CEO Health and Corporate Governance*

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Abstract

Boards hire and fire CEOs based on imperfect information. Using comprehensive data on 28 cohorts in Sweden, we analyze the role of a potentially important attribute—CEO health—in corporate governance. Boards hire CEOs who are healthier than other high-skill professionals, in particular in mental health. After hiring, CEOs' health develops similarly to a control group of executives. Health predicts turnover, measured at appointment and during tenure. These results are consistent with boards appointing CEOs with health robust enough to withstand the pressures of the job, correcting mismatches occurring at the time of appointment, and responding expediently to health shocks.

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1. Introduction

Boards of directors appoint Chief Executive Officers (CEOs) with some knowledge of their traits, skill sets, and the types of policies they are likely to adopt. The screening of CEO candidates may be far from perfect, however.[1] Sometimes, the CEO turns out to be a poor fit with the firm, resulting in a clash of vision or personalities with the board. Other times, the qualifications of the CEO turn out to be worse than what they seemed on paper, or the candidate withholds important information on her ability to meet the challenges of the job. One potentially important piece of such information is health.[2] Health is a personal matter, and thus hard to verify at the time of hiring. Its private nature also limits board's ability to know how healthy the CEO is while in the job, and whether the policies the firm adopts are a result of poor CEO health.

Despite the potential importance of health on executive careers and firm policies, little evidence exists on executives' health and in particular on their mental health. In a recent review of the occupational health literature on leaders' mental health, Barling and Cloutier (2017) conclude that "little is known about leaders' physical health" and that "leaders' mental health remains largely unexplored." The dearth of evidence reflects lack of data: the executive may not wish to disclose the details of her condition even if it is value relevant.[3]

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[1] The assignment models in Gabaix and Landier (2008), Terviö (2008), and Bandiera et al. (2015) assume a frictionless executive labor market. Bandiera et al. (2019) use a model in which CEOs have private information about their types and show mismatches are quantitatively important in the data. Adams, Hermalin, and Weisbach (2010) and Hermalin and Weisbach (2017) provide surveys on the role of boards in corporate governance and on top executive assessment.

[2] The financial press has reported many examples where the top executive of a large firm has been unable to function due to a health crisis. These examples include CEOs of Akzo, Lloyds, Pfizer, and Tokyo Electric Power taking leave or resigning due to fatigue, stress, overwork, and lack of sleep (Goff and Jenkins, 2011; Hill, 2012).

[3] In the recent death of Fiat Chrysler's Sergio Marchionne, the public and the company were not informed of the seriousness of the CEO's health problems until he was on his deathbed (Ball and Sylvers, 2018; Coppola, Ebhardt, Campbell, 2018). Larcker and Tayan (2011) describe the deficiencies in the disclosure of former Apple CEO Steve Jobs's health.

In this paper, we study the role of CEO health in corporate governance using a unique combination of career, health, and firm data from 28 cohorts of the Swedish population. Our data include comprehensive and objective information on health: we have data on every hospitalization, every open care treatment offered by a specialized doctor, and every filled prescription in the entire country.[4] Of the three million individuals in our data, 25,000 served as CEO during the 2006–15 sample period.

Given the paucity of evidence on CEO health, we first analyze how health enters the board's decision to hire a person in the CEO role. We document how CEOs' health differs from the population and other high-skill professionals and study whether such differences reflect health or other predictors of CEO appointments. Addressing these questions is informative about how the CEO labor market assigns executives to firms and what makes an executive climb the corporate ladder.

Using quasi-experiments involving CEO promotions and retirement, we then ask how the CEO job affects health. These analyses tell us how successful boards are in picking CEOs with health robust enough to withstand the pressures of the job or external health shocks (such as the coronavirus pandemic). Finally, we study to what extent mental and physical health predict CEO turnover, and whether we can explain firm policies and performance with CEO health. These questions inform us about how effectively governance works and the frictions boards face in responding to CEOs' health problems.

We follow a common practice in the medical literature of measuring health using a comorbidity index. Taking into account the fact that many conditions co-occur in a given patient, comorbidity

[4] Johnston, Propper, and Shields (2009) find that objective health measures explain economic outcomes better than subjective measures.

indices pool various conditions into broader categories—in our case, into 18 physical and four mental condition categories. Of these conditions, mental disorders are of particular interest because of their serious effects on productivity and the stigma associated with them (Bharadwaj, Pai, and Suziedelyte, 2017). Because of this stigma, information on top leaders' mental health is particularly hard to obtain.

Because most of our medical data come from prescriptions, we choose the Rx-Risk comorbidity index as our main specification. This index, used before e.g. in Fishman et al. (2003) and Katon et al. (2009), has been designed to use prescription data. It captures a wide array of conditions that are chronic in nature. We estimate the weights for the comorbidity categories in the general population in labor force by regressing the number of days on sick leave in a year on lagged dummies for the comorbidity categories. The predicted values of this regression are then used to generate health index values for our research subjects. Our use of predicted values, in lieu of actual absences from work, circumvents challenges arising from potential occupational differences in the use of sick leave to manage health problems.

We start our analysis by studying how healthy CEOs are. We find that CEOs are considerably healthier than other members of their cohort and gender: the population at large has on average 70% higher predicted number of sick days than CEOs. Compared with the population, CEOs suffer less from mental diseases than physical diseases. Their health also compares favorably with that of lawyers, engineers, and finance professionals. This is especially true for CEOs of larger firms.

Despite of their better-than-average health, CEOs are not superhumans. CEOs are treated for cancer, hyperlipidemia, rheumatoid arthritis, and gout about as often as the age-gender equivalent member of the population. Some of these conditions also expose them to other health shocks.[5] Although their mental health is considerably better than that of the population, each year 6% of them receive treatment for anxiety and tension, and 3% for depression.

These comparisons may either reflect the important role of health in the CEO job or capture other attributes correlated with health.[6] We address this matter by estimating the association of health with the number of years it takes for an individual to assume the position as a CEO for the first time. We find health and in particular mental health explains appointments to a CEO position, even when we control for early-life physical condition, traits, and education. Our estimates imply a one-standard deviation change in the health index associates with a 46% change in the hazard of becoming a CEO. This effect is more than twice as large as that of a one-standard deviation change in cognitive ability, and over one-half of the effect of a one-standard deviation change in non-cognitive ability.

We next ask how boards take health into account when hiring and firing a CEO. If boards screened the CEO candidates imperfectly, some individuals appointed to the CEO position might find the demands of the job overwhelming. Such demands can have adverse effects on health. On the other hand, the higher income, higher social standing, and better job control that comes with the CEO job can compensate for some of the adverse health effects.[7] We design a quasi-experiment that allow us to investigate the impact of becoming a CEO on health. This analysis takes advantage of CEO promotions in which we can identify two or more executives as potential contenders for the

[5] For example, Caramelo et al. (2020) and Su et al. (2020) find that underlying conditions such as cancer, heart disease, and diabetes significantly increase the mortality of the novel coronavirus. Booth et al. (2003), Badawi and Ryoo (2016), and Mertz et al. (2013) report similar evidence for severe acute respiratory syndrome (SARS), Middle East respiratory syndrome (MERS), and influenza, respectively.

[6] See, for example, Cutler and Lleras-Muney (2008) for a review of the literature on early-life origins of health.

[7] See, for example, Viscusi (1993) for a review on the literature on the value of health, and Frydman and Jenter (2010) and Murphy (2013) for reviews on CEO pay.

CEO position. Because the contenders come from the same firm and we can follow them before and after the CEO promotion, this setting helps to account for firm- and individual-level differences in health.

We find executives appointed to CEO position seem to manage the demands of their new job well: Their health develops in a manner similar to the executives not promoted to the CEO position. In another quasi-experiment focusing on the end of the CEO career, we find that the health of retiring CEOs develops similarly after the typical retirement age as that of the retiring work force in general. We also find no evidence of differential trends in health prior to CEO promotions or retirement, which suggests the effects can be given a causal interpretation. These results are consistent with the executive labor market matching the right people to the right jobs.

