results for operating performance, we fail to find any evidence that CEO deaths have an effect on asset or sales growth. There is no sign of significant abnormal growth rates due to sudden deaths, slow deaths, deaths of founders, or deaths of non-founders in Panel A. There is also no evidence of an effect of CEO deaths on asset or sales growth for young or old CEOs (Panel B) or for short- or long-tenured CEOs (Panel C). In untabulated results, we also do not find that CEO deaths are associated with abnormal increases in the time-series volatility of asset or sales growth rates.

C.3. The effects of CEO deaths on firm survival

Even though we find no evidence that CEO deaths affect operating profitability, profit margins, or growth, the large effects of CEO deaths on shareholder value might be explained by CEO deaths changing the probability that firms are acquired or go bankrupt. For example, the large gains in shareholder value associated with slow deaths of old CEOs, long-tenured CEOs, and founders might be explained by those deaths increasing the probability that those firms are subsequently sold.¹¹

Table 12 examines differences in survival rates between firms that experience a CEO death and matched control firms. Each event firm is matched to ten control firms by industry, book assets, ROA, and the change in ROA between fiscal years $t-4$ and $t-1$. The table reports the differences in survival rates between event and control firms at the end of the CEO death year, two years after the event year, and five years after the event year.

The results in Table 12 show that CEO deaths slightly increase the probability that a firm survives. In the full sample, a CEO death increases the survival probability at the end of the event

¹¹ Slovin and Sushka (1993) document an increase in corporate control activities after the death of large inside blockholders. They do not distinguish between blockholders who were CEOs and other blockholders in their analysis.

year by 2.8 percentage points relative to the control firms. There appears to be a larger long-term effect for sudden deaths, with an increase in the 5-year survival probability of 9.8 percentage points. There are no significant links between CEO age and survival rates (Panel B) or CEO tenure and survival rates (Panel C).

It is not obvious that the effects of CEO deaths on firm survival shown in Table 12 can explain the shareholder value effects observed in Tables 3 to 9. The changes in survival rates do not correspond in an obvious manner to the categories of CEO deaths associated with large changes in shareholder value. For example, there is no sign that categories of CEO deaths associated with large shareholder value gains, such as slow deaths of old or long-tenured CEOs, are associated with large changes in survival rates. Hence, for now the mechanism underlying the shareholder value effects of CEO deaths remains unknown.

IV. Conclusion

By analyzing changes in shareholder value and firm performance caused by deaths of incumbent CEOs, this paper has provided evidence that CEOs are an important determinant of shareholder value for many firms. The value effects of CEO deaths are extremely heterogeneous. Most sudden deaths, and especially sudden deaths of young and short-tenured CEOs, cause large value losses. This suggests that these firms are worth more under the incumbent CEO than under the best available alternative, and that a significant part of the CEO-firm match surplus benefits shareholders and not just the CEO.

Other CEO deaths – non-sudden deaths, and sudden deaths of old and long-tenured CEOs – are on average associated with large value gains. There are two reasons why a CEO death might increase shareholder value. First, the successor might be a better match than the deceased CEO, in

which case the board of directors should have already replaced the incumbent. Second, the incumbent might have been the best match but extracted higher compensation than justified by the surplus she generates. In either case, the positive value gains suggest that for many firms, the board of directors' treatment of the CEO does not maximize shareholder value.

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Table 1
Descriptive Statistics

This table reports descriptive statistics for 458 event firms that experienced a CEO death. CEO age is the age of the CEO at the time of death. CEO tenure is the number of years the CEO was in office. CEO is founder is a dummy variable that equals one if the CEO is the founder of the firm, and zero otherwise. Book assets is in \$ millions. Market capitalization is the market value of common equity in \$ millions. EBIT is earnings before interest and tax in \$ millions. ROA is return on assets calculated as EBIT divided by book assets. Sales is total sales or revenue in \$ millions. Q is calculated as (book assets – book common equity + market value of common equity)/book assets. Book leverage is total short and long term debt divided by book assets. Employees is the number of employees. Firm age is the age of the firm measured from the year when the firm was founded. All values are from the fiscal year-end prior to the event. The data are from CRSP, Compustat, company filings with the SEC, and news sources.

Variable	Mean	Median	25 th percentile	75 th percentile	Standard deviation	N
<i>CEO characteristics</i>						
CEO age	62.0	62.0	55.0	69.0	10.5	458
CEO tenure	16.9	14.0	6.0	25.0	13.7	453
CEO is founder	0.39	0.00	0.00	1.00	0.49	454
<i>Firm characteristics</i>						
Book assets	1,925	92	16	507	7,854	458
Market capitalization	1,820	63	15	356	14,157	444
EBIT	165.54	5.50	-0.06	41.82	973.87	458
ROA	-0.043	0.060	-0.004	0.126	0.470	458
Sales	1,211	89	15	446	4,691	458
Q	2.34	1.29	1.00	1.94	8.29	429
Book leverage	0.16	0.28	0.07	0.53	5.73	440
Employees	8,538	829	146	3,580	35,088	422
Firm age	42.0	32.0	16.0	59.0	33.9	442

Table 2
Cause of Death for Sudden Death Events

This table reports the cause of death for sudden death events. The data are from company filings with the SEC and news sources.

Cause of death	Number of events
Accident	38
Blood disease (aneurysm, hematoma, etc.)	4
Died in sleep	3
Died in sleep, good health	3
Died on business trip, vacation	2
Heart attack	76
Heart failure	6
Murdered, shot, stabbed	5
Other disease/disorder	2
Other heart disease	2
Overdose	2
Stroke	6
Suicide	9
Other	4
Total	162

Table 3
Abnormal Returns Around Sudden CEO Deaths

This table reports daily abnormal returns around the announcement date for firms with a sudden CEO death. The announcement date ($t=0$) is the earliest date the sudden death is reported by the firm (through a press release or 8K filing) or by any other available news source.

To calculate market-model adjusted abnormal returns, we estimate, for each firm, a market model for the window [-230, -30] before the announcement date. We drop firms with less than 100 return observations during the estimation window. Returns are calculated as simple returns, that is, $R_{i,t} = P_{i,t} / P_{i,t-1} - 1$. The CRSP value-weighted index serves as market portfolio. We use the estimated market model coefficients to calculate abnormal returns as:

$$AR_{i,t} = R_{i,t} - \hat{\alpha}_i - \hat{\beta}_i \times R_{m,t}$$

To calculate market-adjusted excess returns, we subtract the CRSP value-weighted index return from the stock return:

$$MAR_{i,t} = R_{i,t} - R_{m,t}$$

Both abnormal returns are winsorized at the 1% and 99% level for each event day separately. Robust standard errors are used to calculate test statistics for means. The Wilcoxon signed-rank test is used to calculate test statistics for medians. The stock market data are from CRSP and the event data are from SEC filings and news sources. *, **, *** indicate significance at 10%, 5%, and 1%, respectively.

