"Estimating the Value of The Boss: Evidence from CEO Hospitalization Events"*

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Abstract. This paper shows that Chief Executive Officers (CEOs) meaningfully affect firm performance. Using variation in CEO exposure resulting from the number of days a CEO is hospitalized, we provide estimates of the effect of CEOs on firm policies, holding firm and CEO matches constant. We have four main findings. First, CEOs have an economically and statistically significant effect on profitability, revenue, and investment outcomes. Firms whose CEOs are hospitalized underperform when their chief executives are sick but otherwise exhibit similar performance relative to other firms. Second, we find robust CEO effects for relatively young and highly educated CEOs, and for CEOs in rapidly growing environments, where CEO discretion is arguably most valuable. Third, we show that CEOs are unique: the hospitalization of other senior executives does not have similar effects on performance. Fourth, consistent with the idea that hospitalizations meaningfully affect CEO potential at the firm level, we find that even short hospitalizations lead to significant increases in turnover probabilities. Overall, our findings demonstrate that CEOs are a key determinant of firm performance, and that the value of CEO succession and contingency plans is likely to be substantial.

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This paper investigates the impact of CEOs on firm outcomes using these individuals' hospitalization events as a source of variation in their productive ability. The basic premise is that CEO hospitalization events affect managers' ability to perform their jobs as they are physically away from the office and, due to the illness, presumably not in the best condition to attend to their responsibilities.

Using CEO hospitalization to study managerial effects has many advantages. First, because it is unlikely that, beyond its effects through the CEO, hospitalizations are correlated with firm and/or industry characteristics, it allows us to isolate managerial effects. Second, these shocks allow us to compare firm outcomes as firms' exposure to its CEO varies, keeping the match firm-CEO constant. This is in contrast to a growing literature that identifies CEO effects by comparing outcomes of the same CEO in multiple firms ("managerial fixed effects") . Third, because hospitalized CEO are relatively similar to the average CEO, we are able to estimate CEO effects that are more representative of a typical CEO than previous literature, such as the studies that use CEO deaths (CEOs who die in office are significantly older than the average). This is important because, as we shows below, CEO effects are heterogeneous. Forth, CEO hospitalizations are a relatively frequent event. For example, they occur in 6.5% of our firm-years, whereas CEO deaths occur in only 0.2%. They also occur more frequently than deaths of relatives, an event that has been used as an exogenous shock to firms' exposure to their CEOs (Bennedsen, Perez-Gonzalez, Wolfenzon, 2008).

We use a detailed dataset that includes financial information about medium and large Danish firms from 1995 to 2007. The dataset contains 76,354 observations of 8,798 distinct firms. The data is unique in that we are able to link the CEO of each firm with the National Patient Registry in Denmark and obtain information on the number of days each CEO is

hospitalized in a given year as well as on the main diagnosis. We find 4,943 observations in which a CEO is hospitalized at least one day. We are also able to obtain other personal information on CEOs such as gender, age, and education level from administrative records at Statistics Denmark.

We use this panel dataset to assess firm outcomes in years when its CEO is hospitalized. We find that performance measured as operating return on assets (OROA) is remarkably similar when the CEO is not hospitalized (9.4%) and in cases in which he is hospitalized 1 day (9.6%). This difference of 0.2% is not different from zero at conventional levels. The same is true in cases in which the CEO is hospitalized 2 to 4 days. However, performance worsens significantly in firms in which the CEO is hospitalized 5 or more days. For this group, average OROA is only 8.05%. The difference with the OROA of the firms with CEO hospitalized 0 to 4 days is significantly different from zero at the 1% level. Moreover, these differences in performance are not driven by potential concentration of sick CEOs in declining industries as we find qualitatively similar results using industry-adjusted OROA. The results are also not driven by outliers. In median analysis we confirm all these results.

To ascertain whether these differences in performance are due to firms' exposure to their CEO and not to potential correlation between CEO hospitalization and individual, firm and industry characteristics we estimate a panel regression with OROA as dependent variable. We include a firm fixed effect to control for any potential unobserved time-invariant firm characteristic. We find that the coefficient in the number of days the CEO spends at the hospital is negative and statistically significant at the 1% level. The coefficient of 0.0004 implies that a 10-day hospital stay reduces OROA by 0.4 percentage points or 4% relative to mean profitability

levels. The magnitude and significance of this coefficient does not change when we introduce CEO age firm age and size and industry mean profitability as controls.

Importantly, the results estimated using firm fixed effect specifications do not allow us to separate whether the drop in profitability is driven by reduced firm exposure to its CEO or, alternatively, by CEO turnover events that occur around CEO hospitalizations. To isolate the impact of the reduced productive capacity of the CEO, we augment the empirical specification and include firm-CEO fixed effect. This specification allows us to estimate the effect of hospitalization by keeping the CEO-firm match constant. We find that the coefficient is virtually unchanged.

This result is important in light of the difficulty over the interpretation of managerial fixed effects (Fee, Hadlock, and Pierce, 2010). If shocks to the firm's optimal policies are correlated with new managers' fixed effects (e.g., boards hire a cost-cutter CEO when the firm needs to cut costs), the estimation of these fixed effects will be biased. Our results, by controlling for the firm-CEO match, provide stark evidence of the impact of CEOs on firm performance.

To reinforce the interpretation of the causal effect of CEO loss of productive capacity on performance we address three remaining potential concerns. The first one relates to sample selection problems due to the fact that we observe the identity of the CEO in November of each year. If, for example, firms that receive positive shocks to their investment opportunities during the year replace their sick CEO by November, we would end up identifying only the sick CEOs of firms with negative shocks to their investment opportunities. As a result, the correlation we find would be spurious. We address this concern by using the health records of the individual listed as CEO as of November of the previous year and find similar results.

The second concern is that the number of days the CEO stays at the hospital is endogenous. For example, it is possible that CEOs whose time is more valuable –due to their firms' superior investment opportunities-- would be released from the hospital sooner. To address this concern we instrument the number of days the CEO is at the hospital with the fraction of individuals with the same diagnosis that spends at least 10 days at the hospital using the entire Danish population. Again, we find a negative coefficient for the variable indicating the number of days the CEO spends at the hospital. In addition, we cannot reject that the OLS fixed effect estimates are different from those in the IV estimation.

The third concern relates to an additional channel through which number of days could affect profitability. If longer hospital stays imply higher medical bills for the CEO, it is possible for the length of hospitalization to affect profitability even in setting where CEOs are irrelevant for performance. Although the severity of this problem is mitigated by a large extent by the dominant presence of the Danish public sector in the provision of health services, we address this issue by investigating the effect of hospitalization on sales, as this variable is unlikely to be affected by medical expenditures. Using similar specifications to the ones described above, we find that sales drop with the length of the CEO stay at the hospital. In additional tests we also find that net income to assets, total assets and investment rate all decline with CEO

Overall these findings provide striking evidence that CEOs have a significant and large impact on firm outcomes. The test is novel in that it relies on a source of variation in firms' exposure to their CEOs. This allows us identify CEO effects while controlling for the firm-CEO match.

Having established the causal impact of CEOs on firm profitability, we turn to analyze whether CEOs are unique or whether a similar effect is present for other senior managers. Using

information from a matched employee-employer dataset, we are able to identify other (non-CEO) senior managers. For each firm and year we randomly pick a senior manager and obtain matching hospitalization records. Using the same empirical specification as those for CEO hospitalizations, we are unable to find a significant effect of senior managers on performance. The results of this test highlight the uniqueness of CEOs' contribution.

Next we proceed to study heterogeneity of CEO effects by individual, firm and industry characteristics. This analysis allows us to identify the setting and circumstances under which CEOs are more important. In terms of CEO individual characteristics, we find that young CEOs, those with tenures between 2 and 7 years, and those with college education have robust managerial effects. Turning to industry and firm characteristics, we find that CEO effects are more robust in rapidly growing industries. In firms that operate in these industries, profitability, sales, assets, and investment rate fall in years when the CEO is hospitalized. In slowly growing industries, we find that profitability drops, but find no significant effects on sales, assets or investment rates. These results seem to suggest that CEOs in slowly growing industries are more important in reducing costs rather than expanding operations. Therefore, reduced CEO activity implies lower profitability but essentially the same scale of operations.

As an additional test for the importance of CEOs, we investigate whether CEO turnover probability is affected by their hospitalization spells. The idea behind this "revealed preference" type of test is that if, as we have shown so far CEOs hospitalization stays reduce their productive capacity, then hospitalized CEOs should be replaced more often. Confirming this view, we find that 10-day hospital stays increases the turnover probability by 25% (from 4% to 5.1%). To the best of our knowledge, this is the first test that a variable reflecting the productive ability of CEOs affects turnover decisions.

Given the magnitude of this effect and the large body of literature documenting large CEO turnover effects, one remaining concern is that the estimated effect of hospitalization on firm outcomes is driven by these turnover events. A similarly issue could be at work for CEO deaths. It might be that the effects we observe during CEO hospitalizations are driven by the fact that hospitalized CEOs are more likely to die. In this case, there is also a large literature documenting CEO deaths effects. To address these issues we ran the benchmark specification in two subsamples: 1) a subsample that omits firms in which the CEO is hospitalized and later replaced and 2) a subsample that omits firms in which the CEO is hospitalized and later dies. In both these subsamples we find robust CEO effects suggesting that our findings are not driven by turnover events of deaths.

The rest of the paper is organized as follows. Section I describes the data and presents summary statistics. Section III investigates the impact of CEO hospitalizations on performance. Section IV examines the uniqueness of the CEOs effects. Section V, assesses the cross-sectional determinants of CEO effects, and the impact of CEO hospitalizations on turnover events. Section VI concludes.