Albeit boards seem to screen the potential CEO candidates well, some CEOs will inevitably develop health problems during their tenure at a firm. Other things being equal, we would expect boards to be more inclined to dispose of CEOs who are mentally or physically less fit to run the firm. We find that poor health—in particular, poor mental health—is highly significantly associated with greater CEO turnover. Here, both contemporaneous health and health at the time of appointment matter. Thus, even if an individual's poor health goes unnoticed by the board at the time of appointment, she continues to face a greater turnover risk while on the job. This result is consistent with boards correcting mismatches that occurred at the time of appointment.

The strong health-turnover relation is suggestive of boards responding to CEO health problems. However, even if boards are vigilant and replace CEOs as soon as they experience health problems, the costs arising from finding a replacement CEO and breaking her in could affect the firm's ability to react to changing circumstances. We assess the magnitude of these costs by studying the association between CEO health and four corporate policy measures that hinge on active decisions: acquisitions, plant openings, investment, and sales growth. We find that CEO health is statistically significantly correlated with all the policy measures at the 5% level. The correlation is the strongest for acquisitions and plant openings, where a one standard deviation worsening of CEO health index is associated with a 6–7% decrease in acquisition or plant opening probability. For investment and sales growth, the corresponding numbers are 2% and 4%, respectively. These results suggest that health-related corporate governance has tangible frictions, at least for corporate policies requiring an active CEO role.

Does poor CEO health hurt firm performance? We find the association between CEO health and operating performance is of the expected sign but not statistically significant at conventional levels. The lack of a statistically significant result is understandable given that firm performance is far more than an aggregation of active CEO decisions: some of these decisions add value, but some do not, and a significant part of performance is outside of the CEO's control (e.g., Bertrand and Mullainathan, 2001). And even if these decisions add value in the long term, they may have a negative effect on short-run profitability, further hampering inferences about firm performance. Even though the link between CEO health and firm behavior can be viewed as a manifestation of frictions in health-related corporate governance, its performance consequences appear limited.

Given the sensitivity of health matters and their potential implications for CEO careers, we consider the possibility that CEOs avoid the use of the medical services altogether or in particular in Sweden, minimizing the likelihood they will end up in centralized (though strictly confidential) registers. This aversion to record-keeping would make the health records of CEOs less informative about true health than those of non-CEOs. To address this possibility, we study the association between our health metrics and mortality. If CEOs' actual health were worse than that indicated by their health indices, we would expect their health index values to be associated with greater mortality than those for the population as a whole. We find no evidence of such relation: although both physical and mental health indices are highly predictive of mortality, this relation is not significantly different for CEOs. These results speak against CEOs' heightened aversion to record-keeping.

Our results have the following implications. First, the generally good CEO health and the lack of a discernible effect of CEO promotions and retirement on health suggest that the anecdotes on the health crises of individual CEOs (some of which are listed in the second footnote) likely are just anecdotes. Thus, there does not appear to be a broader "CEO health crisis" that requires substantial health-enhancing interventions, for example, considerable additional investment in corporate wellness programs (Grobart, 2017). Second, despite the general lack of disclosure on CEO health, the association between CEO health and turnover is strong. Whether this is a reasonable response to the demands of the job or a form of discrimination is an open question. However, to the extent that health-related corporate governance works reasonably well already under the current circumstances, it would not be easy to justify policies that exchange further improvements in corporate governance against a potentially significant loss of CEO privacy.

Our paper is related to three strands of literature. First, it is related to a small but growing literature on executive health. Holland and Lel (2017) find publicly known CEO health shocks to have a negative effect on firm value, while Limbach and Sonnenburg (2015) find good CEO physical condition, as witnessed by finishing a marathon, to be positively associated with firm value. Borgschulte et al. (2019) find that CEOs who serve under stricter corporate governance regimes face poorer long-term health outcomes, reflected in an earlier age of death.

The study closest to ours is by Bennedsen, Pérez-González, and Wolfenzon (2020) who merge register data on hospitalizations with firm data and find CEO hospitalizations to be associated with lower firm performance and investment. Our study differs from theirs in the research questions addressed, in its greater focus on mental health, and in the fact that our data set also includes drug prescriptions and specialized care. Although the hospitalizations studied in Bennedsen et al. allow analyzing the impact of severe health shocks, they do not lend themselves well to characterizing CEO health in general. The wide spectrum of health issues captured by our health measures makes it possible to comprehensively compare CEOs to the population and its interesting subgroups. We can also analyze how CEO health develops around promotions and retirement, which would be challenging in the rare cases of CEO hospitalizations. We can also study how CEO health at appointment and during tenure predict turnover, and how firm policies associate with CEO health issues that do not necessarily lead to hospitalizations.

These analyses reveal the vast majority of CEOs do not experience severe health problems resulting in hospitalizations. In addition, boards appear to be attentive to a host of CEO health issues that do not involve a hospitalization. Taking this wider perspective, and finding that our broader health measures do not correlate significantly with performance, suggests the aggregate value losses resulting from CEOs' health problems are not as large as one could extrapolate from previous work. More broadly, our paper presents a more optimistic view of how well health related corporate governance works than the prior literature.

Second, our paper is related to the literature on executive traits. Kaplan, Klebanov, and Sorenson (2012), Kaplan and Sorenson (2016), and Gow et al. (2016) study the personal characteristics of CEO candidates and CEOs and their association with corporate performance and policies. Green, Jame, and Lock (2019) find extroverted CEOs to have better career outcomes. Adams, Keloharju, and Knüpfer (2018) find cognitive ability, noncognitive ability, and height to be associated with the likelihood to become a CEO, assignment of the executive to a larger company, and corporate policies. We expand this literature by showing health is an important trait that makes CEOs different and affects their climb in the corporate ladder.

Third, our paper is related to a vast literature linking long-term stress to various medical conditions, and medical conditions to work performance. Cohen, Janicki-Deverts, and Miller

(2007), Thoits (2010), Cesarini et al. (2016) and Persson and Rossin-Slater (2018) review the literature on the link between long-term stress and medical conditions. Ford et al. (2011) report the results of a meta analysis on the strength of the link between various medical conditions and work performance; Garcia-Gomez, Maug, and Obernberger (2020) offer a more recent review of the literature from the finance perspective. Given the challenging nature of CEOs' work, one would expect health to have at least as large effect on their productivity as to the productivity of rank-and-file employees.

2. Data

The sample consists of individuals born between 1951 and 1978 who lived in Sweden in 2006–15. Our data set combines information on individuals and firms from three sources.

Statistics Sweden. The bulk of these data come from the LISA database that covers the whole Swedish population of individuals who are at least 16 years old and reside in Sweden at the end of each year. This database integrates information from registers held by various government authorities and covers for most variables the years 1990–2015. We extract information on labor and total income, wealth, field and level of education, profession, career, family relationships, and mortality, complementing the LISA database with data from the Multigenerational Register and the Wealth Register. The family records allow us to map each individual to their partners, children, parents, and siblings. We identify the executives other than CEOs based on their international ISCO-88 (COM) classification of occupations (codes 122 and 123).[8]

[8] The ISCO-88 (COM) code 122 corresponds to "production and operations managers" and the code 123 to "other specialist managers." The occupation data available from the LISA database come mainly from the official wage-statistics survey (Lönestrukturstatistiken). Statistics Sweden also undertakes surveys of smaller firms that are not included in the official wage survey. The sampling design in the supplementary surveys is a rolling panel and all eligible firms are surveyed at least once every five years. Occupation information is available for each year, but the information

The Swedish Companies Registration Office. The Swedish Companies Registration Office keeps track of all companies, both public and private, and their CEOs and directors. The firm data are available for all corporate entities that have a limited liability structure ("aktiebolag") and report having appointed a CEO ("verkställande direktör"), excluding financial firms that operate as banks or insurance companies. These data record various financial-statement items, including sales and the number of employees. By law, each firm has to supply this information to the registration office within seven months from the end of the fiscal year. Financial penalties and the threat of forced liquidation discourage late filing.

The data reports the starting and ending dates for CEOs in each firm. When the starting date is missing, we assume the CEO was appointed in 1990. To map starting dates to annual data, we use the first of November each year, the date when the individual firm-workers links are recorded in the Statistics Sweden data. When CEO spells are overlapping in a given year for a given individual, we only keep the spell in the firm with the highest total assets during the spell. When the overlap is less than one year, we delete the first year of the new spell. To confine our analysis to large enough firms, we only keep CEO spells that at least one point during our sample period (2006–15) fulfill the following three criteria simultaneously: the firm a) reports information on total assets, b) has more than 10 employees, and c) reports having a non-CEO executive employed. These sample criteria avoid starting CEO spells only due to a firm growing beyond a certain threshold.