Panel A: Market-model adjusted abnormal returns

Event time in trading days	Mean	<i>p</i> -value	Median	<i>p</i> -value	25 th percentile	75 th percentile	Standard deviation	% of events with positive returns
-5	0.19%	0.500	-0.09%	0.623	-1.50%	1.01%	3.36%	46.0%
-4	-0.96%***	0.002	-0.51%***	0.000	-1.99%	0.29%	3.49%	33.8%
-3	-0.10%	0.754	-0.04%	0.855	-1.99%	1.11%	3.93%	48.9%
-2	-0.16%	0.577	-0.13%	0.299	-1.43%	1.22%	3.46%	42.4%
-1	-0.70%**	0.046	-0.18%	0.129	-1.71%	1.28%	4.07%	43.9%
0	-2.49%***	0.000	-1.07%***	0.000	-5.68%	0.57%	8.05%	32.4%
1	0.42%	0.426	-0.12%	0.978	-2.12%	2.40%	6.14%	44.6%
2	0.53%	0.281	0.36%**	0.034	-0.94%	2.76%	5.79%	59.0%
3	0.45%	0.215	-0.03%	0.567	-1.39%	1.77%	4.29%	49.6%
4	0.01%	0.986	-0.01%	0.740	-1.50%	1.64%	5.68%	49.6%
5	-0.36%	0.185	-0.22%*	0.090	-2.05%	0.96%	3.22%	41.7%

Panel B: Market-adjusted excess returns

Event time in trading days	Mean	<i>p</i> -value	Median	<i>p</i> -value	25 th percentile	75 th percentile	Standard deviation	% of events with positive returns
-5	0.30%	0.318	0.04%	0.838	-1.29%	1.08%	3.47%	51.1%
-4	-0.88%***	0.004	-0.41%***	0.001	-2.14%	0.54%	3.56%	34.5%
-3	-0.06%	0.850	0.01%	0.770	-1.55%	1.32%	3.95%	50.4%
-2	-0.07%	0.817	-0.14%	0.582	-1.21%	1.42%	3.58%	46.8%
-1	-0.61%*	0.084	-0.16%	0.486	-1.50%	1.43%	4.13%	47.5%
0	-2.37%***	0.001	-1.19%***	0.000	-5.57%	0.98%	8.11%	32.4%
1	0.49%	0.347	-0.19%	0.799	-2.23%	2.23%	6.13%	47.5%
2	0.63%	0.195	0.64%**	0.019	-1.29%	2.71%	5.73%	61.9%
3	0.52%	0.155	0.04%	0.462	-1.29%	1.61%	4.26%	50.4%
4	0.01%	0.975	-0.09%	0.852	-1.56%	1.92%	5.68%	46.0%
5	-0.40%	0.163	-0.20%*	0.081	-2.06%	0.95%	3.35%	46.0%

Table 4
Cumulative Abnormal Returns Around Sudden CEO Deaths

This table reports cumulative abnormal returns around the announcement date for firms with a sudden CEO death. The announcement date ($t=0$) is the earliest date the sudden death is reported by the firm (through a press release or 8K filing) or by any other available news sources. We calculate cumulative abnormal returns as the sum of market-model adjusted abnormal returns (Panel A) and as the sum of market-adjusted excess returns (Panel B) using raw, unwinsorized daily returns. Both cumulative abnormal returns are then winsorized at the 1% and 99% level. Robust standard errors are used to calculate test statistics for means. The Wilcoxon signed-rank test is used to calculate test statistics for medians. The stock market data are from CRSP and the event data are from SEC filings and news sources. *, **, *** indicate significance at 10%, 5%, and 1%, respectively.

Panel A: Cumulative market-model adjusted abnormal returns

Event window in trading days	Mean	<i>p</i> -value	Median	<i>p</i> -value	25 th percentile	75 th percentile	Standard deviation	% of events with positive returns
[-2, +1]	-2.94%***	0.001	-1.93%***	0.000	-7.58%	1.62%	9.85%	36.7%
[-2, +2]	-2.53%**	0.011	-1.44%**	0.014	-6.20%	3.48%	11.64%	38.8%
[-2, +3]	-2.05%**	0.035	-0.68%	0.066	-7.09%	4.26%	11.33%	43.9%
[-2, +4]	-2.03%*	0.057	-1.12%	0.153	-7.04%	5.16%	12.48%	44.6%
[-2, +5]	-2.33%**	0.030	-1.58%	0.077	-8.77%	5.39%	12.49%	43.2%
[-1, +1]	-2.75%***	0.001	-2.35%***	0.000	-6.15%	1.38%	9.16%	33.1%
[-1, +2]	-2.32%**	0.014	-1.57%***	0.008	-6.22%	2.86%	11.04%	38.8%
[-1, +3]	-1.85%**	0.047	-1.53%**	0.046	-8.04%	4.03%	10.86%	41.0%
[-1, +4]	-1.77%*	0.093	-1.09%	0.158	-7.84%	4.78%	12.36%	43.2%
[-1, +5]	-2.17%**	0.037	-1.08%*	0.090	-7.80%	4.99%	12.11%	43.2%

Panel B: Cumulative market-adjusted excess returns

Event window in trading days	Mean	<i>p</i> -value	Median	<i>p</i> -value	25 th percentile	75 th percentile	Standard deviation	% of events with positive returns
[-2, +1]	-2.50%***	0.002	-1.72%***	0.002	-7.21%	2.29%	9.46%	37.4%
[-2, +2]	-1.99%**	0.039	-1.61%**	0.040	-5.82%	3.91%	11.30%	41.0%
[-2, +3]	-1.44%	0.111	-0.52%	0.163	-6.68%	4.04%	10.56%	48.2%
[-2, +4]	-1.43%	0.149	-0.60%	0.364	-6.41%	5.09%	11.62%	46.0%
[-2, +5]	-1.72%*	0.088	-0.38%	0.188	-7.56%	5.27%	11.80%	48.2%
[-1, +1]	-2.43%***	0.002	-1.97%***	0.000	-5.91%	1.92%	8.87%	37.4%
[-1, +2]	-1.88%**	0.041	-1.66%**	0.022	-5.55%	2.98%	10.74%	41.7%
[-1, +3]	-1.35%	0.119	-1.13%	0.107	-6.59%	4.15%	10.18%	43.9%
[-1, +4]	-1.28%	0.194	-0.53%	0.309	-5.79%	4.45%	11.60%	46.8%
[-1, +5]	-1.69%*	0.085	-0.93%	0.205	-6.15%	5.25%	11.47%	45.3%

Table 5
Cumulative Abnormal Returns Around Sudden CEO Deaths: Sample Splits

This table reports cumulative abnormal returns for the [-1,+2] trading day window around the announcement date for firms with a sudden CEO death. The announcement date ($t=0$) is the earliest date the sudden death is reported by the firm (through a press release or 8K filing) or by any other available news sources. We calculate cumulative abnormal returns as the sum of market-model adjusted abnormal returns and winsorize the cumulative abnormal returns at the 1% and 99% level. Robust standard errors are used to calculate test statistics for means. The Wilcoxon signed-rank test is used to calculate test statistics for medians. The last column reports p -values for a difference-in-means test between the first and the third age or tenure tercile. The stock market data are from CRSP and the event data are from SEC filings and news sources. *, **, *** indicate significance at 10%, 5%, and 1%, respectively.

Category	Mean	p -value	Median	p -value	N	p -value tercile 1 vs. 3
Full sample	-2.32% **	0.014	-1.57% ***	0.008	139	
Founder	-3.25% *	0.080	-2.49% *	0.065	45	
No founder	-1.82%	0.102	-1.29% *	0.058	92	
<i>CEO age terciles</i>						
<i>First tercile: Age < 59 Years</i>						
Full sample	-4.24% ***	0.000	-3.23% ***	0.000	75	0.000
Founder	-8.82% ***	0.000	-6.17% ***	0.000	21	0.000
No founder	-2.37% *	0.079	-1.64% **	0.030	52	0.038
<i>Second tercile: Age between 59 and 65 years</i>						
Full sample	-1.87%	0.371	-1.33%	0.491	43	
Founder	-0.97%	0.806	-0.90%	0.730	14	
No founder	-2.30%	0.361	-1.33%	0.567	29	
<i>Third tercile: Age > 65 years</i>						
Full sample	3.59% **	0.018	0.70% *	0.092	21	
Founder	5.26% **	0.044	4.10% *	0.074	10	
No founder	2.07%	0.242	0.20%	0.594	11	
<i>CEO tenure terciles</i>						
<i>First tercile: CEO tenure below 8 years</i>						
Full sample	-4.00% ***	0.006	-2.19% ***	0.001	61	0.019
Founder	-9.81% **	0.039	-10.01% **	0.046	6	0.054
No founder	-3.18% **	0.040	-1.64% **	0.012	54	0.009
<i>Second tercile: CEO tenure between 8 and 18 years</i>						
Full sample	-2.48%	0.138	-1.96%	0.140	49	
Founder	-3.38%	0.211	-4.77%	0.153	24	
No founder	-1.61%	0.439	-1.57%	0.545	25	
<i>Third tercile: CEO tenure above 18 years</i>						
Full sample	1.46%	0.425	0.15%	0.347	29	
Founder	-0.41%	0.894	-0.36%	0.955	15	
No founder	3.45%	0.105	0.20%	0.221	13	