I. Data and Summary Statistics

A. Data Sources

To analyze the impact of CEO hospitalization on firm performance, we use the following firm and individual data sources:

1. **Firm financial information**. Financial data are from *Købmandsstandens Oplysningsbureau* (KOB) and the *Statistical Business Register* (SBR) at Statistics Denmark. KOB is a dataset assembled by a private data provider that collects financial statement and

management information from all limited liability firms in Denmark. Firms are required to disclose the value of total assets, as well as their operating and net income. While most of the firms in KOB are privately held, firm financials are audited by external accountants, in compliance with Danish corporate law. Critically for our purposes, KOB includes the unique firm-level identifier, the CVR number, issued by the Danish Commerce and Companies Agency (DCCA). The CVR numbers allow us to match KOB data with other data sources. We supplement KOB's financial information with revenue and employment information from the SBR, which is assembled by Statistics Denmark, a Danish government entity under the Ministry of Economic and Business Affairs that is responsible for data collection and record keeping for a large number of economic variables. Furthermore, merging KOB and SBR data allows us to focus on those limited ability firms with actual employment and sales records, and exclude from the tests shell companies that are otherwise difficult to identify.

2. **Management data**. To identify the firms' CEOs we rely on three data sources: (a) KOB, (b) Erhvervs- og Selskabsstyrelsen (ES), a dataset assembled by the DCCA, and (c) employment information from the Integreret Database of Arbejdsmarkedsforskning (IDA) at Statistics Denmark. KOB reports the names of firms' top executives but does not contain individual identifiers. To be able to merge the names reported in KOB with other data sources we use ES, which contains the Danish Personal Identification number (CPR) for all managers of limited liability firms. The CPR number is the Danish equivalent of the U.S. Social Security number. Under Danish corporate law, firms are required to file with ES any change in CEO positions within two weeks of its occurrence. Lastly, we use IDA to verify that CEOs are indeed registered as employees in the reporting firms, as well as to obtain personal information about the firms' CEOs, such as their age and education levels.

3. **Hospitalization data**. Data on hospitalizations are from the Landspatientregisteret (LPR), the National Patient Registry in Denmark, at Statistics Denmark. LPR registers all hospital interactions (both public and private ***) in the country. LPR contains individual CPR identifiers, the duration of each hospital stay, and the primary medical condition of patients based on the International Classification of Diseases of the World Health Organization.[1]

B. Sample Selection

KOB data are available for two types of limited liability firms: aktieselskab (A/S) and anpartsselskab (ApS). ApS corporations are smaller and likely to be informal in their organizational structure as they are not legally required to have a formal Board of Directors.[2] Because of our interest in the role of CEOs in large organizations, we focus on A/S firms. Given our reliance on multiple data sources, our analysis is constrained to the 1995 to 2007 period. As is standard in the literature, we focus on non-financial, non-utility, and non-government-owned entities. Lastly, to focus on the largest firms in Denmark, we require a minimum of (a) 20 or more employees, (b) USD $5 million or more in assets, and (c) USD $10 million or more in sales. We retain any firm that met all three requirements for at least one year during the 1995 to 2005 period.[3] We arrive at a final panel of 8,798 firms and 76,354 firm year observations.

C. Summary Statistics

Table I shows summary statistics for the sample firms as a group (Column I), "event" firms (Column II), and "non-event" firms (Column III). Event firms are those whose CEO was hospitalized for at least one day during the sample period. Of the 8,798 firms in the sample, we

[1] http://www.who.int/classifications/icd/
[2] A/S firms must have a minimum of DKK 500,000 in capitalization. The minimum for ApS firms is DKK 80,000. Neither of these organizational forms includes partnerships. For detailed information on the regulations governing limited liability firms in Denmark, the current Danish Company Act is available online at http://www.dcca.dk/.
[3] Eliminating these size cutoffs does not affect the results of the paper.

classify 3,167 as event and 5,631 as non-event firms. Table I also reports the difference of means across groups (Column IV).

To assess firm performance in the absence of stock price information, we follow the CEO turnover literature in using operating return on assets (OROA) as a measure of performance.[4] OROA is a natural proxy for performance, as it compares the cash flows from operations to the value of assets, and is not distorted by capital structure decisions. The average OROA for event and non-event firms, respectively, is 9.51 and 9.42 percentage points. The difference across groups is not statistically significant at conventional levels.

We also report net income to assets, which is 5.7 percentage points for event firms and 5.5 for non-event firms; again, the difference across groups is insignificant. To explore whether event firms differ in terms of their industry patterns, we also show industry-adjusted OROA values, using their four-digit codes from the Classification of Economic Activities in the European Community (NACE). The difference in industry-adjusted OROAs is also indistinguishable from zero for both event and non-event firms across groups.

The mean value of sales is 126 million Danish Kroner (DKK) for all sample firms, and we report comparable averages for both event and non-event firms. Other measures of firm size, such as total assets or employment, also indicate that firms are comparable across groups. In addition, the average sales values suggest that sample firms are medium-sized organizations, relative to the large publicly traded firms in COMPUSTAT.

Firm age reveals that event firms are significantly older than their non-event peers. Event firms have been in business for nearly 28 years on average while their peers have been active for

[4] Denis and Denis (1995); Huson, Malatesta, and Parrino (2004); Pérez-González (2006), Bennedsen et al (2007), and many others. Operating return on assets (OROA) is measured as the ratio of earnings before interest and taxes (EBIT) to the book value of total assets.

close to 26 years. While this difference is relatively small (1.9 years), it is significant at the 1% level. We also report that an examination of CEO age unsurprisingly shows that event firms are managed by older CEOs (older CEOs are both more likely to be hospitalized and more likely to manage older firms). The average CEO age for firms in the sample is 50.9 years; however, it is 52.2 and 50.1 years for event and non-event firms respectively. The difference of 2.1 years is significant at the 1% level.

Table I also presents evidence that investment is higher for non-event firms. Average investment rate for event firms is 5%, compared to 5.5% for their non-event peers. The difference is statistically significant at the 1% level. Note that since Table I shows mean values for all the firm years of those event firms, this difference can potentially be the result of CEO hospitalization events, an issue we investigate later in the paper.

Lastly, in terms of the representativeness of the firms under examination, the share of the sample firms' employment relative to the aggregate employment of all A/S firms in 2000 was 70.4%. In other words, firms are likely to be representative of limited liability firms in Denmark.

These summary statistics highlight three issues. First, event and non-event firms are comparable in terms of profitability and size. Second, event firms are slightly older and are managed by CEOs who are also older than their peers. Third, sample firms are likely to be representative of medium-sized firms in the economy.

In Table II, we present hospitalization data for the CEOs in the sample, broken by the main medical condition reported in the Danish National Patient Registry and the length of the CEO hospital stay. From the 76,354 total firm-year observations, we identify 4,943 firm-years in which a CEO was hospitalized for at least one day and 1,581 cases in which the CEO experienced hospital stays of 5 or more days. These numbers represent 6.5% and 2.1% of the

total number of firm-years, respectively. For the econometrician investigating whether CEOs affect firm performance, these hospitalization events, while unfortunate, are useful, because they are significantly more frequent than other events previously explored in the literature. One such event is CEO deaths. Yet, CEO deaths occur rarely, in only 0.2% of the firm-year observations.

Table II shows significant variation in the duration of hospital stays as a function of the primary medical condition of the patient. For example, the fraction of neoplasm-related hospitalizations leading to 10 day or longer stays is 32.9%, while the same fraction for illnesses related to the genitourinary system is 7.8%. In the subsequent sections, we exploit this heterogeneity in our empirical tests.

In sum, Table II shows that hospitalization events are frequent and hence provide a significant amount of variation in CEO exposure that we can exploit empirically in the subsequent sections.

II. CEO Hospitalization Events and Firm Performance

A. Univariate Tests

As an initial test for the impact of CEOs on firm performance, in Table III, we examine mean operating profitability ratios as a function of the number of days of hospitalization for the firm's chief executive. As measures of operating profitability, we report OROA (Column I), industry-adjusted OROA (Column II), and net income ratios (Column III).

Mean profitability analysis shows that firms with no CEO hospitalization events and those whose CEOs experienced short hospital stays perform similarly. More specifically, the mean OROA, as shown in the first row of Panel A, is 0.094 for firms with no hospitalization events and 0.096 for firms with CEOs who experienced a one day hospital stay. The difference of 0.002, reported in Panel B, is indistinguishable from zero at conventional levels. Columns II

and III show that similarly comparable performance obtains if we instead rely on industry-adjusted profit measures. Similarly, firms whose CEO was hospitalized for 2-4 days exhibit profitability ratios that are comparable to both no hospitalization firms and those with one-day hospitalization spells.

In contrast, firms whose CEOs experienced hospital stays of at least five days consistently underperform their peers. Mean OROA is 0.083, 0.077, and 0.079 for firms with CEOs hospitalized for 5-9, 10-19, and 20 or more days, respectively. More informatively, the mean industry-adjusted OROA is -0.98, -1.43, and -1.7 percentage points relative to the industry norm. As a group, firms with CEOs who were hospitalized for at least five days underperform their industry benchmarks by 1.2 percentage points. The second row of Table III, Panel B shows that when compared to firms with CEOs who had fewer than 4 hospitalization days, this underperformance is significant at the 1% level.

Interestingly, the third row of Panel B shows that the underperformance of firms with CEOs who experience hospital stays of at least 5 days is not explained by non-hospitalization firm comparisons. In other words, comparing the within-firm changes in operating profitability of event firms (i.e., those with at least one hospital event), we obtain in Columns I, II, and III a performance difference of 1.5, 1.4, and 1.3 percentage points for OROA, industry-adjusted OROA, and industry-adjusted net income to assets, respectively, relative to the same firms in settings where the CEO is healthy. Economically, these performance differences imply reductions in operating profitability of 13-15%, significant at the 1% level.