The National Board of Health and Welfare. Our health data come from the National Board of Health and Welfare, which maintains comprehensive records of hospital visits, open care offered by specialized doctors (from here on, specialized care), and prescriptions in Sweden. The hospital

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may not be accurate for each year. To ensure we have accurate occupation information for every year, we require that the information be collected in the relevant year or earlier and for the correct employer-employee link. If an individual holds multiple executive positions in a given year, we assign the individual to the executive position in the firm with the highest sales.

and specialized care data include primary and secondary diagnoses along with the associated four-digit ICD-10 codes for each diagnosis. The prescription data include all prescriptions along with the associated ATC-code with at least four digits. These ATC codes are further translated into diagnoses using established medical literature. All three data sets cover the years 2006–15. Appendix 1 offers a short description of the health care system in Sweden.

Military Archives. The Military Archives stores information on the cognitive, non-cognitive, and physical characteristics of all conscripts. The purpose of the data collection is to assess whether conscripts are physically and mentally fit to serve in the military and suitable for training for leadership or specialist positions. The examination spans two days and takes place at age 18. Lindqvist and Vestman (2011) offer a comprehensive description of the testing procedure. These data are available for Swedish males drafted in 1970–1996. Military service was mandatory in Sweden during this period, so the test pool includes virtually all Swedish men born between 1951 and 1978.

3. CEO health compared to the population and high-skill professionals

3.1. Descriptive statistics

Table 1 Panel A reports descriptive statistics on the sample individuals. We are primarily interested is CEOs, which we divide into two groups: those running companies with less than SEK 100 million of total assets (small-firm CEOs, about 75% of the CEO observations; SEK 1 ≈ USD 0.10) and those above (larger-firm CEOs, about 25% of the CEO observations). For benchmarking purposes, we also report on the results for three other high-skill professional categories: lawyers, engineers, and finance professionals. Here, we have defined finance professionals as professionals who work in the finance industry and have a university degree.

Our analysis focuses on individuals who were 38–64 years old during our sample period 2006–15. CEOs are on average in their late forties, i.e. 2–3 years older than the population average of 46 years. They are also much more likely to be men, better educated, and earn four to nine times as much as the population on average.

Table 1 Panel B reports on a subsample of men for which we have additional trait information from the military enlistment at age 18. Consistent with Adams, Keloharju, and Knüpfer (2018), CEOs have higher cognitive and non-cognitive ability and are taller than the population. They also possess better cardiovascular fitness and muscle strength and are slightly slimmer than the population. All of these traits improve in firm size. Larger-firm CEOs compare favorably with the other high-skill professions in almost all traits.

Table IA1 reports on descriptive statistics on the sample firms. Their mean total assets are SEK 420 million, i.e. about USD 40 million. Just 1.4% of the firms are publicly traded. Government owned firms account for less than 4% of the firms.

3.2. Differences in health between CEOs and the population

Table 2 studies the health outcomes of the sample individuals. This analysis reports on 22 conditions that can be expected to have a significant and persistent impact on productivity, are sufficiently different from one another to be considered independently, and can be tracked using prescription and diagnosis data. The conditions are a subset of the 26 constituents of the Rx-Risk Comorbidity Index, a chronic disease index designed to assess the health of a patient on the basis of the ATC codes in prescription data.[9] The index, used e.g. in Fishman et al (2003) and Katon et al

[9] Table IA2 reports the mapping of the Rx-Risk comorbidity categories to ATC data. The mapping follows Quinzler et al. (2019) except when the codes in Quinzler et al. are at a finer level than in our ATC data. In these cases, we use a

(2009), takes into account the fact that many conditions co-occur in a given patient, pooling various conditions into broader categories. Each comorbidity category is dichotomous—it is either present or it is not.

Apart from prescriptions, Table 2 uses the diagnosis information embedded in the hospitalization data to assess health outcomes. We assign a condition to an individual in a year if she has that condition in that year either according to prescription or hospitalization data. To our knowledge, no direct translation of the Rx-Risk categories to ICD codes is available. We use the medical literature listed in Table IA2 for this translation.

The first column of Table 2 Panel A reports on the yearly incidence of the 22 conditions in the population, separated to four mental and 18 physical health diagnoses. The remaining seven columns report on the age- and gender-adjusted incidence of these conditions relative to the population in the high-skill professional groups.[10] Age and gender adjusting is important because the groups vary in age and gender, which again are associated with the incidence of the conditions.

Our results suggest the high-skill professional groups have a lower incidence of almost all conditions than the population on average. For example, the age- and gender-adjusted incidence of depression among larger-firm CEOs is 48% of the population average, while the corresponding incidence among lawyers is 76%. The few conditions whose incidence among CEOs is comparable to the population include hyperlipidemia, rheumatoid arthritis, cancer, and gout.

To get a more holistic idea of the health of CEOs, we aggregate the data on individual conditions to a health index, computed separately for the population and for each high-skill

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coarser ATC specification unless this results in an overlap between different comorbidity categories in the index, in which case we omit the codes in question. For four rare conditions (HIV, cystic fibrosis, transplant, and ESRD), the use of coarser ATC data generates an incidence rate that materially differs from that of the population in Sweden. We drop these conditions from the index.

[10] Table IA3 reports the incidence of these conditions in the high-skill professional groups without age and gender adjustment.

professional group. Given that the conditions vary in severity, we wish to avoid using unweighted metrics such as the number of prescriptions or hospitalizations, and rather weigh the conditions according to how taxing they are for the individual. We achieve this by calibrating a health index following established medical literature. Because our data is richer in outcomes and represents a different population than those of readily available indices, we calibrate the index weights ourselves rather that use the weights estimated in previous studies.

We estimate the index weights by regressing the number of days on sick leave in a year—a key health outcome, used e.g. in de Vroome et al. (2015) and, Zhang, McLeod, and Koehoorn (2016)—on one-year lagged dummies for the comorbidity categories.[11] We estimate this regression using data for all individuals born in 1951–78 who are in the work force and use the coefficients, listed in Table IA4, to generate predicted health index values for our research subjects. Thus, the weighing is immune to CEOs possibly being less likely to take sick leave than the population in general.

For each comorbidity category, the regression includes three mutually exclusive variables that indicate the diagnoses related to whether the category appears in prescription data only, specialized care data but not in hospitalization data, or in hospitalization data. In addition, consistent e.g. with Charlson et al. (1987) and Elixhauser et al. (1998), the regression includes controls for age and gender. Almost all coefficients are positive and highly significant. The most important exception to this rule is hyperlipidemia, which takes a significantly negative coefficient in specialized care and prescriptions data. Pratt et al. (2018) also finds that hyperlipidemia retains a negative coefficient in an index regression similar to ours. The R-squared of the model, 10.5%, is in the same ballpark as that for similar models in the medical literature (see, e.g., Newhouse et al., 1989 and Fishman, 2003).

[11] The convention of using a one-year lag is common in the medical literature. See, e.g. Gagne et al. (2011) and Lemke, Weiner, and Clark (2012).

Table 2 Panel B reports on the health index for each group, adjusted for age and gender. The average member of the population takes 6.9 days of sick leave every year, of which 3.6 days are due to mental health and 3.3 days due to physical health. CEOs and in particular larger-firm CEOs exhibit better health than the other high-skill professional groups or the population. For larger-firm CEOs (small-firm CEOs), the predicted number of sick leave days is 55% (62%) of that of the population. This is less than that for the other high-skill professional groups, for whom the predicted number of sick days is 62–73% of that of the population.

Decomposing the health index into its mental and physical health components suggests that CEOs differ from the population and from the other high-skill categories more in their mental health. For larger-firm CEOs, for example, the mental health index is 49% of the population whereas the physical health index is 61% of that of the population. Larger-firm CEOs have an 8 percentage point lower health index value than any of the other professional categories, whereas the corresponding difference for physical health is 6 percentage points. The health of small-firm CEOs echoes this result. Their mental health is better than that of the other professional categories, whereas their physical health is less good than that of engineers and finance professionals. Figure 1 summarizes the results of Table 2 Panel B.