Table 6
Buy-and-hold Abnormal Returns

This table reports buy-and-hold abnormal returns (BHARs) for firms with a CEO death. Both sudden and slow deaths are included. BHARs are calculated for one to six months windows starting before the CEO death and ending five trading days after the event. Event firms are matched to two sets of ten control firms each by (a) industry and size (market capitalization of equity) and (b) industry, book-to-market ratio, and size. Event and control firms are matched six months prior to the CEO death. BHARs are calculated as the difference between the buy-and-hold returns of the event firm and the corresponding control firm. All BHARs are winsorized at the 1% and 99% level. Standard errors to calculate test statistics for means are clustered by event firm. The Wilcoxon rank-sum test is used to calculate tests statistics for medians. The data are from CRSP, Compustat, company filings with the SEC, and news sources. *, **, *** indicate significance at 10%, 5%, and 1%, respectively.

Window in month	Industry and size matched control firms					Industry, book-to-market, and size matched control firms				
	Mean	<i>p</i> -value	Median	<i>p</i> -value	N	Mean	<i>p</i> -value	Median	<i>p</i> -value	N
<i>Full sample</i>										
1	0.66%	0.366	1.07%	0.106	428	-0.05%	0.946	0.89%	0.498	411
2	0.48%	0.593	2.18%	0.143	428	-0.19%	0.839	1.14%	0.451	411
3	0.08%	0.941	-0.30%	0.693	428	-0.86%	0.455	-1.13%	0.819	411
6	0.60%	0.722	0.03%	0.628	428	-0.89%	0.615	-0.68%	0.789	411
<i>Sudden death</i>										
1	-2.22% *	0.073	0.00%	0.450	154	-3.32% ***	0.009	-0.79%	0.151	145
2	-5.02% ***	0.001	-3.41% *	0.053	154	-5.37% ***	0.001	-3.80% **	0.049	145
3	-4.24% **	0.023	-3.59%	0.108	154	-5.66% ***	0.003	-4.34% **	0.041	145
6	-2.49%	0.340	-2.27%	0.663	154	-4.55%	0.109	-4.00%	0.299	145
<i>Slow death</i>										
1	2.28% **	0.011	1.36% ***	0.008	274	1.73% *	0.061	1.31% **	0.048	266
2	3.57% ***	0.001	3.66% ***	0.001	274	2.64% **	0.020	2.88% **	0.013	266
3	2.51% *	0.058	0.76% *	0.077	274	1.76%	0.218	-0.10%	0.188	266
6	2.33%	0.285	0.59%	0.353	274	1.11%	0.624	0.21%	0.665	266

Table 7
Buy-and-hold Abnormal Returns: Founder CEOs

This table reports buy-and-hold abnormal returns (BHARs) for firms with a CEO death. Both sudden and slow deaths are included. BHARs are calculated for one to six months windows starting before the CEO death and ending five trading days after the event. Event firms are matched to two sets of ten control firms each by (a) industry and size (market capitalization of equity) and (b) industry, book-to-market ratio, and size. Event and control firms are matched six months prior to the CEO death. BHARs are calculated as the difference between the buy-and-hold returns of the event firm and the corresponding control firm. All BHARs are winsorized at the 1% and 99% level. Standard errors to calculate test statistics for means are clustered by event firm. The Wilcoxon rank-sum test is used to calculate tests statistics for medians. The data are from CRSP, Compustat, company filings with the SEC, and news sources. *, **, *** indicate significance at 10%, 5%, and 1%, respectively.

Window in month	Industry and size matched control firms					Industry, book-to-market, and size matched control firms				
	Mean	<i>p</i> -value	Median	<i>p</i> -value	N	Mean	<i>p</i> -value	Median	<i>p</i> -value	N
<i>Founder</i>										
1	1.03%	0.466	0.00%	0.547	154	0.81%	0.571	0.00%	0.675	152
2	1.37%	0.430	0.18%	0.285	154	1.40%	0.409	0.33%	0.335	152
3	0.89%	0.659	-0.45%	0.779	154	0.18%	0.931	-0.45%	0.995	152
6	2.07%	0.507	0.47%	0.586	154	0.52%	0.869	-0.85%	0.897	152
<i>Founder, sudden death</i>										
1	-4.39% *	0.090	-4.09%	0.221	50	-4.36% *	0.081	-7.14%	0.197	49
2	-7.06% **	0.032	-2.49%	0.121	50	-5.84% *	0.053	-3.23%	0.209	49
3	-6.25%	0.104	-5.09%	0.166	50	-7.16% *	0.062	-5.20% *	0.095	49
6	-0.55%	0.921	2.40%	0.915	50	-2.44%	0.683	0.31%	0.678	49
<i>Founder, slow death</i>										
1	3.63% **	0.028	0.00%	0.107	104	3.27% *	0.057	0.00%	0.157	103
2	5.43% ***	0.006	1.70% **	0.014	104	4.84% **	0.016	1.70% **	0.038	103
3	4.32% *	0.062	0.10%	0.193	104	3.68%	0.140	0.20%	0.249	103
6	3.33%	0.378	-0.19%	0.493	104	1.93%	0.607	-0.18%	0.672	103

Table 7 continued.

Window in month	Industry and size matched control firms					Industry, book-to-market, and size matched control firms				
	Mean	<i>p</i> -value	Median	<i>p</i> -value	N	Mean	<i>p</i> -value	Median	<i>p</i> -value	N
<i>No founder</i>										
1	0.40%	0.632	1.14%	0.122	271	-0.68%	0.430	0.26%	0.651	256
2	-0.08%	0.934	2.25%	0.304	271	-1.22%	0.263	1.06%	0.873	256
3	-0.33%	0.800	0.57%	0.746	271	-1.45%	0.289	-0.08%	0.782	256
6	-0.06%	0.976	0.06%	0.825	271	-1.53%	0.471	-0.67%	0.667	256
<i>No founder, sudden death</i>										
1	-1.19%	0.386	-0.63%	0.942	102	-2.93% **	0.050	-1.13%	0.359	94
2	-4.04% **	0.017	-1.77%	0.220	102	-5.30% ***	0.004	-3.43%	0.119	94
3	-3.16%	0.135	-0.67%	0.354	102	-4.92% **	0.027	-1.88%	0.184	94
6	-3.09%	0.268	-3.09%	0.684	102	-5.51% *	0.074	-5.39%	0.328	94
<i>No founder, slow death</i>										
1	1.36%	0.191	1.43% **	0.038	169	0.63%	0.551	0.78%	0.186	162
2	2.30% *	0.065	3.52% **	0.018	169	1.14%	0.395	2.45%	0.139	162
3	1.39%	0.389	1.33%	0.227	169	0.56%	0.746	0.66%	0.465	162
6	1.77%	0.509	1.70%	0.513	169	0.78%	0.784	0.07%	0.786	162

Table 8
Buy-and-hold Abnormal Returns: CEO Age Terciles

This table reports buy-and-hold abnormal returns (BHARs) for firms with a CEO death. BHARs are calculated starting two months before the CEO death and ending five trading days after the event. Event firms are sorted into three groups by CEO age at the time of death. Event firms are matched to two sets of ten control firms each by (a) industry and size (market capitalization of equity) and (b) industry, book-to-market ratio, and size. Event and control firms are matched six months prior to the CEO death. BHARs are calculated as the difference between the buy-and-hold returns of the event firm and the corresponding control firm and are winsorized at the 1% and 99% level. Standard errors to calculate test statistics for means are clustered by event firm. The Wilcoxon rank-sum test is used to calculate tests statistics for medians. The column “*p*-value tercile 1 vs. 3” reports *p*-values for a difference-in-means test between the first and the third age tercile for each category. The data are from CRSP, Compustat, company filings with the SEC, and news sources. *, **, *** indicate significance at 10%, 5%, and 1%, respectively.