In Table III, Panel C, we report results from univariate quantile (median) regression analysis performed to test if the differences in operating performance are explained by outliers. Using median analysis, we confirm the three main patterns highlighted above. First, firms with

CEOs who had brief hospital stays are indistinguishable from non-event firms in terms of operating performance. Second, firms whose CEOs experience hospitalizations of at least five days significantly underperform. Third, such underperformance is not explained by industry effects and holds even when we solely focus on within-firm comparisons.

B. Hospitalization Events and Firm Profitability: Regression Analysis

In Table IV, we turn to multivariate analysis to investigate the impact of hospitalization events on firm profitability using both firm fixed and firm-CEO fixed effects specifications.

Firm fixed effects

As a benchmark for analysis, in Column I, we report the impact of the number of days that a CEO spends in the hospital on profitability (OROA) without firm or year controls, but using a firm fixed effect specification. The estimated coefficient is -0.0004, significant at the 1% level. Such estimate implies that a 10 day hospitalization would lead to a decline in OROA of 0.4 percentage points or 4% relative to mean profitability levels. Column II shows that the estimated coefficient on the number of days a CEO spends in the hospital is unaffected by the introduction of firm controls.

In terms of the impact of firm-level variables, firm size (log of lagged assets) and CEO age are correlated with lower OROA levels. Industry profitability (4-digit level) is strongly and positively correlated with firm OROA. In contrast, employment and firm age are insignificant at conventional levels.

Firm-CEO fixed effects

The evidence presented in Columns I and II shows that when firm time-invariant characteristics and other time-varying controls are held constant, CEO hospitalizations affect firm profitability. Firm fixed effects specifications, however, do not allow us to separate whether the results reported are driven by CEO turnover events, which compare outgoing and incoming CEOs, or by the within-CEO variation in CEO exposure that results from hospitalization. A large literature has emphasized the importance of CEO turnover events and of CEO fixed effects in explaining changing firm outcomes.[5] However, in this paper, we seek to estimate the effect of changing CEO productivity and capacity on performance, holding firm and CEO matches constant, which is economically relevant and previously unexplored in the literature. To this end, we rely on firm and CEO fixed effects specifications.

In Table IV, Column III, we show that after controlling for firm and CEO fixed effects ***should it be firm-ceo fixed effect? This is different from ceo and firm fixed effect***, CEO hospitalization events negatively affect profitability. The effect is statistically significant at the 1% level and in terms of magnitude is virtually unchanged relative to the firm fixed effects specifications. However, the economic interpretation of the result is unique. Relative to a given CEO and firm match, firm performance declines whenever a CEO is hospitalized. While intuitive, this result provides striking evidence of the direct impact of CEOs on the organizations they lead. Furthermore, this finding overcomes concerns that the correlation between managerial effects and firm performance, as previously reported in the literature, is driven solely by demand and not supply effects.[6]

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[5] For changes in performance around turnover events see, for example, Johnson et al. (1985), Denis and Denis (1995), Huson, Malatesta, and Parrino (2004), Pérez-González (2006), and Bennedsen et al (2007), among others. For the importance of CEO fixed effects on firm outcomes see Chevalier and Ellison (1999), Bertrand and Schoar (2003), Frank and Goyal (2007), and Graham, Li, and Qiu (2011), among others.

[6] A concern with CEO fixed effects studies stressed by some authors (see, for example, Fee, Hadlock, and Pierce (2010)) is that CEO fixed effects are observed by the board of directors and other market participants. Given that CEOs would tend to be hired

When considering other variables, such as size, industry profitability, and CEO age, their effect on performance is unchanged. Moreover, firm age drops from the analysis, because within firm-CEO groupings, firm age increases one to one with CEO age.

In Table IV, Columns IV and V, we test whether CEO hospitalization effects last beyond the year in which these shocks occur. The results show that lagged hospitalization events continue to affect firm operating performance one year after they occur. The estimated coefficient reported in Column IV is, however, smaller than the one estimated for concurrent hospitalizations. Nevertheless, the effect is negative and statistically significant. In contrast, results in Column V show that two year lags in hospitalization events do not have a significant effect on firm performance.

In Table IV, Columns VI and VII, we examine the effect of hospital stays of different lengths using indicator variables. Specifically, we use dummy variables that indicate whether the CEO had a hospital stay of at least 1, 5, 10, or 30 days, respectively. The results confirm that short hospitalization events (hospital stays of 1 to 4 days) do not have a meaningful impact on firm performance. In contrast, longer hospitalizations are correlated with economically and statistically significant effects on profitability. In Column VI, we show that hospital stays of at least 5 days lead to a decline in OROA of 0.72 percentage points or 7.6%. Hospital stays of 30 or more days suggest even larger effects on firms, but the standard errors on those coefficients are large, preventing us from establishing significant incremental effects relative to firms with 5 to 29 day hospitalizations. In Column VII, we show that 10 day and longer hospital stays are correlated with a decrease in OROA of 1.12 percentage points, a 12% decline in profitability relative to non-event years. As before, the dummy for hospitalizations of 30 or more days is

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precisely because of their known traits, it is empirically challenging to distinguish the effect of CEOs on firm performance that results from demand (firm) or supply (CEO) forces.

negative but insignificant. The latter result may be indicative that long hospital shocks may allow some firms to react and minimize further deterioration of the bottom line.

C. Alternative Specifications

One concern with the evidence thus far presented is that we are only able to identify a firm's CEO in November of each year, and as result, our findings may be subject to a sample selection problem. Specifically, it is plausible that even when hospitalization events are exogenous to firms' investment opportunities, those firms that allow their sick CEOs to remain as top executives until the end of the year are predominantly firms with declining firm prospects. Firms with attractive investment opportunities would arguably replace their CEOs, making the correlation spurious.

To evaluate this concern, we replicate the analysis using hospitalizations of the individual who was reported as CEO of the firm as of November of the prior year. If only relatively weak firms retain their hospitalized CEOs, we would expect insignificant effects on performance using this alternative test. In contrast to this anticipated outcome, the results shown in Table V demonstrate that the impact of CEO hospitalization on profitability is unchanged both for the univariate (Column I) and multivariate (Column II) specifications.[7]

An alternative approach to overcome inference concerns related to the number of days a CEO is in the hospital, is to find a plausibly exogenous variable that captures the severity of the CEO hospitalization shocks but does not condition on the endogenous length of a hospital stay. We argue that the fraction of lengthy hospital stays per medical condition for the entire Danish population is a reasonably proxy for the expected intensity of a medical shock. To test this idea

[7] The number of observations in Table V, Columns I and II, drops from 76,354 to 65,038 as we impose the additional requirement of identifying a CEO with data from a year prior.

empirically, we compute the fraction of patients that spends at least 10 days in the hospital between 1995 and 2007 for each medical condition.[8] We use this variable to predict: (a) the length in days of hospital stays and (b) whether the CEO experiences a 10 day or longer hospitalization, and then use a two-stage least-squares instrumental variable (2SLS-IV) specification to test for the impact of hospitalizations on performance.

As predicted, country-wide variables are strong predictors of CEOs' time spent hospitalized (the value of the univariate first-stage F-test is over 70, results not shown). Using this first-stage variation, we confirm that CEO hospitalization events have a negative effect on operating profitability. The IV estimates shown in Table V, Columns III and IV indicate that the effect of the number of days a CEO spends in the hospital is in the 0.1 percentage point range or 2.5 times the estimates reported in other specifications, significant at the 10% level. An analysis based on the 10 day hospital stay indicator variable shown in Column V arrives at similar conclusions. As is common with IV-2SLS specifications, standard errors are substantially larger than those obtained using fixed effects models because IV estimates rely on a fraction of the data to generate the estimates of interest. As a result, we cannot reject the hypothesis that the OLS fixed effect estimates are different than those reported in this alternative IV specification.

An alternative potential concern with the analysis is that hospital stays may be anticipated and, as a result, we may not be capturing the direct effect of CEO hospitalizations. To address this issue, and to capture the effect of the first hospitalization event occurring to a CEO during the sample period, we set to zero those hospitalization events that occurred to CEOs who had had a previous hospital stay since 1995. Table V, Column VI shows that the effect of the duration of CEO hospitalization on performance is indeed larger in absolute value in the specification

[8] 99 diagnosis based on the International Classification of Diseases of the World Health Organization.

without firm controls, but it is unchanged relative to other estimates once we control for firm characteristics (Column VII).

Overall, the results show that CEO hospitalizations lead to large and significant declines in profitability. These findings provide novel evidence that varying CEO exposure affects performance when controlling for firm-CEO fixed effects, which is a new result in the literature. Moreover, we demonstrate that the results are robust to the inclusion of a battery of controls and specifications. However, while the evidence presented weakens the case that our results are driven by selection in the number of days a CEO is in the hospital, our tests are thus far silent about the potentially mechanical connection between CEO hospitalizations and profitability. Namely, if hospitalizations lead to higher medical bills, the correlation between hospitalization and profits may hold even in a setting where CEOs are irrelevant for performance.

As we previously argued, an attractive feature of our empirical setting is the dominant presence of the public sector in the provision of health services, which suggests that such concerns are minimized in the Danish health care system. Still, to address these concerns more directly we proceed as follows. First, we examine alternative outcome variables that are not directly linked to medical expenses. Second, we revisit our tests using the subsample of CEOs who relied only on public hospitals for their treatment.

D. Alternative Outcome Variables

In Table VI, we investigate the impact of CEO hospital shocks on net income, sales, total assets, and investment rates, both in the concurrent and immediately prior years. For each variable we rely on firm-CEO fixed effect specifications, with and without time-varying firm

controls. Moreover, we report clustered (firm) standard errors to relax the assumption that multiple observations from the same firm are uncorrelated.