The above results are not sensitive to the health outcome measure. In Table IA5 we calculate the health indices using two alternative health-related outcomes—early retirement and mortality—and find similar results as in Table 2. CEOs have better overall health than any of the other high-skill professional categories, and they outperform their peers in particular in mental health.

Does the importance of CEO health increase in firm size? Figure 2 studies assignment by sorting newly appointed CEOs into 50 bins on firm's total assets and reporting the age and gender adjusted average CEO health index value for each bin. Panel A plots for each bin the CEOs' average mental health index value, scaled by the corresponding mental health index value for the population.

Panel B plots the same relationship for physical health, and Panel C for the combined mental and physical health index. In each panel, the CEO health index value decreases about linearly in firm size. Consistent with Table 2 Panel B and Figure 1, CEOs differ more from the population in mental health than in physical health.

The fact that CEO health improves in firm size suggests CEOs may be selected to their positions based on health. This interpretation is consistent with assignment theories in which positive assortative matching of the "best" CEOs to largest firms maximizes value (Gabaix and Landier, 2008; Terviö, 2008).

3.3. Controlling for early-life determinants of health

Firms select their CEOs using many criteria. If these criteria correlate with health, it is possible the CEO health advantage reflects attributes other than health. To analyze the sensitivity of the association between health and CEO appointments to controls, Table 3 estimates the association of health with the number of years it takes for an individual to assume the position as a CEO for the first time. We estimate a Cox proportional hazards model that assumes censoring after the last sample year to account for the fact that some of our sample subjects may assume a CEO position only after the end of the sample period. The three first columns decompose health into mental and physical components, while columns 4–6 study them jointly.

Column 1 runs the analysis in the entire population. Apart from indices for mental and physical health in each year, the regressors include indicators for age, gender, and year. Results suggest mental and physical health indices are associated with the hazard to become a CEO (*t*-values –21 and –13, respectively): the better the health, the sooner the individual becomes a CEO. The coefficient for mental health (–0.041) has a higher absolute value than that for physical health (–

0.027), suggesting that mental health is an even more important predictor of CEO appointment than physical health.

We narrow our sample to individuals for whom we have data on mandatory military enlistment at age 18. This allows us to control for many early-life predictors of CEO appointments: education, cognitive ability, non-cognitive ability, height, cardiovascular fitness, muscle strength, and the body mass index (see Adams et al. (2018) for an analysis of how early-life variables predict CEO appointments).

Column 2 in Table 3 reports the results of column 1's specification in the military subsample. The coefficients in this sample are statistically highly significant but somewhat smaller than in column 1. They also retain the relative ranking of the importance of mental health compared to physical health. Column 3 adds early-life controls to the regression equation. All controls are of the expected sign and, except for muscle strength, statistically significant at least at the 5% level. The mental and physical health coefficient sizes decrease from column 2 by 26% and 38% respectively, but remain highly significant (*t*-values –10 and –5, respectively). These numbers imply a one-standard deviation change in the mental health index decreases the hazard of becoming a CEO by $(e^{-0.021})^{15.9} - 1 = -28\%$. For the physical health index, this magnitude equals $(e^{-0.009})^{14.0} - 1 = -12\%$. For comparison, the corresponding one-standard deviation effect sizes range from 1.6% to 12% for the measures of early-life physical condition. Cognitive and non-cognitive abilities show effects of 21% and 86%, respectively, whereas university education increases the hazard by 110%.

Columns 4–6 report on the association between pooled physical and mental health and CEO appointments. The results mirror those reported in columns 1–3. In each specification the combined health variable retains a coefficient that is close to the mean of its subcomponents. The combined health variable has a less noisy association with the likelihood of appointment than its subcomponents, commanding *t*-values that range from –27 in column 1 to –12 in column 3. All in all, these results suggest health and in particular mental health is an important predictor of CEO appointments and this relation is difficult to capture with early-life correlates of CEO appointments.

3.4. Are health records of CEOs comparable to those of the population?

The robust health we report for CEOs in Tables 2 and 3 could be due to them avoiding the use of medical services altogether or in particular in their home country (see, for example, Babitch et al., 2012, for a review of the evidence on cross-sectional differences in health care use). To verify that our results are not due to CEOs' register aversion, we correlate measured health with mortality—an observable outcome intimately related to true health. If CEO's observed health is better than their true health, and the average person's is not, we would expect CEOs' observed health to correlate differently with mortality than that for the population. The same prediction would also result from a scenario where the CEOs' observed health accurately reflects their true health, whereas the average person's observed health does not, perhaps because her diagnoses partly reflect an attempt to qualify for sick leave or early retirement. We test the joint hypothesis embedded in these scenarios in Table 4.

We report on a regression that explains mortality with the health index, CEO status, and their interaction. The dependent variable counts the number of years until death for each individual over the 2007–15 period and the independent variables measure the individual's health in 2006. We estimate a Cox proportional hazards model that assumes censoring after the last sample year. We divide the sample into CEOs and non-CEOs based on an individual holding a CEO position in 2006. All regressions also include age and gender indicators. In the first column mental and physical components enter separately, while in column 2 we use the combined health index.

Column 1 finds that both physical and mental health are highly significantly related to mortality (t-values 57 and 52, respectively). Consistent with the results in Tables 2 and 3, CEOs also have a lower mortality (t-value = –7.2). Column 2 finds that the combined health index variable retains a t-value of 97, making it even more significantly related to mortality than its subcomponents. From our perspective, the most interesting result relates to the interactions between the mental and physical health indices (or the pooled health index) and the CEO status. None of these interaction variables is statistically significant at conventional levels. In other words, there is no evidence that the correlation between the health indices and mortality would be different for CEOs than for the average member of the population.

These results speak against the idea that CEOs would be more averse to record keeping than the population as a whole or that the average member of the population is more likely to have diagnoses than CEOs, perhaps due to an attempt to qualify for sick leave. At the same time, they are also inconsistent with an alternative scenario where CEOs have better access to health care than others, making them more likely to enter health registers. If both of these scenarios apply, their net result must be close to zero so that the interaction coefficients do not differ significantly from zero.

4. CEO health, turnover, and firm policies

4.1. How does health affect CEO turnover?

Our results so far are consistent with the view that health, over and above its correlation with other early-life traits, is one of the attributes boards pay attention to when selecting a CEO. Given that the flipside of CEO selection is turnover, we next ask whether CEOs leave the company sooner when facing health problems. This analysis benefits from the fact that each individual appearing in the sample has been selected by the board to run a firm, which makes the individuals more homogenous in terms of potential non-health-related correlates of health.

Table 5 Panel A reports results from a survival analysis that explains the number of years it takes a CEO to leave her current company with her health index and control variables in the previous year. Like in Table 3 and 4, we estimate a Cox proportional hazards model that assumes right-censoring after the last sample year.[12] Here, we count CEO tenure from the start of the CEO spell; when data on the start of the spell is missing, we assume left-censoring before 1990. Our main variable of interest is the health index, which we decompose into mental and physical health components. The firm-level control variables include firm size, sales growth, operating return on assets, indicators for firms managed or owned by at least two members of the same family, listed and government held firms, and industry. All regressions include tenure and year, age, and gender indicators. The two rightmost specifications additionally control for early-life traits and the level of education by focusing on the subsample for which we have data from the military enlistment.

We find that CEO's health, in particular her mental health, is highly significantly associated with the time it takes for her to leave the company. This association is also economically significant. In specification 2, for example, a one standard deviation change in mental health is associated with a 4.4% greater turnover hazard (t = 6.2), and a one standard deviation change in physical health is associated with a 2.2% increase in turnover hazard (t = 3.2). Combined, their association with CEO turnover hazard is about one-third of that of the operating return on assets (−19.2%), a strong predictor of turnover (e.g., Denis and Denis, 1995). The strength of the turnover-health relation is similar in all four specifications. Table IA6 reports qualitatively similar results in a specification pooling mental and physical health indices into a combined index. All in all, these results are

[12] Campbell et al. (2011) and Jenter and Kanaan (2015) also estimate duration models to study CEO turnover.

consistent with Bennedsen at al. (2020) and suggestive of boards responding to CEO health problems.