Category	Industry and size matched control firms						Industry, book-to-market, and size matched control firms					
	Mean	<i>p</i> -value	Median	<i>p</i> -value	N	<i>p</i> -value tercile 1 vs. 3	Mean	<i>p</i> -value	Median	<i>p</i> -value	N	<i>p</i> -value tercile 1 vs. 3
<i>First tercile: Age < 59 Years</i>												
Full sample	-1.55%	0.348	-1.22%	0.390	159	0.025	-3.54%**	0.043	-2.94%	0.571	150	0.006
Sudden death	-7.01%***	0.001	-6.55%	0.705	84	0.111	-8.22%***	0.000	-6.64%	0.387	78	0.050
Slow death	4.57%*	0.057	4.07%	0.155	75	0.941	1.54%	0.548	1.79%	0.173	72	0.526
Founder	-5.95%	0.199	-7.30%	0.537	37	0.025	-8.44%*	0.062	-7.44%	0.938	36	0.008
Founder, sudden death	-11.36%**	0.039	-9.41%	0.577	23	0.137	-12.72%***	0.009	-8.84%	0.360	22	0.043
Founder, slow death	2.96%	0.723	-0.08%	0.253	14	0.685	-1.70%	0.849	-2.46%	0.578	14	0.441
No founder	-0.36%	0.829	0.55%	0.693	119	0.626	-2.25%	0.224	-0.63%	0.740	111	0.365
No founder, sudden death	-5.41%**	0.019	-5.20%	0.845	59	0.357	-6.80%**	0.013	-6.04%	0.709	54	0.362
No founder, slow death	4.61%**	0.048	4.66%	0.551	60	0.290	2.06%	0.404	1.96%	0.416	57	0.737
<i>Second tercile: Age between 59 and 65 years</i>												
Full sample	-0.05%	0.971	1.78%	0.771	137		0.69%	0.642	1.41%	0.794	131	
Sudden death	-3.75%	0.176	-1.36%	0.906	46		-2.91%	0.251	-0.97%	0.584	44	
Slow death	1.82%	0.272	2.35%	0.701	91		2.51%	0.168	2.15%	0.858	87	
Founder	0.49%	0.862	0.00%	0.818	41		4.03%	0.140	1.94%	0.938	40	
Founder, sudden death	-5.74%	0.312	-1.43%	0.743	16		-1.75%	0.726	0.68%	0.620	16	
Founder, slow death	4.47%	0.115	0.77%	0.476	25		7.89%**	0.011	3.06%	0.478	24	
No founder	-0.28%	0.867	2.40%	0.837	96		-0.78%	0.657	0.74%	0.823	91	
No founder, sudden death	-2.69%	0.386	-0.27%	0.718	30		-3.57%	0.216	-1.92%	0.822	28	
No founder, slow death	0.81%	0.688	3.00%	0.947	66		0.46%	0.836	2.34%	0.680	63	

Table 8 continued.

Category	Industry and size matched control firms						Industry, book-to-market, and size matched control firms					
	Mean	<i>p</i> -value	Median	<i>p</i> -value	N	<i>p</i> -value tercile 1 vs. 3	Mean	<i>p</i> -value	Median	<i>p</i> -value	N	<i>p</i> -value tercile 1 vs. 3
<i>Third tercile: Age > 65 years</i>												
Full sample	3.47%**	0.022	3.89%	0.102	132		2.79%*	0.062	3.66%	0.166	130	
Sudden death	-0.51%	0.884	2.80%	0.133	24		-0.41%	0.904	1.61%	0.243	23	
Slow death	4.36%***	0.010	4.09%	0.262	108		3.48%**	0.038	3.53%	0.322	107	
Founder	5.41%**	0.016	4.14%	0.686	76		4.67%**	0.030	3.77%	0.855	76	
Founder, sudden death	0.00%	1.000	6.23%	0.395	11		2.00%	0.729	6.50%	0.405	11	
Founder, slow death	6.33%***	0.010	4.34%	0.842	65		5.12%**	0.029	3.86%	0.645	65	
No founder	0.84%	0.651	2.93%*	0.095	56		0.15%	0.940	2.41%*	0.069	54	
No founder, sudden death	-0.94%	0.836	-1.69%	0.201	13		-2.62%	0.518	-1.89%	0.366	12	
No founder, slow death	1.38%	0.500	3.92%	0.244	43		0.94%	0.680	3.46%	0.109	42	

Table 9
Buy-and-hold Abnormal Returns: CEO Tenure Terciles

This table reports buy-and-hold abnormal returns (BHARs) for firms with a CEO death. BHARs are calculated starting two months before the CEO death and ending five trading days after the event. Event firms are sorted into three groups by CEO tenure at the time of death. Event firms are matched to two sets of ten control firms each by (a) industry and size (market capitalization of equity) and (b) industry, book-to-market ratio, and size. Event and control firms are matched six months prior to the CEO death. BHARs are calculated as the difference between the buy-and-hold returns of the event firm and the corresponding control firm and are winsorized at the 1% and 99% level. Standard errors to calculate test statistics for means are clustered by event firm. The Wilcoxon rank-sum test is used to calculate tests statistics for medians. The column “*p*-value tercile 1 vs. 3” reports *p*-values for a difference-in-means test between the first and the third age tercile for each category. The data are from CRSP, Compustat, company filings with the SEC, and news sources. *, **, *** indicate significance at 10%, 5%, and 1%, respectively.

Category	Industry and size matched control firms						Industry, book-to-market, and size matched control firms					
	Mean	<i>p</i> -value	Median	<i>p</i> -value	N	<i>p</i> -value tercile 1 vs. 3	Mean	<i>p</i> -value	Median	<i>p</i> -value	N	<i>p</i> -value tercile 1 vs. 3
<i>First tercile: Tenure < 8 years</i>												
Full sample	-1.37%	0.409	-0.67%	0.316	130	0.044	-1.95%	0.267	-0.11%	0.483	125	0.083
Sudden death	-4.66%**	0.039	-3.53%	0.579	64	0.317	-5.81%**	0.019	-3.51%	0.495	61	0.210
Slow death	1.82%	0.454	3.72%	0.101	66	0.416	1.73%	0.486	2.90%	0.159	64	0.728
Founder	-6.70%	0.470	-7.78%	0.312	10	0.172	-15.66%**	0.043	-9.77%	0.362	9	0.003
Founder, sudden death	-5.53%	0.682	-7.19%	0.331	6	0.528	-16.30%	0.211	-8.42%	0.769	5	0.089
Founder, slow death	-8.45%	0.579	-6.85%	0.726	4	0.240	-14.86%	0.140	-12.00%	0.342	4	0.006
No founder	-0.98%	0.555	0.00%	0.505	119	0.886	-1.01%	0.575	0.16%	0.275	115	0.659
No founder, sudden death	-4.75%**	0.031	-3.33%	0.404	57	0.885	-5.21%**	0.039	-3.34%	0.546	55	0.959
No founder, slow death	2.48%	0.311	4.23%	0.122	62	0.577	2.83%	0.267	3.60%**	0.036	60	0.276
<i>Second tercile: Tenure between 8 and 18 years</i>												
Full sample	-0.58%	0.719	1.54%	0.601	145		-0.90%	0.584	1.03%	0.764	138	
Sudden death	-7.79%***	0.007	-1.83%	0.950	57		-7.62%***	0.004	-4.24%	0.884	52	
Slow death	4.09%**	0.026	3.38%	0.706	88		3.17%	0.121	2.70%	0.872	86	
Founder	-4.27%	0.226	-1.89%	0.716	50		-0.96%	0.784	-0.87%	0.402	50	
Founder, sudden death	-13.49%***	0.003	-11.39%	0.615	27		-9.65%**	0.017	-7.89%	0.826	27	
Founder, slow death	6.56%	0.197	3.29%	0.400	23		9.25%	0.102	4.27%	0.220	23	
No founder	1.36%	0.404	3.83%	0.173	95		-0.87%	0.605	2.23%	0.152	88	
No founder, sudden death	-2.67%	0.446	3.97%	0.528	30		-5.44%	0.119	2.18%	0.334	25	
No founder, slow death	3.22%*	0.067	3.45%	0.180	65		0.95%	0.616	2.01%	0.253	63	

Table 9 continued.