As with operating profits, net income also declines as a function of the number of days the CEO is hospitalized. The negative effect of hospitalizations on earnings reported in Table VI, Columns I and II, is both economically and statistically significant. For example, a 10 day hospital stay induces a significant decline in net income of 5%.

The results presented in Table VI, Columns II and IV show that CEO hospitalizations also have a negative effect on firm sales. Both concurrent and lagged hospital stays significantly affect revenues. These findings suggest that the results reported capture the effect of convalescent CEOs whose productive capacity is at least temporarily affected. An increase in medical expenses resulting from hospitalization events cannot, by itself, explain why revenue declines when CEOs are hospitalized.

Columns V to VIII of Table VI show the effect of CEO hospitalization on the level of assets and the rate of investment growth. Both concurrent and lagged hospital stays negatively affect the level of assets. In particular, a 10 day hospitalization event leads to a reduction in assets of at least 1.2%, significant at the 1% level. Lagged hospital shocks also affect assets, with estimates that are at least half of those for concurrent values of that variable. Finally, the number of days that a CEO is hospitalized also has a negative effect on the level of investment. Given the discretionary nature of investment, it is not surprising that such estimates are economically larger: a 10 day hospital stay leads to a decline in investment rates of 0.8-0.9 percentage points or at least 16%.

III. Are CEOs Unique? A Placebo Test Using Senior Managers' Hospitalization Events

The evidence presented in Tables III to VII shows a striking connection between the personal health of a firm's chief executive and its performance. In this section, we test whether CEOs are unique, or if these results also apply to other senior executives. To assess this issue empirically, we test whether the hospitalization events of senior managers have significant consequences for profitability, revenue, and investment policies.

To identify senior executives, we use employment records that contain broad job classifications and we sort employees into three groups according to the seniority of their positions. The first group includes the most senior employees (classified as "top managers" or "high level managers"), the second group includes mid-level employees ("intermediate" positions) and, finally, the third group includes the rest (employees classified as performing "basic" or "other" jobs). Using these data, and for each firm-year observation, we randomly select an employee from the most senior category. With the identity of the senior employee in hand, we obtain matching hospitalization records using the same procedure we followed for the CEOs.

Table VIII reports the impact of senior employees' hospitalization events on firm performance. In Columns I to III, we assess the impact of the number of days in the hospital on operating profitability, the benchmark performance measure used in the preceding section. Interestingly, the effect of a hospital stay by the non-CEOs reported in Column I, while negative, is indistinguishable from zero at conventional levels. We test for the effect of lagged (one and two year) hospitalization events (Column II) and for the effect of 1 and 10 day and longer hospitalization events (Column III). The results are also insignificant.

In Table VIII, Columns IV and V, we report similar results for net income and revenue. In both cases, the estimated coefficients are negative but indistinguishable from zero at conventional levels. Lastly, in Columns VI and VII, we show that investment levels also exhibit insignificant effects.

Taken together, this evidence provides a compelling case for the importance of CEOs for firm performance. Furthermore, the placebo tests shown stress the uniqueness of the CEOs' contributions. These combined results make a strong empirical case for the importance of a comprehensive CEO succession and contingency plan. As we document, the organizational disruption costs that are triggered by even partial illness or disability can be substantial.

IV. CEO Hospitalization Events and Firm Performance

Having established the importance of CEOs for firm prospects, we examine the environments in which CEOs affect performance the most. To this end, we divide event firms into groups based on CEO, firm, and industry characteristics. As before, we explore the consequences of CEO hospitalizations on OROA, net income, revenue, sales, and investment rates.

In the interest of conserving space, in Table IX and X we only report the estimated coefficient of the key variable of interest, i.e., the number of days of hospitalization. Also, to allow for lagged effects on this variable, in this section we redefine this variable to include the number of days in the hospital in the concurrent plus immediately prior years. In consequence, each estimated coefficient in these tables corresponds to a separate fixed (firm-CEO) regression. Results are unchanged when we separately include these variables. As before, we rely on firm-CEO fixed effects to stress deviations in performance that compare each CEO-firm match to the

same CEO-firm combination in periods without a hospitalization. All specifications include controls for year effects, firm size, and mean industry profitability.

A. CEO Characteristics

Table IX, Panel A examines the impact of the number of days a CEO is hospitalized on subsamples grouped by the tenure of the CEO at the time of the initial hospital event. The first row in Table IX reports the impact of CEO hospitalization events on firms with relatively new CEOs. For all performance measures other than investment rate, we show that CEO hospitalizations have an insignificant effect on outcomes for these firms. In contrast, the second row in Panel A shows that for firms with CEOs who had been at the helm for 3 to 7 years prior to their hospitalization, performance—including profitability, revenue, and investment—consistently declines when their CEOs are hospitalized. These drops in performance are significant at the 1% level. The third row in Panel A reports insignificant effects on profitability (OROA and net income) for long-tenured CEOs. However, the estimated coefficients are larger in absolute value, suggesting that there is larger heterogeneity in this subsample. Such evidence is consistent with the idea that a fraction of long-tenured CEOs are entrenched and difficult to fire, while others are highly valuable. Sales and asset tests also yield mixed results. While revenue increases around long-tenured CEO hospitalizations, suggesting that some firms may benefit from CEO hospitalizations, assets exhibit significant declines.

To further explore the effect of CEO tenure, in Table IX, Panel B, we split firms based on whether their CEOs have served past a normal retirement age. However, we find that fewer than 10% of the event firms experienced initial hospitalization events after their CEO was 64 years of age or older. The results in the first row in Table B, shows insignificant effects on those firms.

We also explore whether the results that CEO hospitalizations affect performance can be explained by CEO deaths, which would mean that our findings are not strictly new. To assess this issue, we focus on those firms where a CEO died during the sample period. We identify 176 CEO deaths, and we then separately analyze the hospitalization effects for those firms with at least one CEO death (1,711 firm-years). The results, shown in Table IX, Panel C, indicate that the effect of CEO hospitalization on outcomes is not obtained in that subsample. These results reinforce the idea that the hospitalization-performance tests presented are uncovering a thus far unexplored link between CEOs and firm performance.

Table IX, Panel D presents the results obtained by splitting the sample firms based on the education of their CEOs. We find that firms with college-educated CEOs suffer significant declines in all performance measures when their CEOs are hospitalized. Assuming education proxies for managerial talent, such evidence is consistent with the idea that highly talented CEOs are particularly valuable to the organizations they lead. In contrast, we find significant effects only on assets and investments in the subsample of non-college-educated CEOs.

As a whole, the results of the analysis of CEO characteristics stress that robust managerial effects are found in settings where CEOs are relatively young, college educated, and with intermediate CEO tenures. Additionally, and importantly, we are able to rule out the hypothesis that the results shown are a consequence of CEO deaths, which have been explored in the literature at least since Johnson et al (1985). We examine industry and firm traits next.

B. Industry and Firm Characteristics

In Table X, Panel A, we test whether the industry environment in which the firm operates has a bearing on the results by investigating the cost of having a hospitalized CEO in settings where the industry is rapidly expanding. To this end, we split firms into two groups based on the

aggregate asset growth of its industry (4-digit NACE code) during the sample. The results, reported in the first row of Panel A, indicate that firms that operate in the top half of industry growth exhibit significant performance declines whenever their CEOs are hospitalized; OROA, net income, revenue, assets, and investment rates are all negatively and significantly affected. In contrast, firms in moderate growth industries exhibit less robust effects. While these firms' profitability is significantly depressed by CEO hospital stays, revenue and investment are not robustly affected. These latter results may indicate that CEO actions in low growth industries are potentially more influential in reducing costs rather than expanding operations. As a result, having a hospitalized CEO hurts the bottom line but leaves the scale of operations unaffected.

In Table X, Panel B, we split event firms into two groups based on their firm-level investment rate (up to five year averages, where the data is available) prior to the first hospitalization event. Following the logic in Panel A, we explore whether firms that are engaged in significant expansion campaigns are more likely to suffer significant effects on performance when their CEOs are in the hospital. The results, shown in Panel B, confirm that the performance of high growth firms deteriorates when their CEOs are hospitalized. In contrast, firms in the bottom half of the growth distribution show mixed results. OROA significantly declines, consistent with the idea that CEOs may be crucial for cost cutting in those environments. However, revenue is unaffected, while assets decline with CEO hospital stays.

The results presented in Tables IX and X provide suggestive evidence of the settings in which CEO succession and contingency plans may have the most meaningful effect on performance. For example, the evidence shows that CEOs systematically influence firm outcomes when they are relatively young or when the firm is in a high growth environment. Counterintuitive as it may seem, the evidence shows that succession plans are extremely valuable

in those settings. Furthermore, the results also stress specific variables that may be targeted in designing contingency plans. For example, shielding cost cutting initiatives relative to other policies may be crucial for firms operating in low growth environments.

C. CEO Turnover

The basic tenet of this paper is that hospitalizations affect the productive capacity of CEOs. The evidence thus far presented is consistent with this premise, as it demonstrates that firms whose CEOs experience hospital stays underperform relative to both their peers and their own performance in years without hospital shocks. A further test of this idea is to investigate whether CEO hospitalizations affect turnover decisions. If, as predicted, the effectiveness of CEOs is at least partially reduced by hospitalizations, we would expect that those executives who have experienced a hospital stay will be more likely to exit the labor force than other executives.