How do boards respond to mismatches that occur at the time of appointment? Table 5 Panel B studies this by regressing the time from appointment to leaving the company on the health index at the time of appointment. To the extent that firms' tastes for CEO health do not vary in a significant way, the health index can be thought of representing mismatch between the CEO and the firm, perhaps because the board did not notice her true state of health at the time of appointment. The sample is much smaller than that in Table 5 Panel A, because CEO health at appointment is not available prior to 2006. Otherwise, the structure of the test is identical to that of Panel A.

We find that health at appointment significantly predicts CEO turnover. In specification 2, for example, a one standard deviation change in the health index at appointment is associated with a 1.6% greater turnover hazard (t = 2.5) . The results are even stronger in the subsample controlling for early-life traits. In specification 4, a one standard deviation change in the health index at appointment is associated with a 2.6% greater turnover hazard (t = 3.4). Table IA7 decomposes the health index into mental and physical components. The mental component retains a larger coefficient in all specifications, although the difference is not statistically significant at conventional levels. All in all, these results suggest that even if the board underestimates the effect of a CEO candidate's health on productivity, or she manages to win the job by concealing her poor health, the board is ultimately likely to figure out her true productivity and replace her if necessary.

4.2. Changes in health around CEO promotions and retirement

A complementary way to understand how the executive labor market matches people with firms is to study changes in health after an executive has been promoted to a CEO position. Insufficient screening along the health dimension would result in promotions of executives that struggle with the demands of the CEO job. All else equal, such demands would make an executive promoted to a CEO position more likely to experience health problems (e.g., Schnall et al., 1994). However, the CEO job is also associated with higher income, higher social standing, and better job control, which can contribute to more robust health (e.g., Marmot et al., 1991, 1997; Karasek, 1979). These positive effects on health can compensate for some of the negative health effects. We apply a difference-in-differences framework, where we compare the health of appointed CEOs to that of their peers before and after the appointment.

To accurately measure the peer group and to control for the work environment, we focus on CEO appointments in which we can identify the most likely contenders for the CEO position. Here, we define this group as the four highest paid executives in the same firm in the year prior to the turnover and the person appointed to the position in case of external appointment.13 Our analysis regresses the health index of each job contender on CEO appointment indicator, an indicator for the period after appointment, and their interaction. Our regressions also control for age, gender, and year, and we include fixed effects for each CEO turnover event. These fixed effects identify the effect of becoming a CEO from within-firm variation and thus keep the firm's working environment and the demands on all of its most important executives constant.14

Table 6 reports the results of the analysis. We run six regressions across two dimensions: the length of the post-appointment period (two or four years) and the components of the health index (mental, physical, or both). The analysis produces two kinds of results. First, individuals appointed to the CEO position have similar health as their peers. All the health index differences between the

[13] The setting reminds that of Olenski et al. (2015) and Borgschulte and Vogler (2019) who compare the mortality of elected political leaders to that of their runners-up. If there are only two or three individuals in the firm with an executive status, we take the actual number of executives.

[14] We obtain similar results from regressions that remove these fixed effects.

CEO and her peers are insignificant at conventional levels. Second, and more importantly, the health of the individuals who are appointed to the CEO position develops similarly to that of their peers. The interaction term is insignificant at conventional levels for all health components, regardless of the length of the time period in which we measure the health post appointment. The confidence intervals of the largest estimate in the last specification (−0.20, 0.51) allow us to reject effects larger than 6% of the standard deviation in the health index (8.6 days). These results are consistent with the idea that boards are successful in selecting CEOs with health robust enough to withstand the pressures of the job.

Table IA8 confirms we successfully identify events in which an individual becomes a CEO. Replacing the health indices with logged income, it shows the individual appointed to CEO enjoys 14%–18% higher pay after the appointment compared to the mean pay in our sample. Figure IA1 plots the raw health indices used in the regressions in Table 6 as a function of event time. Panels A and B show there are no discernible differences in the pre-trends in health prior to the CEO appointment. These figures also corroborate the regression results by showing no clear differences in the development of health of the two groups of individuals.

Table 7 complements the analysis in Table 6 by studying what happens to CEOs' health after they leave the CEO position compared with other members of the work force. To minimize the effect of health-related retirements on our analysis, we focus on changes in health around the time when individuals typically retire. More specifically, we narrow our sample to 835,000 individuals (of whom 1,100 are CEOs) who are born in 1942–48. The retirement sample does not overlap with the core sample analyzed in the earlier tables, which consists of cohorts born in 1951–78.

Panel A reports on descriptive statistics on the individuals in the retirement sample at the age of 64, i.e. two years before the median retirement age of 66. 94% of the retiring CEOs are men, and they earn on average about six times as much as retiring non-CEOs do. Panel B reports on difference-in-difference regressions that explain predicted days of sick leave with an indicator for CEOs. This indicator is interacted with a dummy variable for the years after the median retirement age of 66. All regressions additionally include year and gender indicators; the construction of the sample around the age of 66 requires the removal of age indicators.

Consistent with Table 2, the main effects for the CEO indicator are negative and statistically highly significant with t-values ranging from –4 to –7. This suggests that retiring CEOs have on average better health than the population in labor force. The post-retirement dummy is also positive and highly significant, indicating the worsening of health over time. The variable of our primary interest, the interaction between CEOs and post-retirement, takes a positive coefficient for physical health and a negative coefficient for mental health. These results and the results for the overall health index are not statistically significant except for the four-years specification for mental health, which takes a marginally significant *t*-value of –2.0. These results suggest that the health of individuals who retire from the CEO position develops similarly after retirement as that of the average member of the work force.

Panels C and D in Figure IA1 show health of CEOs and other individuals develop in similar ways prior to retirement. These figures also confirm the notion CEOs are in better health prior to retirement. This health advantage also survives in the years after retirement.

The evidence in Table 6 and Table 7 is consistent with an executive labor market that matches the right person to the right firm. In Table 7, the fact that the CEOs have stayed in their positions until retirement is already consistent with successful matching.

4.3. Does CEO health affect firm policies?

Our evidence so far is suggestive of boards responding to CEO health problems. However, even if boards are vigilant and replace CEOs as soon as they experience health problems, the costs arising from finding a replacement CEO and breaking her in could affect firm strategy and its implementation. We are primarily interested in the hypothesis that these costs could affect the firm's likelihood to react to changing circumstances (rather than maintaining the status quo, which would likely be easier for an interim or replacement CEO). We assess the magnitude of this friction by studying the association between CEO health and four corporate policy measures that hinge on active decisions: indicators for making an acquisition and opening a new plant (Bertrand and Mullainathan, 2003), as well as sales growth and investment. To gain further insight into the impact of health on operating performance, we also study OROA, in line with previous literature (e.g., Bertrand and Schoar, 2003, and Bennedsen et al., 2020).

Table 8 Panel A reports regressions that explain a firm characteristic in a year with its CEO's predicted sick leave—the health index—and control variables in the previous year. The firm-level control variables include firm size and indicators for firms managed or owned by at least two members of the same family, listed firms, government held firms, and industry. All regressions include year, age, and gender indicators.

Consistent with Bennedsen et al. (2020), we find a negative association between the health index and the firm policy variables. This association is statistically significant at the 5% level for all active policy variables. The coefficient for OROA is also negative with a t-value exceeding −1, but it is not statistically significant at conventional levels. The latter result is in contrast with Bennedsen et al., who find a strong negative association between health shocks and operating profitability. The acquisition and plant opening results have the greatest economic significance: a one standard deviation increase in the health index is associated with a 6–7% decrease in the probability of an acquisition or plant opening. Likewise, a one standard deviation increase in the health index is associated with a 4% decrease in sales growth and a 2% decrease in investment and OROA.

Panel B reports on similar regressions as Panel A except that we decompose the health index into mental and physical health subcomponents. Given that both the mental and physical component contribute to overall health, we would expect the results for overall health to be statistically more significant than those for the mental and physical health components separately. Even in the decomposition, all the associations between our health variables and firm policy and performance variables are negative. One of these associations (mental health and sales growth) is statistically significant at the 5% level and one is significant at the 10% level (physical health and plant openings). A one standard deviation change in the mental health index is associated with a larger change in the policy variables than a one standard deviation change in the physical health index. In this sense, the firm policy results are in line with our earlier results on the relative strength of the mental and physical health components.