Category	Industry and size matched control firms						Industry, book-to-market, and size matched control firms					
	Mean	<i>p</i> -value	Median	<i>p</i> -value	N	<i>p</i> -value tercile 1 vs. 3	Mean	<i>p</i> -value	Median	<i>p</i> -value	N	<i>p</i> -value tercile 1 vs. 3
<i>Third tercile: Tenure > 18 years</i>												
Full sample	3.06%**	0.029	3.78%	0.342	153		1.96%	0.174	2.54%	0.493	148	
Sudden death	-0.93%	0.755	1.75%	0.887	33		-0.88%	0.783	0.87%	0.983	32	
Slow death	4.16%***	0.009	3.66%	0.264	120		2.75%*	0.092	3.42%	0.369	116	
Founder	5.23%***	0.006	3.70%	0.695	94		4.31%**	0.022	3.55%	0.815	93	
Founder, sudden death	2.60%	0.562	8.96%	0.999	17		3.29%	0.475	8.58%	0.935	17	
Founder, slow death	5.81%***	0.006	2.32%	0.574	77		4.54%**	0.029	1.88%	0.874	76	
No founder	-0.62%	0.757	1.97%	0.370	57		-2.28%	0.318	0.66%	0.280	53	
No founder, sudden death	-4.11%	0.324	-2.21%	0.934	15		-5.46%	0.249	-2.84%	0.704	14	
No founder, slow death	0.63%	0.781	3.36%	0.359	42		-1.13%	0.667	1.98%	0.163	39	

Table 10
Operating Performance

This table reports abnormal changes in return on assets (ROA) and profit margins between fiscal years $t-1$ and $t+2$, where year t is the event year, for firms with a CEO death. ROA is calculated as earnings before interest and taxes (EBIT) divided by total book assets, and profit margins is EBIT divided by sales. Each event firm is matched to ten control firms by industry, pre-event size (book assets), ROA, and the change in ROA between years $t-4$ and $t-1$. The numbers in the table are the differences between the change in ROA (left panels) and profit margin (right panels) of the event firm and the corresponding control firms. Panel A shows overall results, Panel B shows results for firms sorted into terciles by CEO age, and Panel C reports numbers for firms sorted into terciles by CEO tenure. All p -values are calculated as the proportion of bootstrapped statistics that exceed the value of the statistic observed in the data. In Panels B and C, the column “ p -value tercile 1 vs. 3” reports p -values for a difference-in-means test between the first and the third tercile for each category. Treated and control samples are winsorized separately at the 1% and 99% level after calculating the changes. The data are from CRSP, Compustat, company filings with the SEC, and news sources. *, **, *** indicate significance at 10%, 5%, and 1%, respectively.

Panel A: Overall results

Category	Change in ROA					Change in profit margin				
	Mean	p -value	Median	p -value	N	Mean	p -value	Median	p -value	N
Full sample	0.35%	0.775	0.09%	0.783	303	0.50%	0.873	0.26%	0.493	296
Sudden death	-0.41%	0.862	0.58%	0.342	103	1.17%	0.802	0.56%	0.291	101
Slow death	0.75%	0.643	0.01%	0.992	200	0.14%	0.976	0.31%	0.489	195
Founder	-0.23%	0.911	0.18%	0.791	115	-2.57%	0.654	0.24%	0.737	112
Founder, sudden death	-2.11%	0.653	2.98%	0.105	37	1.59%	0.868	1.45%	0.313	36
Founder, slow death	0.66%	0.767	-0.43%	0.529	78	-4.57%	0.517	-0.31%	0.671	76
No founder	0.71%	0.650	0.07%	0.797	188	2.36%	0.535	0.34%	0.419	184
No founder, sudden death	0.54%	0.799	0.19%	0.681	66	0.94%	0.847	0.55%	0.336	65
No founder, slow death	0.81%	0.720	0.04%	0.937	122	3.14%	0.520	0.51%	0.373	119

Panel B: CEO age terciles

Category	Change in ROA					Change in profit margin						
	Mean	<i>p</i> -value	Median	<i>p</i> -value	N	<i>p</i> -value tercile 1 vs. 3	Mean	<i>p</i> -value	Median	<i>p</i> -value	N	<i>p</i> -value tercile 1 vs. 3
<i>First tercile: Age < 59 Years</i>												
Full sample	1.02%	0.707	-0.30%	0.587	102	0.903	5.78%	0.374	0.44%	0.525	98	0.313
Sudden death	0.57%	0.872	-0.65%	0.514	52	0.697	0.71%	0.907	0.27%	0.710	50	0.885
Slow death	1.48%	0.693	0.17%	0.844	50	0.933	11.06%	0.270	0.87%	0.346	48	0.237
Founder	-0.15%	0.982	-0.35%	0.851	23	0.826	-3.10%	0.715	-0.20%	0.919	21	0.876
Founder, sudden death	2.48%	0.762	-2.90%	0.422	13	0.723	3.34%	0.664	0.88%	0.782	12	0.828
Founder, slow death	-3.58%	0.624	0.06%	0.984	10	0.305	-11.70%	0.384	-1.30%	0.555	9	0.975
No founder	1.36%	0.643	-0.04%	0.944	79	0.802	8.20%	0.290	0.58%	0.458	77	0.472
No founder, sudden death	-0.07%	0.985	-0.42%	0.604	39	0.930	-0.11%	0.985	0.11%	0.907	38	0.987
No founder, slow death	2.75%	0.504	0.33%	0.733	40	0.718	16.31%	0.156	1.03%	0.317	39	0.434
<i>Second tercile: Age between 59 and 65 years</i>												
Full sample	-0.63%	0.734	-0.57%	0.319	95		0.28%	0.960	0.38%	0.634	93	
Sudden death	-1.18%	0.694	1.22%	0.250	33		2.52%	0.756	1.64%	0.107	33	
Slow death	-0.34%	0.891	-1.18%	0.123	62		-0.94%	0.849	-0.88%	0.293	60	
Founder	-2.55%	0.479	-0.27%	0.882	30		5.34%	0.620	0.94%	0.632	29	
Founder, sudden death	-6.31%	0.330	6.59% *	0.086	13		1.36%	0.935	1.49%	0.673	13	
Founder, slow death	0.33%	0.939	-0.96%	0.587	17		8.39%	0.774	-0.68%	0.772	16	
No founder	0.25%	0.924	-0.45%	0.403	65		-2.01%	0.619	0.14%	0.842	64	
No founder, sudden death	2.16%	0.345	0.81%	0.370	20		3.25%	0.585	1.63% *	0.061	20	
No founder, slow death	-0.59%	0.856	-1.39% *	0.099	45		-4.41%	0.433	-1.04%	0.313	44	
<i>Third tercile: Age > 65 years</i>												
Full sample	0.60%	0.755	0.57%	0.220	106		-4.25%	0.405	0.27%	0.634	105	
Sudden death	-1.83%	0.771	1.81%	0.184	18		-0.02%	1.000	0.90%	0.456	18	
Slow death	1.10%	0.594	0.45%	0.350	88		-5.13%	0.370	0.03%	0.966	87	
Founder	0.87%	0.752	0.65%	0.388	62		-6.10%	0.328	0.19%	0.815	62	
Founder, sudden death	-2.56%	0.807	3.23%	0.203	11		-0.07%	0.996	2.97%	0.189	11	
Founder, slow death	1.60%	0.552	0.29%	0.712	51		-7.41%	0.294	-0.37%	0.655	51	
No founder	0.23%	0.927	0.32%	0.421	44		-1.57%	0.777	0.39%	0.640	43	
No founder, sudden death	-0.69%	0.693	-0.68%	0.543	7		0.00%	1.000	0.54%	0.716	7	
No founder, slow death	0.41%	0.904	0.39%	0.383	37		-1.88%	0.757	0.48%	0.582	36	