In Table XI, we examine the impact of the number of days of hospitalization on CEO turnover outcomes in the subsequent year using both probit (Columns I to IV, which report marginal effects) and fixed-effects specifications (Columns V to VIII). The results show that CEO hospitalizations have a significant effect on CEO turnover that is both economically large and statistically significant. Univariate results, shown in Column I, indicate that 10 day hospital stays lead to a 1.1 percentage point increase in the probability that a CEO is replaced, significant at the 1% level. Economically, this estimate implies an increase in the probability of a CEO turnover of over 25% (turnover occurs in 4% of the firm-year observations). Column II shows that including controls for firm size and profitability, CEO tenure and age, and industry performance reduces the marginal effects by almost half (from 0.11 to 0.06 percentage points per day), but it remains large and significant at the 1% level. Moreover, the effect of these additional variables on turnover is as expected: when controlling for industry profitability, more profitable

and larger firms are less likely to replace their CEOs, while older executives with longer tenure are more likely to be removed. Lastly, fixed effects estimates, reported in Columns V to VII, show that probit estimates are not driven by time-invariant firm characteristics.

In Table XI, Columns III and IV, we examine the duration of hospitalization's effect on turnover events and explore the robustness of the results to changes in the definition of a health shock. Column III shows that hospital stays do not systematically affect CEO turnover events two years after the event. Column IV shows that 10 to 29 day hospitalizations increase the probability of CEO turnover by over 50%, significant at the 1% level. The effect of longer than 30 day hospital stays is not significant at the margin. This result suggests that firms react and replace their CEOs when they have been away from the office for spells of up to a month.

Overall, the results indicate that even moderate-length hospitalization events trigger economically large and statistically significant increases in the probability of CEO turnover, confirming the notion that a CEO's effectiveness is diminished by these shocks. This is the first systematic evidence that a continuous variable reflecting the productive ability of CEOs, such as the number of days hospitalized, affects CEO turnover decisions.

Given the results shown in Table XI, it is relevant to explore whether the performance results reported in this paper hold for those firms without CEO turnover events. Such tests are important, as an established line of research has shown the relevance of CEO turnover events for performance. In contrast, relatively little is known about whether variation in CEO exposure within firm-CEOs pairs matters in the absence of turnover. To evaluate this latter channel, in Table XII we reexamine the analyses shown in Tables IV to VII focusing solely on non-turnover firms. In these tests, we omit firms that experienced both a hospitalization event and a turnover. The results, reported in Table XII, show an across-the-board negative effect of CEO hospital

stays on the profitability, firm size, and investments of non-turnover firms. In short, within firm-CEO matches changes in CEO exposure resulting from hospital stays significantly affect firm performance.

V. Conclusions

Say that within fixed effect firm-CEO match is what theory papers have in mind.

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TABLE I. SUMMARY STATISTICS

This table presents firm characteristics for non-financial, non-utility public limited liability firms in Denmark (A/S) between 1995 and 2007. Firms are classified as: (a) *event* firms (Column II) in cases where their chief executive officer (CEO) was hospitalized at least one day during the sample period according to data from Statistics Denmark, (b) *non-event* (Column III), otherwise. *OROA* is the operating income (Primært resultat) to book value of assets. *Net income to assets* is the ratio of net income (Årets resultat) to book value of assets. Industry-adjusted OROA is the difference between OROA and the average of its four-digit NACE (European industry classification system) benchmark. Revenue (omsætning) is the value of sales in Danish Kroner (DKK) in millions (constant 2008 DKK). *Ln assets* is the natural logarithm of the total book value of assets in millions (2008 DKK). *Ln employment* is the natural logarithm of the total number of employees. *Investment rate* is the rate of growth of total assets. *Firm age* is calculated using the earliest of the year of establishment, registration, or the firms' bylaws. *CEO age* is determined based on information from the Danish Civil Registration System. Standard errors are shown in parentheses.

Variable	All	Event Firms	Non-Event Firms	Difference (II)-(III)
	(I)	(II)	(III)	(IV)
Operating return on assets (OROA)	0.0939 *(0.0010)*	0.0952 *(0.0015)*	0.0931 *(0.0013)*	0.0021 *(0.0020)*
Net income to assets	0.0555 *(0.0008)*	0.0567 *(0.0012)*	0.0547 *(0.0010)*	0.0019 *(0.0015)*
Industry-adjusted OROA	-0.0001 *(0.0010)*	0.0016 *(0.0015)*	-0.0013 *(0.0013)*	0.0029 *(0.0019)*
Revenue	125.6788 *(5.4494)*	125.5483 *(10.1152)*	125.7655 *(6.0903)*	-0.2173 *(11.8063)*
Ln assets	3.2121 *(0.0135)*	3.1979 *(0.0220)*	3.2216 *(0.0171)*	-0.0237 *(0.0279)*
Ln employment	3.5059 *(0.0104)*	3.4893 *(0.0166)*	3.5170 *(0.0134)*	-0.0277 *(0.0213)*
Investment rate	0.0529 *(0.0009)*	0.0497 *(0.0014)*	0.0551 *(0.0012)*	-0.0054 *** *(0.0019)*
Firm age	26.4925 *(0.2326)*	27.6573 *(0.3823)*	25.7180 *(0.2919)*	1.9394 *** *(0.4809)*
CEO age	50.9382 *(0.0866)*	52.1937 *(0.1395)*	50.1034 *(0.1089)*	2.0902 *** *(0.1770)*
Number of observations	76,354	30,493	45,861	
Number of firms	8,798	3,167	5,631	

***, **, and * denote significance at the 1, 5, and 10 percent levels, respectively.

TABLE II. NUMBER OF DAYS OF HOSPITAL STAY AND MEDICAL CONDITIONS

This table presents hospitalization data for Chief Executive Officers (CEOs) of non-financial, non-utility public limited liability firms in Denmark (A/S) between 1995 and 2007. Data are classified by medical condition (main sickness) based on the *International Classification of Diseases* of the World Health Organization. Hospital data are constructed based on records from Statistics Denmark, which reports the number of days that an individual was hospitalized and reported as sick in a year.

Main Medical Condition	Number of Days of Hospital Stay					
	All	1	2-4	5-9	10-19	over 20
	(I)	(II)	(III)	(IV)	(V)	(VI)
All firm-years	76,354					
No hospital stay	71,411					
Hospital stay	4,943	1,921	1,441	846	478	257
Infectious and parasitic diseases	120	27	43	28	15	7
Neoplasms	374	90	88	73	56	67
Endocrine, nutritional and metabolic diseases, and immunity disorders	64	15	19	24	4	2
Diseases of the blood / blood-forming organs	16	6	3	2	3	2
Mental disorders	26	10	8	5	2	1
Diseases of the nervous system / sense organs	234	89	76	42	18	9
Diseases of the circulatory system	1026	270	284	229	168	75
Diseases of the respiratory system	242	86	87	35	23	11
Diseases of the digestive system	610	237	190	106	58	19
Diseases of the genitourinary system	319	112	113	69	18	7
Pregnancy, childbirth, post-natal complications	5	5	0	0	0	0
Diseases of the skin and subcutaneous tissue	81	31	26	12	6	6
Diseases of the musculoskeletal system and connective tissue	416	172	100	79	45	20
Congenital anomalies	18	9	4	2	3	0
Symptoms, signs, and ill-defined conditions	836	486	242	73	23	12
Injury and poisoning	556	276	158	67	36	19

TABLE III. NUMBER OF DAYS OF HOSPITAL STAY AND FIRM PERFORMANCE: TABLE OF MEANS

This table presents: (1) average performance measures as a function of the number of days that a firm's CEO stayed in the hospital in a given year (Panel A), (2) differences of means analysis (Panel B), and (3) results from quantile (median) regressions (Panel C). Performance measures include: (a) OROA: operating return on assets (Column I), the ratio of operating income to total assets, (b) Industry-adjusted OROA (Column II): the difference between a firm's OROA and the average of its four-digit NACE (European industry classification system) industry benchmark, and (c) Industry-adjusted net income (Column III): the difference between a firm's net income to assets ratio and the average of its four-digit NACE benchmark. Industry averages are calculated using firm-year observations where CEOs were not hospitalized. Hospital day data are constructed based on hospitalization records from Statistics Denmark, which reports the number of days that an individual was hospitalized and reported as sick in a year. Standard errors are shown in parentheses.

		Dependent variables		
		OROA	**Ind Adj. OROA**	**Ind. Adj. NI/Assets**
	Firm-Years	(I)	(II)	(III)
All firm-years	76,354	0.0939	-0.0001	-0.0002
		(0.0010)	*(0.0010)*	*(0.0007)*
Panel A. By number of days of hospital stay				
A. 0 days	71,411	0.0941	0.000002	-0.0001
		(0.0010)	*(0.0010)*	*(0.0008)*
B. 1 day	1,921	0.0964	0.0023	0.0038
		(0.0033)	*(0.0033)*	*(0.0027)*
C. 2-4 days	1,441	0.0974	0.0027	0.0020
		(0.0036)	*(0.0036)*	*(0.0031)*
D. 5-9 days	846	0.0830	-0.0098	-0.0100
		(0.0044)	*(0.0044)*	*(0.0037)*
E. 10-19 days	478	0.0770	-0.0143	-0.0098
		(0.0055)	*(0.0055)*	*(0.0049)*
F. At least 20 days	257	0.0785	-0.0167	-0.0149
		(0.0089)	*(0.0089)*	*(0.0076)*
G. 0-4 days, all firms	74,773	0.09419	0.00011	0.00003
(A+B+C)		*(0.00098)*	*(0.00096)*	*(0.00075)*
H. 0-4 days, event fims	28,630	0.0959	0.0022	0.0021
		(0.0015)	*(0.0015)*	*(0.0012)*
I. At least 5 days	1,581	0.0805	-0.0123	-0.0107
(D+E+F)		*(0.0034)*	*(0.0034)*	*(0.0029)*
Panel B. Differences of Means				
J. 1 vs. 0 days		0.0023	0.0023	0.0039
(B) minus (A)		*(0.0032)*	*(0.0032)*	*(0.0027)*
K. At least 5 days *minus* 0-4 days		-0.0137 ***	-0.0124 ***	-0.0108 ***
(I) minus (G)		*(0.0034)*	*(0.0034)*	*(0.0029)*
L. At least 5 days *minus* 0-4 days,		-0.0154 ***	-0.0144 ***	-0.0128 ***
event firms only, *(I) minus (H)*		*(0.0033)*	*(0.0033)*	*(0.0029)*
Panel C. Median Analysis				
M. 1 vs. 0 days		0.0040	0.0020	0.0027
		(0.0025)	*(0.0022)*	*(0.0019)*
N. At least 5 days *minus* 0-4 days		-0.0076 ***	-0.0079 ***	-0.0062 ***
		(0.0027)	*(0.0025)*	*(0.0021)*
O. At least 5 days *minus* 0-4 days,		-0.0083 ***	-0.0088 ***	-0.0074 ***
event firms only		*(0.0026)*	*(0.0024)*	*(0.0022)*