The significant correlations between CEO health and the firm policy measures suggest that health-related corporate governance has enough friction to affect the firm's ability to react to changing circumstances, at least for corporate policies requiring an active CEO role.[15] The lack of a statistically significant association between CEO health and operating performance is understandable given that firm performance is far more than an aggregation of active CEO decisions: some of these decisions add value, but some do not, and a significant part of performance is outside of the CEO's control. Even though the link between CEO health and firm behavior can

[15] In theory, the board might want to keep an unhealthy CEO aboard to curb her incentives to take actions that destroy value, such as to build an empire. We consider such a scenario unlikely.

be viewed as a manifestation of the friction in health-related corporate governance, its performance consequences appear limited.

5. Conclusion

Despite of the important role CEOs play in the economy, little is known of their health. We study the health of CEOs by using a unique combination of data on specialized care, hospitalizations, drug prescriptions, and labor market outcomes of 28 cohorts in Sweden.

Our results suggest health-related corporate governance works at least reasonably well both in selection and in retention. Health predicts appointment to a CEO position, even when early-life physical condition, traits, and education are controlled for. Healthier CEOs also run larger corporations and are significantly less likely to leave their position. Despite of the challenges associated with the job, the health of the individuals selected to the CEO job develops similarly as that of their peers. This result is consistent with the idea that boards are successful in selecting CEOs with health robust enough to withstand the pressures of the job. Both contemporaneous health and health at appointment associate with turnover, suggesting that boards respond to health problems and correct mismatches occurring at the time of appointment.

The strong health-turnover relation leads us to ask whether there is enough friction in health related corporate governance for CEO health to have an effect on firm strategy and its implementation. This appears to be the case. We find significant correlations between CEO health and corporate policy measures that hinge on active decisions, which affect the firm's ability to react to changing circumstances. CEO health problems would thus appear to generate significant friction in the implementation of corporate policies requiring her active role.

Taken together, our results offer some comforting news on CEO health and its implications to firms. CEOs generally have good health and are resilient to the demands of their job, and boards appear to be attentive to CEO health problems. The resulting lack of a correlation between CEO health and corporate performance suggests the aggregate value losses from CEOs' health problems likely are smaller than what one could extrapolate from the small set of earlier work in this important area.

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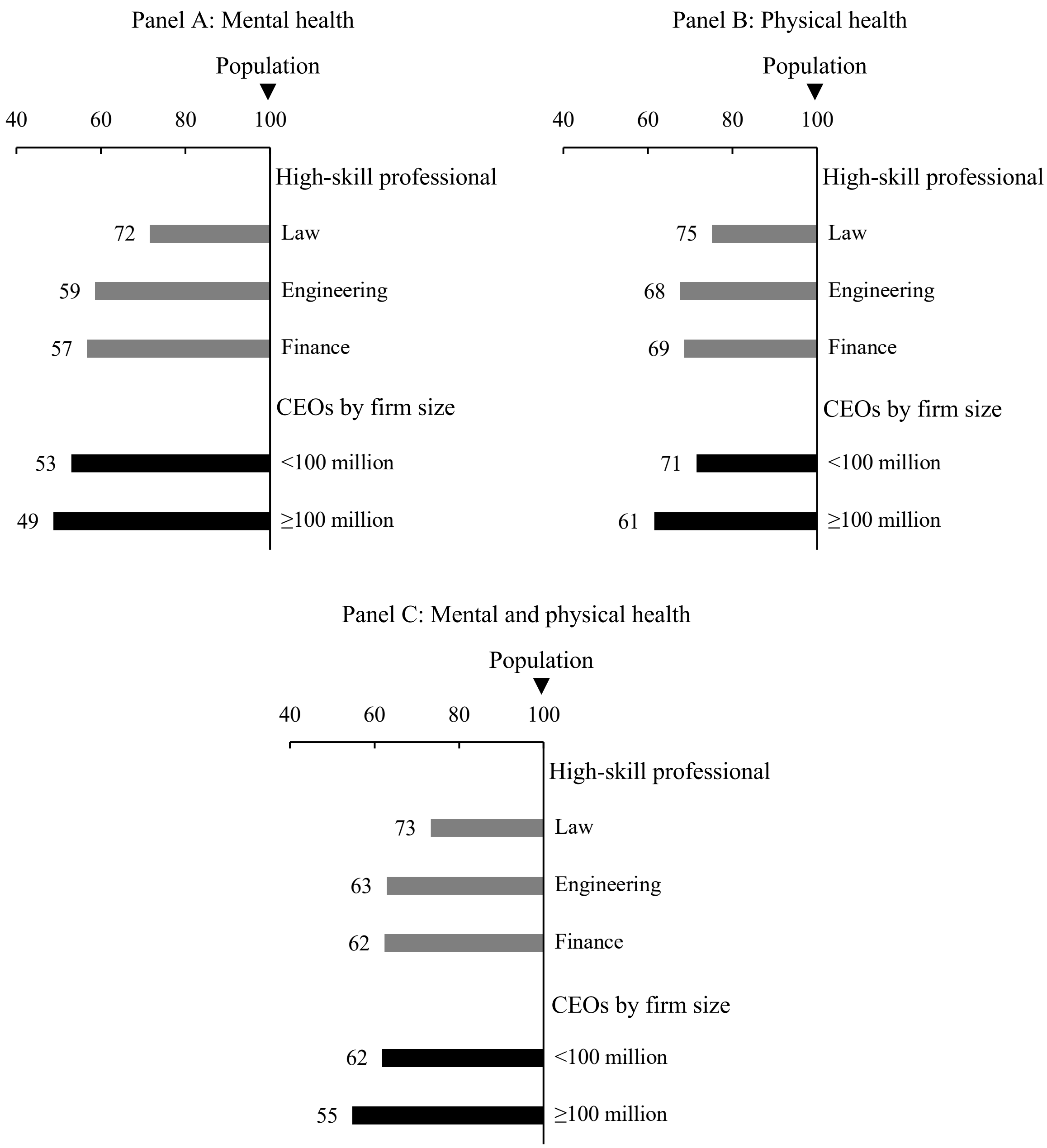

Figure 1. Health of CEOs and high-skill professionals compared to population
This figure plots indices of mental and physical health for CEOs and high-skill professionals in law, engineering, and finance compared to the population. The health indices calculate first the predicted number of days of next-year sick leave for each individual-year observation using information on the diagnoses an individual has in a given year. The health indices are then orthogonalized with respect to age, gender, and year to arrive at the final indices. The figure plots the ratio of the predicted sick leave for CEOs and high-skill professionals and the predicted sick leave in the population. Panels A and B calculate the predicted days of sick leave separately for diagnoses relating to mental health and physical health; Panel C shows the joint results. Unit of reporting is percentage point.