Panel C: CEO tenure terciles

Category	Change in ROA					Change in profit margin						
	Mean	p-value	Median	p-value	N	p-value tercile 1 vs. 3	Mean	p-value	Median	p-value	N	p-value tercile 1 vs. 3
<i>First tercile: Tenure < 8 years</i>												
Full sample	-1.29%	0.632	-0.24%	0.606	97	0.320	-4.15%	0.480	0.5%	0.416	93	0.692
Sudden death	0.45%	0.891	0.09%	0.913	44	0.946	-2.67%	0.754	0.1%	0.880	43	0.770
Slow death	-2.73%	0.510	-0.52%	0.337	53	0.142	-5.44%	0.382	0.5%	0.562	50	0.628
Founder	-5.47%	0.505	-6.89%	0.288	3	0.264	-62.95%	0.125	-11.7%	0.198	3	0.076
Founder, sudden death	-4.80%	0.673	-8.34%	0.451	2	0.683	-88.78%	0.134	-112.8%	0.122	2	0.108
Founder, slow death	-6.81%	0.264	-5.72%	0.483	1	0.268	-11.28%***	0.000	-12.1%***	0.000	1	0.577
No founder	-1.16%	0.668	0.25%	0.627	94	0.454	-2.20%	0.651	0.5%	0.391	90	0.410
No founder, sudden death	0.70%	0.837	0.38%	0.710	42	0.829	1.51%	0.840	0.5%	0.493	41	0.652
No founder, slow death	-2.65%	0.546	-0.52%	0.316	52	0.346	-5.32%	0.392	0.6%	0.475	49	0.257
<i>Second tercile: Tenure between 8 and 18 years</i>												
Full sample	0.57%	0.802	-0.37%	0.569	92		8.41%	0.216	0.50%	0.443	90	
Sudden death	-1.78%	0.627	-0.17%	0.920	36		6.25%	0.403	0.97%	0.268	35	
Slow death	2.08%	0.472	-0.56%	0.428	56		9.78%	0.325	0.57%	0.564	55	
Founder	-3.28%	0.455	-0.75%	0.558	35		4.92%	0.627	0.96%	0.687	33	
Founder, sudden death	-4.07%	0.536	2.02%	0.529	18		12.56%	0.444	1.35%	0.633	17	
Founder, slow death	-2.45%	0.661	-2.02%	0.217	17		-3.40%	0.800	-0.72%	0.757	16	
No founder	2.93%	0.223	-0.36%	0.610	57		10.43%	0.180	0.39%	0.563	57	
No founder, sudden death	0.50%	0.783	-0.45%	0.506	18		0.21%	0.912	1.74%*	0.072	18	
No founder, slow death	4.06%	0.267	-0.08%	0.925	39		15.16%	0.196	0.63%	0.468	39	
<i>Third tercile: Tenure > 18 years</i>												
Full sample	1.64%	0.354	0.74%	0.181	113		-1.97%	0.672	0.25%	0.682	112	
Sudden death	0.09%	0.987	2.27%*	0.084	23		0.64%	0.918	2.16%	0.159	23	
Slow death	2.04%	0.225	0.47%	0.440	90		-2.65%	0.641	0.17%	0.794	89	
Founder	1.36%	0.624	0.63%	0.451	77		-3.45%	0.597	0.29%	0.683	76	
Founder, sudden death	0.29%	0.981	3.35%	0.110	17		1.17%	0.888	2.62%	0.145	17	
Founder, slow death	1.67%	0.481	0.20%	0.804	60		-4.79%	0.527	-0.24%	0.791	59	
No founder	2.25%	0.245	0.72%	0.225	36		1.17%	0.702	0.35%	0.677	36	
No founder, sudden death	-0.46%	0.873	0.26%	0.822	6		-0.80%	0.783	-2.65%	0.407	6	
No founder, slow death	2.79%	0.211	0.86%	0.223	30		1.57%	0.681	0.82%	0.430	30	

Table 11
Firm Growth

This table reports abnormal asset growth and sales growth between years fiscal years $t-1$ and $t+2$, where year t is the event year, for firms with a CEO death. Growth rates are calculated as logarithmic differences. Each event firm is matched to ten control firms by industry, pre-event size (book assets), and the growth rate of assets between years $t-4$ and $t-1$. The numbers in the table are the differences between the asset growth rate (left panels) and sales growth rate (right panels) of the event firm and the corresponding control firms. Panel A shows overall results, Panel B shows results for firms sorted into terciles by CEO age, and Panel C reports numbers for firms sorted into terciles by CEO tenure. All p -values are calculated as the proportion of bootstrapped statistics that exceeded the value of the statistic observed in the data. In Panels B and C, the column “ p -value tercile 1 vs. 3” reports p -values for a difference-in-means test between the first and the third tercile for each category. Treated and control samples are winsorized separately at the 1% and 99% level. The data are from CRSP, Compustat, company filings with the SEC, and news sources. *, **, *** indicate significance at 10%, 5%, and 1%, respectively.

Panel A: Overall results

Category	Asset growth					Sales growth				
	Mean	p -value	Median	p -value	N	Mean	p -value	Median	p -value	N
Full sample	-3.37%	0.346	-0.37%	0.902	330	-0.78%	0.802	0.22%	0.901	319
Sudden death	-0.16%	0.974	-0.05%	0.984	112	3.75%	0.521	2.06%	0.581	108
Slow death	-5.01%	0.199	-0.59%	0.857	218	-3.09%	0.420	-2.07%	0.480	211
Founder	-3.62%	0.544	1.72%	0.723	117	1.34%	0.836	-0.67%	0.927	112
Founder, sudden death	0.13%	0.989	6.27%	0.485	37	15.39%	0.233	13.18%	0.117	35
Founder, slow death	-5.35%	0.453	-0.16%	0.978	80	-5.03%	0.472	-6.96%	0.219	77
No founder	-3.23%	0.383	-0.87%	0.778	213	-1.93%	0.633	0.35%	0.878	207
No founder, sudden death	-0.30%	0.951	-0.59%	0.894	75	-1.83%	0.752	-4.14%	0.266	73
No founder, slow death	-4.82%	0.309	-0.31%	0.948	138	-1.98%	0.651	1.16%	0.713	134