***, **, and * denote significance at the 1, 5, and 10 percent levels, respectively.

TABLE IV. THE IMPACT OF CEO HOSPITALIZATION EVENTS ON FIRM PERFORMANCE

This table examines the impact of CEO hospitalization events on firm operating performance. The dependent variable is *operating return on assets* (OROA), defined as the ratio of operating income to total assets. Hospital day data are constructed based on records from Statistics Denmark, which reports the number of days that an individual was hospitalized and reported as sick in a given year. *N days of hospital stay, t*, is the number of days of hospital stay for a CEO in a given year. *N days of hospital stay, t-1 and t-2*, are the number of days of hospital stay for a CEO in the year (two years) prior, respectively. *At least 1, 5, 10 and 30 days hospitalized*, are indicator variables equal to one if a given CEO experienced a hospital stay of 1, 5, 10, or 30 days, respectively, in a given year, zero otherwise. Other controls where shown include: (i) *Ln assets*: the natural logarithm of the lagged value of total assets (in DKK millions), (ii) *Ln employment*: the natural logarithm of the lagged value of number of employees, (iii) *Industry OROA*: the average operating return on assets of the firm's four-digit NACE industry benchmark, (iv) *CEO age*: the age of the incumbent CEO, and (v) *Firm age*: calculated using the earliest of the year of establishment, registration, or the firms' bylaws. Each column shows the results of a separate fixed effect regression using, respectively: (a) firm fixed effects (Columns I and II), and (b) firm-CEO fixed effects (Columns III to VII). Clustered (firm) standard errors are shown in parentheses.

	Dependent variable: Operating Return on Assets (OROA)						
	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)
N days of hospital stay, t	-0.0004 ***	-0.0004 ***	-0.0004 ***	-0.0004 **	-0.0004 ***		
	(0.0001)	*(0.0001)*	*(0.0001)*	*(0.0001)*	*(0.0001)*		
N days of hospital stay, t-1				-0.0002 **	-0.0003 ***		
				(0.0001)	*(0.0001)*		
N days of hospital stay, t-2					-0.0001		
					(0.0001)		
At least 1 day hospitalized, t						0.0030	0.0023
						(0.0019)	(0.0018)
At least 5 days hospitalized, t						-0.0072 **	
						(0.0032)	
At least 10 days hospitalized, t							-0.0112 ***
							(0.0039)
At least 30 days hospitalized, t						-0.0110	-0.0066
						(0.0116)	(0.0117)
Ln assets		-0.0222 ***	-0.0241 ***	-0.0241 ***	-0.0241 ***	-0.0240 ***	-0.0240 ***
		(0.0024)	*(0.0026)*	*(0.0026)*	*(0.0026)*	*(0.0026)*	*(0.0026)*
Ln employment		0.0017	0.0019	0.0019	0.0018	0.0018	0.0018
		(0.0021)	*(0.0022)*	*(0.0022)*	*(0.0022)*	*(0.0022)*	*(0.0022)*
Industry OROA		0.8914 ***	0.8895 ***	0.8896 ***	0.8897 ***	0.8895 ***	0.8891 ***
		(0.0370)	(0.0386)	(0.0386)	(0.0386)	(0.0386)	(0.0386)
CEO age		-0.0006 ***	-0.0008 ***	-0.0008 ***	-0.0007 ***	-0.0008 ***	-0.0008 ***
		(0.0001)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Firm age		-0.0001					
		(0.0002)					
Year controls	No	Yes	Yes	Yes	Yes	Yes	Yes
Fixed effect	Firm	Firm	Firm-CEO	Firm-CEO	Firm-CEO	Firm-CEO	Firm-CEO
Number of firm-years	76,354	76,354	76,354	76,354	76,354	76,354	76,354
R-squared	0.4791	0.5031	0.5440	0.5440	0.5441	0.5440	0.5440

***, **, and * denote significance at the 1, 5, and 10 percent levels, respectively.

TABLE V. CEO HOSPITALIZATION EVENTS AND FIRM PERFORMANCE: ALTERNATIVE SPECIFICATIONS

This table examines the impact of CEO hospitalization events on operating return on assets (OROA). OROA is defined as the ratio of operating income to total assets. *N days of hospital stay:* is the number of days of hospital stay for a CEO in a given year. *At least 10 days hospitalized*: is an indicator variable equal to one if a given CEO experienced a hospital stay of 10 days in a given year, zero otherwise. Columns I and II show results for CEO hospitalization events occurring to the individual that was reported as CEO of the firm as of November of the prior year. Columns III to V show results of IV-2SLS specifications in which the number of days of hospital stay occurring to the individual that was reported as CEO of the firm in a given year is instrumented by the fraction of patients that spend at least 10 days at the hospital for a given medical condition (99 diagnosis) between 1995 and 2007 for the entire Danish population. Columns VI and VII show results for CEO hospitalization events occurring to the individual that was reported as CEO of the firm in a given year, except for hospitalization events that occur to CEOs who had a previous hospital stay since 1995, which are set to zero. Columns VI and VII seek to capture the effect of the first hospitalization event occurring to a CEO during the sample period. Additional controls in Columns II, IV, V, and VII include (estimated coefficients are not shown): (i) *Ln assets*: the natural logarithm of the lagged value of total assets (in DKK millions), (ii) *Ln employment*: the natural logarithm of the lagged value of number of employees, (iii) *Mean industry OROA*: the average operating return on assets of the firm's four-digit NACE industry benchmark, and (iv) year indicator variables. Each column shows results for a separate fixed effect (firm-CEO) specification. The number of observations in Columns I and II reflects the additional requirement of identifying a CEO using data from a year prior. In Columns III to V, nine observations for which no within firm variation exists drop from the analysis. Clustered (firm) standard errors are shown in parentheses.

	Dependent variable: Operating Return on Assets (OROA)						
	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)
N days of hospital stay	-0.0004 ***	-0.0004 **	-0.0011 *	-0.0010 *		-0.0005 ***	-0.0004 **
	(0.0001)	*(0.0002)*	*(0.0006)*	*(0.0006)*		*(0.0002)*	*(0.0002)*
At least 10 days hospitalized					-0.0337 *		
					(0.0204)		
Year controls	No	Yes	No	Yes	Yes	No	Yes
Firm controls	No	Yes	No	Yes	Yes	No	Yes
Firm-CEO fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
IV-2SLS	No	No	Yes	Yes	Yes	No	No
Number of firm-years	65,038	65,038	76,345	76,345	76,345	76,354	76,354

***, **, and * denote significance at the 1, 5, and 10 percent levels, respectively.

TABLE VI. THE IMPACT OF CEO HOSPITALIZATION EVENTS ON FIRM PERFORMANCE: ALTERNATIVE OUTCOME VARIABLES

This table examines the impact of CEO hospitalization events on: (a) *Net income/assets* (Columns I and II): the ratio of net income to total assets, (b) *Ln revenue* (Columns III and IV): the natural logarithm of sales in DKK millions, (c) *Ln assets* (Columns V and VI): the natural logarithm of total book value of assets in DKK millions, and (d) *Investment rate* (Columns VII and VIII): the rate of growth of total assets. *N days of hospital stay, t*, is the number of days of hospital stay for a CEO in a given year. *N days of hospital stay, t-1* is the number of days of hospital stay for a CEO in the prior year. All specifications include year indicator variables as controls (results not shown). Additional controls in Columns II, IV, VI and VII include: (i) *Ln employment*: the natural logarithm of the lagged value of number of employees, and (ii) *Mean industry net income to assets ratio*: the mean ratio of net income to total assets of the firm's four-digit NACE industry benchmark (estimated coefficients are not shown). Columns II, IV, and VIII also include *Ln assets*: the natural logarithm of the lagged value of total assets (in DKK millions) as an additional control variable. Each column shows results for a separate fixed effect (firm-CEO) specification. Clustered (firm) standard errors are shown in parentheses.