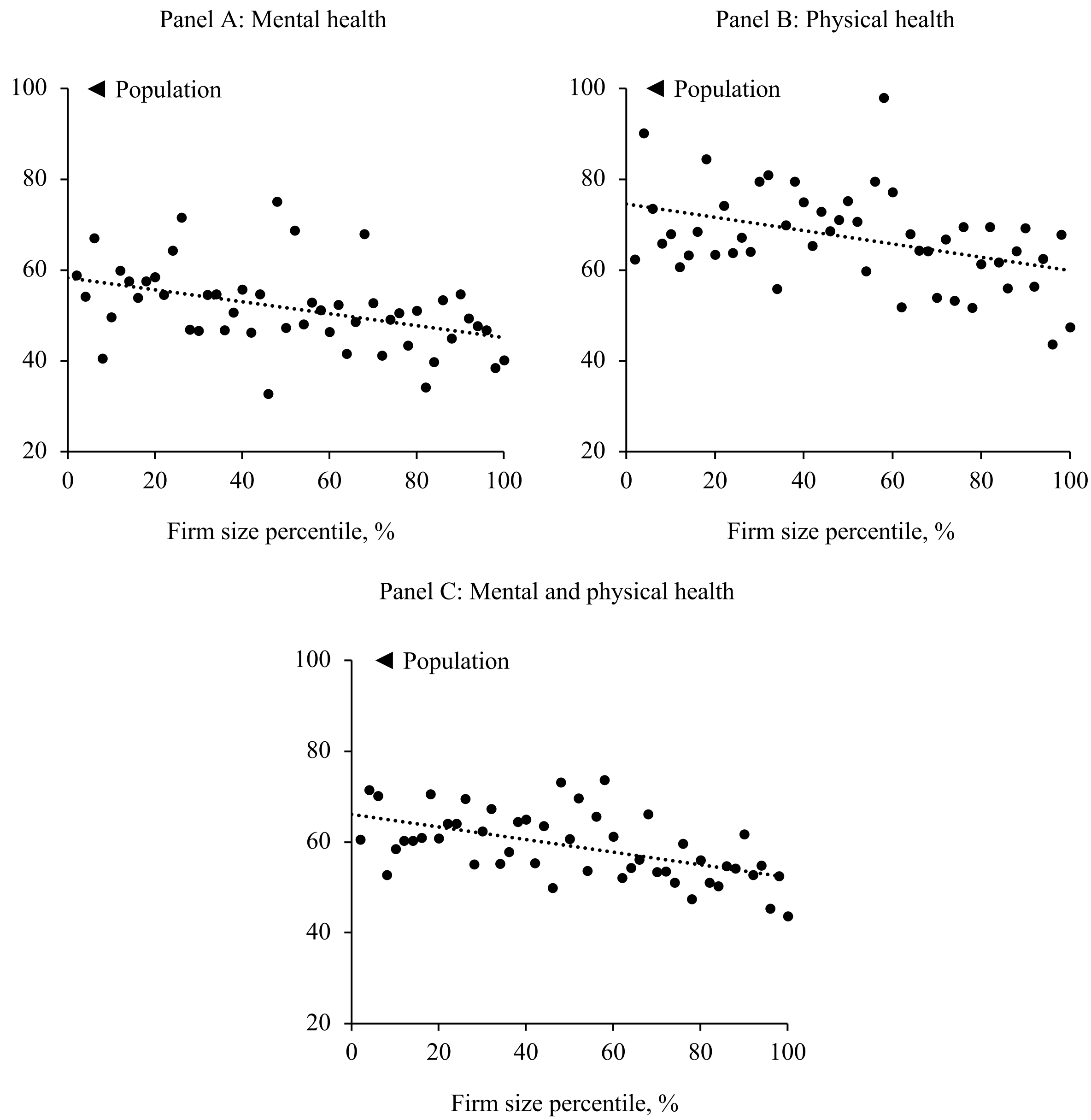

Figure 2. Health of newly appointed CEOs in firms of different size
This figure plots indices of mental and physical health for newly appointed CEOs in firms of different size. The firms are divided into 2% bins according to their total assets and the averages of health indices, measured one year prior to CEO appointment, are shown in each bin. In these bins, each firm-CEO pair is the unit of observation. The health indices calculate first the predicted number of days of next-year sick leave for each individual-year observation using information on the diagnoses an individual has in a given year. The health indices are then orthogonalized with respect to age, gender, and year to arrive at the final indices. The figure plots the ratio of the predicted sick leave for CEOs in each firm-size category and the predicted sick leave in the population. Panels A and B plot the mental and physical health indices separately whereas Panel C combines the mental and physical health diagnoses into one index. The linear regression line accompanies each plot. The unit of reporting is percentage points.

Table 1

Descriptive statistics on population, high-skill professionals, and CEOs

This table reports descriptive statistics on the 3.6 million individuals born in 1951–78 over the 2006–15 observation period. The statistics are calculated separately for all individuals in the population, for high-skill professionals in law, engineering, and finance, and for CEOs by firm size (measured by total assets in SEK). The unit of observation is an individual in a year. Panel A reports on age, gender, education, and income for the full sample. Panel B reports also on cardiovascular fitness, muscle strength, body mass index, cognitive and non-cognitive ability, and height available from the military enlistment on a sample of males. Cardiovascular fitness is measured in a cycle ergometry test and muscle strength in a combination of knee extension, elbow flexion, and hand grip tests. Body mass index is weight divided by squared height. The cognitive-ability test consists of four subtests designed to measure inductive reasoning (instruction test), verbal comprehension (synonym test), spatial ability (metal folding test), and technical comprehension (technical comprehension test). The subscores are aggregated into a composite score. The non-cognitive-ability score is based on psychologist's evaluation of social maturity, intensity, psychological energy, and emotional stability. All the personal traits are standardized to have zero mean and standard deviation of one in the population.

Panel A: Descriptive statistics on full sample

	Population	High-skill professional			CEO by firm size	
		Law	Engineering	Finance	<100 million	≥100 million
Age, years	45.9	43.8	43.1	43.7	47.4	48.8
Female, %	49.4	50.9	27.5	32.4	11.1	9.2
Level of education, %						
Basic	13.3	0.0	0.0	0.0	7.3	2.6
High school	47.9	0.0	0.0	0.0	38.9	20.5
Vocational	15.0	0.0	0.0	0.0	23.7	21.9
University	23.8	100.0	100.0	100.0	30.1	55.0
Income, SEK thousand	298	674	533	1,206	1,119	2,634
Number of observations	33,866,790	102,212	349,947	33,712	89,326	26,405

Panel B: Subsample of men with data on early-life traits						
	Population	High-skill professional			CEO by firm size	
		Law	Engineering	Finance	<100 million	≥100 million
Age, years	46.2	45.5	43.5	43.6	47.5	48.9
Level of education, %						
Basic	12.8	0.0	0.0	0.0	7.6	2.6
High school	51.7	0.0	0.0	0.0	39.9	21.9
Vocational	16.1	0.0	0.0	0.0	24.3	21.2
University	19.4	100.0	100.0	100.0	28.2	54.3
Income, SEK thousand	389	829	570	1,492	1,148	2,683
Cognitive ability, % sd	-0.3	77.0	105.0	73.2	47.4	71.9
Non-cognitive ability, % sd	0.3	59.4	40.5	68.2	65.9	91.3
Height, % sd	0.2	23.7	20.1	23.7	20.2	36.1
Cardiovascular fitness, % sd	0.3	31.4	34.8	44.3	32.7	49.8
Muscle strength, % sd	0.2	-10.8	-1.9	-2.0	17.0	18.4
Body mass index, % sd	-0.2	-14.6	-18.5	-19.7	-0.3	-1.7
Number of observations	11,952,139	43,109	204,544	19,423	66,962	20,481

Table 2

CEO health compared to population and high-skill professionals

This table reports on health of the 3.6 million individuals born in 1951–78 over the 2006–15 observation period. The statistics are calculated separately for all individuals in the population, for high-skill professionals in law, engineering, and finance, and for CEOs by the firm's total assets in SEK. The unit of observation is an individual in a year. Panel A reports the annual incidence of diagnoses, broken down into the Rx-Risk categories detailed in Table IA1. Diagnoses in the hospitalization, specialized care, and drug prescription registers enter the calculation. The panel reports the ratio of the incidence of diagnoses, adjusted for age and gender, among CEOs and high-skill professionals compared with the population. The ratio is negative for psychotic illness for larger-firm CEOs because these firms have so few CEOs with diagnosed psychotic illness, producing a negative adjusted incidence after age and gender adjustment. Panel B aggregates the incidence of diagnoses listed in Panel A into health indices based on sick leave. These indices calculate first the predicted number of days of next-year sick leave for each individual-year observation using information on the diagnoses an individual has in the current year (these regressions are reported in Table IA3). The health indices are then orthogonalized with respect to age, gender, and year. The panel reports the ratio of the predicted sick leave for CEOs and high-skill professionals and the predicted sick leave in the population.