Panel B: CEO age terciles

Category	Asset growth					Sales growth						
	Mean	<i>p</i> -value	Median	<i>p</i> -value	N	<i>p</i> -value tercile 1 vs. 3	Mean	<i>p</i> -value	Median	<i>p</i> -value	N	<i>p</i> -value tercile 1 vs. 3
<i>First tercile: Age < 59 Years</i>												
Full sample	-0.53%	0.940	-0.27%	0.938	109	0.680	0.28%	0.963	5.60%	0.148	105	0.639
Sudden death	4.90%	0.596	15.69% **	0.025	55	0.485	1.31%	0.875	7.65%	0.180	53	0.975
Slow death	-6.05%	0.439	-7.21%	0.312	54	0.699	-0.74%	0.936	4.84%	0.389	52	0.694
Founder	7.37%	0.633	16.76%	0.243	22	0.405	14.08%	0.396	19.80% *	0.057	20	0.180
Founder, sudden death	23.36%	0.353	24.08%	0.193	12	0.364	25.62%	0.346	35.10% *	0.054	11	0.430
Founder, slow death	-11.82%	0.499	-16.95%	0.373	10	0.716	0.02%	0.999	-10.11%	0.626	9	0.692
No founder	-2.52%	0.699	-2.75%	0.589	87	0.696	-2.95%	0.639	5.09%	0.207	85	0.589
No founder, sudden death	-0.26%	0.980	1.63%	0.883	43	0.930	-5.04%	0.536	2.13%	0.734	42	0.531
No founder, slow death	-4.74%	0.602	-6.05%	0.381	44	0.623	-0.91%	0.923	5.31%	0.358	43	0.893
<i>Second tercile: Age between 59 and 65 years</i>												
Full sample	-5.92%	0.256	-3.38%	0.330	106		0.78%	0.871	-4.04%	0.219	103	
Sudden death	-3.48%	0.709	-5.38%	0.391	35		8.31%	0.395	-4.19%	0.457	35	
Slow death	-7.12%	0.258	-2.32%	0.627	71		-3.10%	0.608	-4.04%	0.328	68	
Founder	-3.80%	0.762	-11.71%	0.327	30		10.28%	0.402	6.41%	0.640	29	
Founder, sudden death	-7.48%	0.758	-8.86%	0.665	13		21.05%	0.267	8.52%	0.710	13	
Founder, slow death	-0.99%	0.952	-12.14%	0.358	17		1.52%	0.918	5.12%	0.741	16	
No founder	-6.75%	0.246	-1.93%	0.643	76		-2.98%	0.567	-5.49%	0.145	74	
No founder, sudden death	-1.11%	0.912	-4.86%	0.432	22		0.61%	0.956	-6.61%	0.325	22	
No founder, slow death	-9.05%	0.152	-1.11%	0.838	54		-4.53%	0.460	-5.24%	0.258	52	
<i>Third tercile: Age > 65 years</i>												
Full sample	-3.70%	0.532	2.00%	0.632	115		-3.22%	0.566	-1.16%	0.797	111	
Sudden death	-7.52%	0.619	-6.55%	0.413	22		2.15%	0.871	2.23%	0.764	20	
Slow death	-2.80%	0.672	4.12%	0.402	93		-4.42%	0.487	-0.90%	0.854	91	
Founder	-7.25%	0.395	2.13%	0.686	65		-6.84%	0.384	-6.56%	0.215	63	
Founder, sudden death	-14.87%	0.545	-4.84%	0.692	12		-1.70%	0.940	4.53%	0.612	11	
Founder, slow death	-5.53%	0.501	5.98%	0.352	53		-7.93%	0.339	-7.62%	0.232	52	
No founder	0.91%	0.908	1.87%	0.755	50		1.50%	0.849	3.79%	0.524	48	
No founder, sudden death	1.31%	0.921	0.77%	0.947	10		7.03%	0.635	-0.69%	0.914	9	
No founder, slow death	0.81%	0.943	3.32%	0.642	40		0.24%	0.978	5.44%	0.398	39	

Panel C: CEO tenure terciles

Category	Asset growth					Sales growth						
	Mean	p-value	Median	p-value	N	p-value tercile 1 vs. 3	Mean	p-value	Median	p-value	N	p-value tercile 1 vs. 3
<i>First tercile: Tenure < 8 years</i>												
Full sample	-8.25%	0.200	-4.32%	0.328	106	0.617	-3.51%	0.504	0.08%	0.978	101	0.901
Sudden death	-7.68%	0.405	-8.24%	0.186	49	0.846	-3.71%	0.649	-6.06%	0.245	48	0.609
Slow death	-8.73%	0.287	-0.51%	0.922	57	0.582	-3.33%	0.693	0.99%	0.805	53	0.888
Founder	-42.26%	0.329	-53.72%	0.293	3	0.286	-2.27%	0.980	7.78%	1.000	3	0.979
Founder, sudden death	-11.30%	0.822	-13.76%	0.756	2	0.910	36.71%	0.609	27.67%	0.707	2	0.542
Founder, slow death	-104.19%	0.105	-98.52% *	0.089	1	0.079	-80.22%	0.286	-63.53%	0.254	1	0.157
No Founder	-7.26%	0.243	-3.85%	0.395	103	0.663	-3.54%	0.523	-0.79%	0.796	98	0.748
No Founder, sudden death	-7.53%	0.428	-8.24%	0.135	47	0.850	-5.45%	0.515	-6.57%	0.237	46	0.756
No Founder, slow death	-7.03%	0.396	0.94%	0.883	56	0.708	-1.84%	0.812	1.70%	0.725	52	0.969
<i>Second tercile: Tenure between 8 and 18 years</i>												
Full sample	3.45%	0.591	0.79%	0.826	100		3.54%	0.539	2.57%	0.552	98	
Sudden death	13.71%	0.245	13.40%	0.110	36		13.92%	0.186	13.31%	0.104	35	
Slow death	-2.32%	0.734	-6.54%	0.219	64		-2.22%	0.740	-1.72%	0.730	63	
Founder	3.61%	0.777	11.18%	0.356	35		11.49%	0.341	8.64%	0.389	33	
Founder, sudden death	7.26%	0.710	17.44%	0.293	17		22.77%	0.236	30.97% *	0.059	16	
Founder, slow death	0.16%	0.991	-4.57%	0.755	18		0.95%	0.942	3.50%	0.804	17	
No founder	3.37%	0.591	-0.82%	0.794	65		-0.56%	0.927	-1.05%	0.840	65	
No founder, sudden death	19.49%	0.101	11.68%	0.182	19		6.44%	0.569	3.99%	0.692	19	
No founder, slow death	-3.29%	0.654	-6.32%	0.281	46		-3.43%	0.652	-4.86%	0.437	46	
<i>Third tercile: Tenure > 18 years</i>												
Full sample	-4.46%	0.426	0.16%	0.990	123		-2.09%	0.709	-2.04%	0.598	119	
Sudden death	-5.01%	0.690	-7.44%	0.313	27		3.78%	0.776	2.63%	0.722	25	
Slow death	-4.30%	0.486	2.25%	0.567	96		-3.64%	0.538	-3.01%	0.552	94	
Founder	-5.35%	0.471	-1.80%	0.738	79		-2.95%	0.687	-4.06%	0.442	76	
Founder, sudden death	-5.34%	0.768	-7.92%	0.511	18		5.88%	0.755	3.75%	0.606	17	
Founder, slow death	-5.35%	0.507	3.05%	0.621	61		-5.48%	0.437	-6.58%	0.276	59	
No founder	-2.86%	0.680	1.27%	0.759	44		-0.51%	0.952	1.74%	0.787	43	
No founder, sudden death	-4.34%	0.677	-3.51%	0.659	9		-0.53%	0.961	-8.13%	0.406	8	
No founder, slow death	-2.47%	0.757	2.53%	0.616	35		-0.50%	0.963	1.79%	0.798	35	

Table 12
Firm Survival

This table reports average differences in survival rates between firms that experienced a CEO death and control firms for different horizons. Year t is the end of the fiscal year in which the CEO death occurs. Firm survival is defined as having non-zero book assets reported in Compustat or in any other available source. Each event firm is matched to ten control firms by industry, pre-event size (book assets), ROA, and the change in ROA between years $t-4$ and $t-1$. The numbers in the table are the average differences between the survival indicator for the event firm and the corresponding control firms. Panel A shows overall results, Panel B shows results for firms sorted into terciles by CEO age, and Panel C reports numbers for firms sorted into terciles by CEO tenure. All p -values are calculated as the proportion of bootstrapped statistics that exceed the value of the statistic observed in the data. In Panels B and C, the column “ p -value tercile 1 vs. 3” reports p -values for a difference-in-means test between the first and the third tercile for each category. Treated and control samples are winsorized separately at the 1% and 99% level. The data are from CRSP, Compustat, company filings with the SEC, and news sources. *, **, *** indicate significance at 10%, 5%, and 1%, respectively.