	Dependent variables							
	Net income / Assets		***Ln Revenue***		***Ln Assets***		***Investment Rate***	
	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)
N days of hospital stay, t	-0.0003 **	-0.0003 ***	-0.0006 *	-0.0006 *	-0.0012 ***	-0.0013 ***	-0.0008 ***	-0.0009 ***
	(0.0001)	*(0.0001)*	*(0.0004)*	*(0.0003)*	*(0.0004)*	*(0.0003)*	*(0.0003)*	*(0.0002)*
N days of hospital stay, t-1	-0.0001	-0.0001	-0.0007 **	-0.0005 **	-0.0008 ***	-0.0007 ***	-0.0002	-0.0004
	(0.0001)	*(0.0001)*	*(0.0003)*	*(0.0002)*	*(0.0003)*	*(0.0002)*	*(0.0003)*	*(0.0003)*
Year controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	No	Yes	No	Yes	No	Yes	No	Yes
Firm-CEO fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of firm-years	76,354	76,354	76,354	76,354	76,354	76,354	76,354	76,354
R-squared	0.4917	0.5050	0.9260	0.9533	0.9490	0.9588	0.2025	0.3060

***, **, and * denote significance at the 1, 5, and 10 percent levels, respectively.

TABLE VII. CEO HOSPITALIZATION AND FIRM PERFORMANCE: PUBLIC HOSPITALS

This table examines the impact of CEO hospitalization events on firm performance for the subsample that excludes observations in which the CEO is replaced after being hospitalized. The dependent variables are: (a) *Operating return on assets* (OROA) (Column I): the ratio of operating income to total assets, (b) *Net income to assets* (Column II): the ratio of net income to total assets, (c) *Ln revenue* (Column III): the natural logarithm of sales in DKK millions, (d) *Ln assets* (Column IV): the natural logarithm of total book value of assets in DKK millions, and (e) *Investment rate* (Column V): the rate of growth of total assets. *N days of hospital stay, t*, is the number of days of hospital stay for a CEO in a given year. *N days of hospital stay, t-1* is the number of days of hospital stay for a CEO in the prior year. All specifications include the following variables as controls (estimated coefficients not shown): (i) *Ln assets*: the natural logarithm of the lagged value of total assets in DKK millions (except for Column IV, where it is omitted), (ii) *Ln employment*: the natural logarithm of the lagged value of number of employees, (iii) *Mean industry OROA*: the average operating return on assets of the firm's four-digit NACE industry benchmark, and (iv) year controls. Each column shows results for a separate fixed effect (firm-CEO) specification. Clustered (firm) standard errors are shown in parentheses.

	Dependent variables				
	OROA	***NI/Assets***	***Ln Rev.***	***Ln Assets***	***Inv. Rate***
	(I)	(II)	(III)	(IV)	(V)
N days of hospital stay, t	-0.0004 **	-0.0003 **	-0.0006 *	-0.0010 ***	-0.0011 ***
	(0.0002)	*(0.0001)*	*(0.0004)*	*(0.0003)*	*(0.0003)*
N days of hospital stay, t-1	-0.0003 ***	-0.0002 *	-0.0005 ***	-0.0005	-0.0004
	(0.0001)	*(0.0001)*	*(0.0002)*	*(0.0003)*	*(0.0003)*
Year controls	Yes	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes	Yes
Firm-CEO fixed effects	Yes	Yes	Yes	Yes	Yes
Number of firm-years	73,388	73,388	73,388	73,388	73,388
R-squared	0.5432	0.5018	0.9521	0.9771	0.3041

***, **, and * denote significance at the 1, 5, and 10 percent levels, respectively.

TABLE VIII. ARE CEOS UNIQUE? OTHER MANAGERS' HOSPITALIZATION EVENTS AND FIRM PERFORMANCE

This table examines the impact of senior manager's (non-CEO) hospitalization events on: (a) *Operating return on assets* (OROA) (Columns I to III): the ratio of operating income to total assets, (b) *Net income to assets* (Column IV): the ratio of net income to total assets, (c) *Ln revenue* (Column V): the natural logarithm of sales in DKK millions, (d) *Ln assets* (Column VI): the natural logarithm of total book value of assets in DKK millions, and (e) *Investment rate* (Column VII): the rate of growth of total assets. Hospital day data are constructed based on records from Statistics Denmark, which reports the number of days that an individual was hospitalized and reported as sick in a given year. For each firm-year observation, we: (1) use employment data and randomly select a non-CEO senior manager, and (2) obtain matching hospitalization data from Statistics Denmark. *N days of hospital stay, t*, is the number of days of hospital stay for the randomly selected senior manager in a given year. *N days of hospital stay, t-1 and t-2*, are the number of days of hospital stay for the randomly selected senior manager in the year (two years) prior, respectively. *At least 1 and 10 days hospitalized*: are indicator variables equal to one if the randomly selected senior manager experienced a hospital stay of 1 or 10 days, respectively, in a given year, and zero otherwise. All specifications include the following variables as controls (estimated coefficients not shown): (i) *Ln assets*: the natural logarithm of the lagged value of total assets in DKK millions (except for Column VI, where it is omitted), (ii) *Ln employment*: the natural logarithm of the lagged value of number of employees, (iii) *Mean industry OROA*: the average operating return on assets of the firm's four-digit NACE industry benchmark, and (iv) year controls. Each column shows results for a separate fixed effect (firm) specification. Clustered (firm) standard errors are shown in parentheses.

	Dependent variables						
	OROA			***NI/Assets***	***Ln Rev.***	***Ln Assets***	***Inv. Rate***
	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)
N days of hospital stay, t	-0.00020 *(0.00017)*	-0.00020 *(0.00017)*		-0.00007 *(0.00016)*	-0.00029 *(0.00050)*	-0.00069 *(0.00044)*	-0.00041 *(0.00032)*
N days of hospital stay, t-1		0.00023 *(0.00023)*					
N days of hospital stay, t-2		-0.00021 *(0.00033)*					
At least 1 day hospitalized, t			0.00375 *(0.00288)*				
At least 10 days hospitalized, t			-0.00972 *(0.00741)*				
Year controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of firm-years	76,354	76,354	76,354	76,354	76,354	76,354	76,354
R-squared	0.50266	0.50267	0.50267	0.45760	0.94732	0.95075	0.26392

***, **, and * denote significance at the 1, 5, and 10 percent levels, respectively.

TABLE IX. CEO HOSPITALIZATION EVENTS ON FIRM PERFORMANCE: CEO CHARACTERISTICS

This table examines the impact of CEO hospitalization events on firm performance when event firms are classified into subsamples based on a number of CEO's individual characteristics at the time of the initial hospitalization event (non-event firms are omitted from the analysis). The dependent variables are: (a) *Operating return on assets* (OROA) (Column I): the ratio of operating income to total assets, (b) *Net income to assets* (Column II): the ratio of net income to total assets, (c) *Ln revenue* (Column III): the natural logarithm of sales in DKK millions, (d) *Ln assets* (Column IV): the natural logarithm of total book value of assets in DKK millions, and (e) *Investment rate* (Column V): the rate of growth of total assets. Each estimated coefficient in the table reports the effect of *N days of hospital stay*, the number of days of hospital stay for a CEO in the current and immediately prior years on each of the outcome variables. Each estimated coefficient corresponds to a separate regression that results from a fixed effects (firm-CEO) specification. Individual characteristics include: (1) *CEO tenure* (Panel A): is the number of years since the individual first appears as CEO of the firm, (b) *CEO age* (Panel B): the age of the CEO at the time of the initial hospitalization event, (c) *CEO status* (Panel C): whether the CEO was alive or passed away during the hospitalization year based on data from the Danish Civil Registration System, and (d) *CEO education* (Panel D): whether or not the CEO obtained a college education based on data from Statistics Denmark. All specifications include the following variables as controls (estimated coefficients not shown): (i) *Ln assets*: the natural logarithm of the lagged value of total assets in DKK millions (except for Column IV, where it is omitted), (ii) *Ln employment*: the natural logarithm of the lagged value of number of employees, (iii) *Mean industry OROA*: the average operating return on assets of the firm's four-digit NACE industry benchmark, and (iv) year controls. Clustered (firm) standard errors are shown in parentheses.

		Dependent variables				
		OROA	***NI/Assets***	***Ln Revenue***	***Ln Assets***	***Inv. Rate***
	Firm-Years	(I)	(II)	(III)	(IV)	(V)
Panel A. By CEO Tenure Characteristics						
Tenure ≤ 2	8,406	-0.0002	-0.00003	-0.0003	-0.0004	-0.0008 **
		(0.0003)	*(0.0003)*	*(0.0006)*	*(0.0006)*	*(0.0004)*
2< Tenure ≤ 7	15,013	-0.0003 ***	-0.0003 ***	-0.0008 ***	-0.0009 ***	-0.0006 **
		(0.0001)	*(0.0001)*	*(0.0003)*	*(0.0002)*	*(0.0002)*
Tenure > 8	6,792	-0.0005	-0.0004	0.0012 *	-0.0027 ***	-0.0005
		(0.0004)	*(0.0003)*	*(0.0007)*	*(0.0009)*	*(0.0006)*
Panel B. By CEO Age						
Age ≥ 64	2,847	-0.0004	-0.0004	0.0004	-0.0008	-0.0003
		(0.0004)	*(0.0003)*	*(0.0008)*	*(0.0007)*	*(0.0004)*
Age < 64	27,364	-0.0003 ***	-0.0002 **	-0.0006 **	-0.0010 ***	-0.0007 ***
		(0.0001)	*(0.0001)*	*(0.0002)*	*(0.0002)*	*(0.0002)*
Panel C. By CEO Status						
CEO passed away	1,142	-0.0001	0.00001	-0.0004	-0.0001	0.0001
		(0.0004)	*(0.0003)*	*(0.0008)*	*(0.0009)*	*(0.0005)*
CEO is alive	29,069	-0.0003 ***	-0.0003 ***	-0.0005 **	-0.0011 ***	-0.0007 ***
		(0.0001)	*(0.0001)*	*(0.0002)*	*(0.0002)*	*(0.0002)*
Panel D. By CEO Education						
College	9,492	-0.0004 ***	-0.0003 ***	-0.0005 **	-0.0011 ***	-0.0005 **
		(0.0001)	*(0.0001)*	*(0.0002)*	*(0.0003)*	*(0.0002)*
Non-College	20,719	-0.0002	-0.0002	-0.0005	-0.0009 **	-0.0007 ***
		(0.0002)	*(0.0001)*	*(0.0004)*	*(0.0004)*	*(0.0003)*

***, **, and * denote significance at the 1, 5, and 10 percent levels, respectively.

TABLE X. WHAT ACTIONS DO CEOS PERFORM?