Panel A: Overall results

Category	Firm survives until $t+0$		Firm survives until $t+2$		Firm survives until $t+5$		N
	Mean	p -value	Mean	p -value	Mean	p -value	
Full sample	2.80% **	0.017	0.67%	0.737	2.53%	0.337	375
Sudden death	2.36%	0.241	4.15%	0.233	9.84% **	0.021	123
Slow death	3.02% *	0.063	-1.03%	0.693	-1.03%	0.771	252
Founder	2.34%	0.265	1.24%	0.661	7.52% *	0.070	145
Founder, sudden death	0.67%	0.779	7.33%	0.190	18.00% **	0.020	45
Founder, slow death	3.10%	0.223	-1.50%	0.708	2.80%	0.564	100
No founder	3.09% *	0.057	0.30%	0.847	-0.61%	0.828	230
No founder, sudden death	3.33%	0.201	2.31%	0.549	5.13%	0.327	78
No founder, slow death	2.96% *	0.098	-0.72%	0.725	-3.55%	0.363	152

Panel B: CEO age terciles

Category	Firm survives until $t+0$			Firm survives until $t+2$			Firm survives until $t+5$			N
	Mean	p -value	p -value tercile 1 vs. 3	Mean	p -value	p -value tercile 1 vs. 3	Mean	p -value	p -value tercile 1 vs. 3	
<i>First tercile: Age < 59 Years</i>										
Full sample	4.19%*	0.063	0.777	3.31%	0.333	0.892	5.40%	0.189	0.479	124
Sudden death	3.17%	0.295	0.787	4.92%	0.337	0.270	11.27%*	0.075	0.913	63
Slow death	5.25%*	0.098	0.542	1.64%	0.724	0.860	-0.66%	0.894	0.899	61
Founder	2.50%	0.557	0.949	-0.62%	0.841	0.836	10.31%	0.188	0.588	32
Founder, sudden death	-2.22%	0.742	0.535	1.67%	0.799	0.351	11.11%	0.323	0.455	18
Founder, slow death	8.57%*	0.077	0.235	-3.57%	0.765	0.853	9.29%	0.385	0.569	14
No founder	4.78%**	0.029	0.943	4.67%	0.247	0.975	3.70%	0.415	0.303	92
No founder, sudden death	5.33%**	0.049	0.701	6.22%	0.231	0.571	11.33%*	0.100	0.091	45
No founder, slow death	4.26%	0.192	0.881	3.19%	0.571	1.000	-3.62%	0.511	0.844	47
<i>Second tercile: Age between 59 and 65 years</i>										
Full sample	0.65%	0.710		-4.03%	0.230		0.56%	0.850		124
Sudden death	0.00%	0.747		-1.95%	0.675		7.56%	0.322		41
Slow death	0.96%	0.655		-5.06%	0.213		-2.89%	0.574		83
Founder	1.39%	0.712		2.22%	0.634		10.00%	0.202		36
Founder, sudden death	0.67%	0.582		7.33%	0.319		20.67%	0.111		15
Founder, slow death	1.90%	0.637		-1.43%	0.791		2.38%	0.812		21
No founder	0.34%	0.850		-6.59%	0.114		-3.30%	0.476		88
No founder, sudden death	-0.38%	0.716		-7.31%	0.261		0.00%	0.840		26
No founder, slow death	0.65%	0.806		-6.29%	0.148		-4.68%	0.405		62
<i>Third tercile: Age > 65 years</i>										
Full sample	3.54%*	0.062		2.68%	0.382		1.65%	0.715		127
Sudden death	4.74%	0.187		14.74%**	0.031		10.00%	0.269		19
Slow death	3.33%	0.136		0.56%	0.801		0.19%	0.930		108
Founder	2.73%	0.314		1.56%	0.661		5.19%	0.295		77
Founder, sudden death	5.00%*	0.090		15.83%*	0.064		25.00%**	0.021		12
Founder, slow death	2.31%	0.430		-1.08%	0.749		1.54%	0.804		65
No founder	4.80%*	0.052		4.40%	0.310		-3.80%	0.541		50
No founder, sudden death	4.29%	0.239		12.86%	0.203		-15.71%	0.188		7
No founder, slow death	4.88%	0.102		3.02%	0.503		-1.86%	0.770		43

Panel C: CEO tenure terciles

Category	Firm survives until $t+0$			Firm survives until $t+2$			Firm survives until $t+5$			N
	Mean	p -value	p -value tercile 1 vs. 3	Mean	p -value	p -value tercile 1 vs. 3	Mean	p -value	p -value tercile 1 vs. 3	
<i>First tercile: Tenure < 8 years</i>										
Full sample	1.81%	0.352	0.600	-4.57%	0.158	0.184	-2.28%	0.564	0.388	127
Sudden death	1.67%	0.574	0.121	1.48%	0.711	0.471	4.44%	0.452	0.528	54
Slow death	1.92%	0.431	0.960	-9.04% **	0.026	0.122	-7.26%	0.194	0.242	73
Founder	-28.75% ***	0.006	0.002	-43.75% ***	0.001	0.008	-28.75% **	0.041	0.022	8
Founder, sudden death	-38.33% ***	0.000	0.000	-43.33% ***	0.004	0.001	-28.33% *	0.094	0.000	6
Founder, slow death	0.00% ***	0.000	0.793	-45.00% ***	0.008	0.081	-30.00% **	0.047	0.356	2
No founder	3.87% *	0.061	0.751	-1.93%	0.507	0.324	-0.50%	0.833	0.421	119
No founder, sudden death	6.67% *	0.067	0.472	7.08%	0.165	0.118	8.54%	0.205	0.017	48
No founder, slow death	1.97%	0.423	0.949	-8.03% *	0.069	0.038	-6.62%	0.203	0.516	71
<i>Second tercile: Tenure between 8 and 18 years</i>										
Full sample	3.33%	0.163		5.19%	0.157		9.17% **	0.045		108
Sudden death	-0.48%	0.754		5.48%	0.302		16.43% **	0.019		42
Slow death	5.76% *	0.082		5.00%	0.261		4.55%	0.428		66
Founder	6.00%	0.123		12.00% *	0.081		18.25% **	0.018		40
Founder, sudden death	4.00%	0.417		15.00% *	0.094		23.00% **	0.029		20
Founder, slow death	8.00%	0.161		9.00%	0.262		13.50%	0.254		20
No founder	1.76%	0.400		1.18%	0.754		3.82%	0.516		68
No founder, sudden death	-4.55%	0.404		-3.18%	0.507		10.45%	0.233		22
No founder, slow death	4.78%	0.102		3.26%	0.544		0.65%	0.880		46
<i>Third tercile: Tenure > 18 years</i>										
Full sample	3.24%	0.101		1.80%	0.566		2.16%	0.582		139
Sudden death	8.15% **	0.049		7.41%	0.287		10.37%	0.200		27
Slow death	2.05%	0.310		0.45%	0.901		0.18%	0.930		112
Founder	3.40%	0.132		0.52%	0.889		6.08%	0.227		97
Founder, sudden death	9.47% *	0.056		15.26% *	0.055		27.37% ***	0.007		19
Founder, slow death	1.92%	0.451		-3.08%	0.447		0.90%	0.803		78
No founder	2.86%	0.238		4.76%	0.372		-6.90%	0.300		42
No founder, sudden death	5.00%	0.326		-11.25%	0.358		-30.00% **	0.045		8
No founder, slow death	2.35%	0.414		8.53%	0.136		-1.47%	0.877		34