This table examines the impact of CEO hospitalization events on firm performance when event firms are classified into subsamples based on their industry (Panel A) and firm (Panel B) relative growth prospects (non-event firms are omitted from the analysis). The dependent variables are: (a) *Operating return on assets* (OROA) (Column I): the ratio of operating income to total assets, (b) *Net income to assets* (Column II): the ratio of net income to total assets, (c) *Ln revenue* (Column III): the natural logarithm of sales in DKK millions, (d) *Ln assets* (Column IV): the natural logarithm of total book value of assets in DKK millions, and (e) *Investment rate* (Column V): the rate of growth of total assets. Each estimated coefficient in the table reports the effect of *N days of hospital stay*, the number of days of hospital stay for a CEO in the current and immediately prior years on each of the outcome variables. Each estimated coefficient corresponds to a separate regression that results from a fixed effects (firm-CEO) specification. In Panel A, event firms are classified into the "high" (low) industry growth grouping whenever the aggregate rate of growth in the industry (four-digit NACE classification) value of total assets was above (below) the median of the sample for the 1995-2007 period. In Panel B, event firms are classified into the "high" (low) firm growth category whenever the firm five-year average investment rate prior to the hospitalization event was above (below) the median. All specifications include the following variables as controls (estimated coefficients not shown): (i) *Ln assets*: the natural logarithm of the lagged value of total assets in DKK millions (except for Column IV, where it is omitted), (ii) *Ln employment*: the natural logarithm of the lagged value of number of employees, (iii) *Mean industry OROA*: the average operating return on assets of the firm's four-digit NACE industry benchmark, and (iv) year controls. Clustered (firm) standard errors are shown in parentheses.

		Dependent variables				
		OROA	***NI/Assets***	***Ln Revenue***	***Ln Assets***	***Inv. Rate***
	Firm-Years	(I)	(II)	(III)	(IV)	(V)
Panel A. By Industry Growth						
High industry growth	14,977	-0.0003 ***	-0.0002 **	-0.0006 **	-0.0012 ***	-0.0007 **
		(0.0001)	*(0.0001)*	*(0.0002)*	*(0.0003)*	*(0.0003)*
Low industry growth	15,234	-0.0003 *	-0.0003 *	-0.0002	-0.0003	-0.0004
		(0.0002)	*(0.0002)*	*(0.0005)*	*(0.0005)*	*(0.0002)*
Panel B. By Firm Growth						
High firm growth	15,102	-0.0003 **	-0.0002 **	-0.0008 ***	-0.0006 ***	-0.0007 ***
		(0.0001)	*(0.0001)*	*(0.0003)*	*(0.0002)*	*(0.0003)*
Low firm growth	15,109	-0.0005 **	-0.0003	0.0003	-0.0016 ***	-0.0003
		(0.0002)	*(0.0002)*	*(0.0005)*	*(0.0006)*	*(0.0003)*

***, **, and * denote significance at the 1, 5, and 10 percent levels, respectively.

TABLE XI. CEO HOSPITALIZATION AND CEO TURNOVER DECISIONS

This table examines the impact of CEO hospitalization events on CEO turnover. The dependent variable is *CEO Turnover*: an indicator variable equal to one whenever the CEO is replaced. *N days of hospital stay*: is the number of days of hospital stay for a CEO in a given year. *At least 10 and 30 days hospitalized*: are indicator variables equal to one if a given CEO experienced a hospital stay of 10, or 30 days, respectively, zero otherwise. $_{t=-1}$ and $_{t=-2}$ subscripts indicate hospitalization values corresponding to the year and two years prior, respectively, to the relevant firm-year observation. Other controls include: (i) *Ln assets*$_{t=-1}$: the lagged value of the natural logarithm of total assets (in DKK millions), (ii) *OROA*$_{t=-1}$ and *OROA*$_{t=-2}$, the lagged and two-year lagged values of the ratio of operating income to total assets, (iii) *Industry OROA* $_{t=-1}$: the lagged value of the average operating return on assets of the firm's four-digit NACE industry benchmark, (iv) *CEO tenure*: the number of years since the CEO first appears as such in the sample, and (v) *CEO age*: the age of the CEO. All specifications except for Columns I and V include year controls. Columns I to IV report changes in probabilities estimated using a maximum-likelihood probit model. Columns V to VIII report fixed effects (firm) estimates. Clustered (firm) standard errors are shown in parentheses.

	Dependent variable: CEO Turnover							
	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)
N days of hospital stay, $_{t=-1}$	0.0011 ***	0.0006 ***	0.0006 ***		0.0028 ***	0.0020 ***	0.0020 ***	
	(0.0003)	*(0.0002)*	*(0.0002)*		*(0.0009)*	*(0.0007)*	*(0.0007)*	
N days of hospital stay, $_{t=-2}$			0.0001				0.0002	
			(0.0001)				*(0.0003)*	
At least 10 days hospitalized, $_{t=-1}$				0.0245 ***				0.0463 ***
				(0.0088)				*(0.0157)*
At least 30 days hospitalized, $_{t=-1}$				0.0195				0.0375
				(0.0125)				*(0.0311)*
Ln assets, $_{t=-1}$		0.0042 ***	0.0042 ***	0.0042 ***		-0.0091 ***	-0.0091 ***	-0.0092 ***
		(0.0005)	*(0.0005)*	*(0.0005)*		*(0.0030)*	*(0.0030)*	*(0.0030)*
OROA, $_{t=-1}$		-0.0283 ***	-0.0283 ***	-0.0280 ***		-0.0411 ***	-0.0411 ***	-0.0414 ***
		(0.0058)	*(0.0058)*	*(0.0058)*		*(0.0099)*	*(0.0099)*	*(0.0099)*
OROA, $_{t=-2}$		0.0016	0.0016	0.0015		-0.0021	-0.0021	-0.0024
		(0.0060)	*(0.0060)*	*(0.0059)*		*(0.0094)*	*(0.0094)*	*(0.0094)*
Industry OROA, $_{t=-1}$		0.0730 ***	0.0730 ***	0.0720 ***		0.1261 *	0.1258 *	0.1260 *
		(0.0263)	*(0.0263)*	*(0.0262)*		*(0.0661)*	*(0.0661)*	*(0.0661)*
Tenure		0.0011 ***	0.0011 ***	0.0011 ***		0.0258 ***	0.0258 ***	0.0258 ***
		(0.0002)	*(0.0002)*	*(0.0002)*		*(0.0008)*	*(0.0008)*	*(0.0008)*
CEO age		0.0015 ***	0.0015 ***	0.0015 ***		0.0032 ***	0.0032 ***	0.0032 ***
		(0.0001)	*(0.0001)*	*(0.0001)*		*(0.0003)*	*(0.0003)*	*(0.0003)*
Year controls	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Specification	Probit	Probit	Probit	Probit	FE	FE	FE	FE
Number of firm-years	67,556	67,556	67,556	67,556	67,556	67,556	67,556	67,556

***, **, and * denote significance at the 1, 5, and 10 percent levels, respectively.

TABLE XII. CEO HOSPITALIZATION EVENTS AND FIRM PERFORMANCE: EVIDENCE FROM NON-TURNOVER FIRMS

This table examines the impact of CEO hospitalization events on firm performance for the subsample that excludes observations in which the CEO is replaced after being hospitalized. The dependent variables are: (a) *Operating return on assets* (OROA) (Column I): the ratio of operating income to total assets, (b) *Net income to assets* (Column II): the ratio of net income to total assets, (c) *Ln revenue* (Column III): the natural logarithm of sales in DKK millions, (d) *Ln assets* (Column IV): the natural logarithm of total book value of assets in DKK millions, and (e) *Investment rate* (Column V): the rate of growth of total assets. *N days of hospital stay, t*, is the number of days of hospital stay for a CEO in a given year. *N days of hospital stay, t-1* is the number of days of hospital stay for a CEO in the prior year. All specifications include the following variables as controls (estimated coefficients not shown): (i) *Ln assets*: the natural logarithm of the lagged value of total assets in DKK millions (except for Column IV, where it is omitted), (ii) *Ln employment*: the natural logarithm of the lagged value of number of employees, (iii) *Mean industry OROA*: the average operating return on assets of the firm's four-digit NACE industry benchmark, and (iv) year controls. Each column shows results for a separate fixed effect (firm-CEO) specification. Clustered (firm) standard errors are shown in parentheses.

	Dependent variables				
	OROA	***NI/Assets***	***Ln Rev.***	***Ln Assets***	***Inv. Rate***
	(I)	(II)	(III)	(IV)	(V)
N days of hospital stay, t	-0.0004 **	-0.0003 **	-0.0006 *	-0.0010 ***	-0.0011 ***
	(0.0002)	*(0.0001)*	*(0.0004)*	*(0.0003)*	*(0.0003)*
N days of hospital stay, t-1	-0.0003 ***	-0.0002 *	-0.0005 ***	-0.0005	-0.0004
	(0.0001)	*(0.0001)*	*(0.0002)*	*(0.0003)*	*(0.0003)*
Year controls	Yes	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes	Yes
Firm-CEO fixed effects	Yes	Yes	Yes	Yes	Yes
Number of firm-years	73,388	73,388	73,388	73,388	73,388
R-squared	0.5432	0.5018	0.9521	0.9771	0.3041

***, **, and * denote significance at the 1, 5, and 10 percent levels, respectively.