Panel A: Annual incidence of diagnoses in population, and age-gender-adjusted incidence relative to population

	Incidence in population, %	Age-gender-adjusted incidence relative to population, %				
		High-skill professional			CEO by firm size	
		Law	Engineering	Finance	<100 million	≥100 million
Mental health diagnosis	16.1	79.5	66.6	69.1	66.4	63.1
Anxiety and tension	10.4	82.1	62.5	72.2	71.4	70.8
Depression	10.2	75.6	67.1	59.8	55.8	48.4
Psychotic illness	1.6	37.3	30.6	23.3	1.0	-1.2
Bipolar disorder	0.5	56.1	57.5	47.4	25.7	11.7
Physical health diagnosis	32.3	89.0	80.0	86.1	93.5	87.7
Hypertension	8.7	83.4	70.5	69.4	92.5	77.9
Gastric acid disorder	8.1	58.9	61.6	60.0	76.8	63.2
Heart disease, hypertension	6.1	84.6	69.7	76.1	75.5	62.9
Hyperlipidemia	5.3	88.1	68.5	74.5	95.8	89.8
Rheumatoid arthritis	4.3	87.5	78.1	95.8	105.7	104.8
Coronary, peripheral vascular disease	4.1	89.4	67.8	71.7	83.0	61.1
Thyroid disorder	3.9	98.2	99.8	101.0	83.4	79.8
Liver disease	3.8	83.4	78.6	85.7	79.4	73.6
Diabetes	3.1	61.8	55.7	43.1	47.2	12.6
Asthma	5.9	92.4	85.2	89.5	92.2	79.4
Cardiac disease	2.8	71.2	67.8	65.8	69.1	55.3
Epilepsy	2.2	53.2	42.9	38.3	34.9	25.4
Malignancies	1.9	111.1	105.5	110.8	96.6	99.7
Gout	0.5	86.1	50.5	45.7	124.3	84.8
Irritable bowel syndrome	0.5	80.6	78.5	80.7	78.5	75.8
Parkinson's disease	0.4	65.5	71.9	49.3	68.1	31.3
Renal disease	0.2	84.5	62.8	59.9	45.2	43.4
Tuberculosis	0.04	29.6	24.5	29.2	45.9	37.0

Panel B: Aggregating diagnoses to health index based on sick leave						
	Index in population, days	Age-gender-adjusted index relative to population, %				
		High-skill professional			CEO by firm size	
		Law	Engineering	Finance	<100 million	≥100 million
Mental health	3.6	71.6	58.6	56.7	53.0	48.7
Physical health	3.3	75.2	67.6	68.6	71.5	61.5
Mental and physical health	6.9	73.3	62.9	62.4	61.8	54.8

Table 3

Health and CEO appointments

This table reports results on a survival analysis that explains the number of years it takes an individual to become a CEO. Health is measured using the predicted number of days of sick leave, defined in Table 2 Panel B, in the year prior to observing the dependent variable. Health is further divided into mental and physical health conditions following the categorization of the diagnoses in Table 2 Panel A. The table reports a duration regression based on counting the years it takes an individual to become a CEO, estimated using the Cox proportional hazards model and assuming censoring after the last sample year. The sample follows each individual in the sample defined in Table 1 up to the year in which they are first appointed as CEO over the 2007–15 observation period. All specifications include age and year indicators; specifications 1 and 4 also include an indicator for gender. Specifications 2, 3, 5, and 6 report on a subsample of males for whom we have data on early-life traits from the military enlistment (see Table 1 for definitions). These early-life traits, and level of education, are added as controls in specifications 3 and 6. Mental and physical health are measured in days of predicted sick leave and the unit of observation is an individual in a year. The table reports the coefficients of the duration model and the *t*-values below coefficients assume clustering at the individual level.

Dependent variable	Years to CEO appointment					
Specification	Mental and physical health separately			Mental and physical health jointly		
	Full sample	Sample with early-life traits		Full sample	Sample with early-life traits	
	1	2	3	4	5	6
Mental health	-0.041	-0.028	-0.021			
	(-21.4)	(-13.1)	(-9.9)			
Physical health	-0.027	-0.015	-0.009			
	(-12.6)	(-6.9)	(-4.6)			
Mental and physical health				-0.035	-0.022	-0.015
				(-26.6)	(-15.9)	(-11.5)
High school degree			0.141			0.141
			(2.8)			(2.8)
Vocational degree			0.545			0.544
			(9.9)			(9.9)
University degree			0.744			0.742
			(13.7)			(13.6)
Cognitive ability			0.188			0.188
			(15.7)			(15.7)
Non-cognitive ability			0.620			0.621
			(49.8)			(49.9)
Height			0.114			0.114
			(11.1)			(11.2)
Physical fitness			0.048			0.048
			(4.3)			(4.3)
Muscle strength			0.016			0.015
			(1.3)			(1.3)
Body mass index			-0.029			-0.027
			(-2.4)			(-2.2)
p-value for mental vs. physical	[0.000003]	[0.0001]	[0.0004]	NA	NA	NA
Mean dependent variable	5.01	4.98	4.98	5.01	4.98	4.98
Number of observations	30,130,805	10,621,616	10,621,616	30,130,805	10,621,616	10,621,616

Table 4

Health and mortality

This table reports results on a survival analysis that explains mortality with the health index constructed from predicted days of sick leave, defined in Table 2. The dependent variable counts the number of years until death for each individual over the 2007–15 period and the independent variables measure the individual's health in 2006. The table estimates a Cox proportional hazards model that assumes censoring after the last sample year. The sample is divided into CEOs and non-CEOs based on an individual holding a CEO position in 2006. All regressions include age and gender indicators. The unit of observation is an individual, the table reports the coefficients of the duration model, and the *t*-values below coefficients are based on robust standard errors.

Dependent variable	Years to death	
	Mental and physical health separately	Mental and physical health jointly
Specification	1	2
Mental health	0.021	
	(52.0)	
Physical health	0.033	
	(56.8)	
Mental health × CEO	-0.005	
	(-0.4)	
Physical health × CEO	0.007	
	(1.4)	
Mental and physical health		0.028
		(96.9)
Mental and physical health × CEO		0.007
		(1.6)
CEO	-0.835	-0.846
	(-7.2)	(-7.3)
Controls		
Age	Yes	Yes
Gender	Yes	Yes
Mean dependent variable	8.94	8.94
Number of observations	3,337,707	3,337,707

Table 5

CEO health and turnover

Panel A reports results on a survival analysis that explains the number of years it takes a CEO leaves her current company. The dependent variable is the CEO tenure and it is measured from the year 1990 onwards. The table estimates a Cox proportional hazards model assuming censoring after the last sample year. The mental and physical health indices, lagged by one year, are calculated separately based on the diagnoses listed in Table 2. The unit of observation is a year of a CEO's spell at a firm. Panel B repeats the analysis of Panel A for CEOs appointed after 2006, regressing the number of years to turnover on the combined health index value at the time of appointment. The unit of observation is a CEO's spell at a firm. The firm characteristics, lagged by one year, are logged total assets (measured in SEK), operating return on assets, sales growth calculated as relative change from last year, an indicator for firms either managed or owned by at least two members of the same family, and indicators for listed companies and firms fully owned by the national, regional, or local government. OROA and sales growth are winsorized at the 5 and 95 percentiles. All regressions include age, year, and gender indicators, and indicators for industry based on two-digit SNI codes. The two rightmost specifications additionally control for early-life traits and the level of education, defined in Table 1. The *t*-values below coefficients assume clustering at the CEO level. Coefficients for mental and physical health and for the combined health measure are multiplied by one hundred whereas the other coefficients enter the table in their natural unit.

Panel A: Contemporaneous health				
Dependent variable	Years to CEO turnover			
Sample	Full sample		Sample with early-life traits	
Specification	1	2	3	4
Mental health	0.83	0.80	1.02	0.98
	(6.5)	(6.2)	(6.8)	(6.5)
Physical health	0.26	0.32	0.27	0.26
	(2.5)	(3.2)	(2.2)	(2.2)
Logged assets		0.18		0.17
		(36.5)		(27.9)
OROA		-1.14		-1.15
		(-25.7)		(-22.1)
Sales growth		-0.09		-0.10
		(-7.2)		(-6.8)
Family firm, family managed		-0.17		-0.20
		(-5.2)		(-5.3)
Family firm, not family managed		-0.88		-0.86
		(-14.9)		(-12.6)
Listed firm		-0.27		-0.30
		(-4.3)		(-4.5)
Government-owned firm		-0.26		-0.31
		(-5.2)		(-5.1)
Controls				
Age	Yes	Yes	Yes	Yes
Gender	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes
Early-life traits and education	No	No	Yes	Yes
p-value for mental vs. physical	[0.001]	[0.006]	[0.0003]	[0.0004]
Mean dependent variable	6.39	6.39	6.64	6.64
Number of observations	101,729	101,729	77,131	77,131

Panel B: Subsample of CEOs with health at the time of appointment				
Dependent variable	Years to CEO turnover			
Sample	Full sample		Sample with early-life traits	
Specification	1	2	3	4
Mental and physical health at appointment	0.23	0.30	0.47	0.49
	(1.8)	(2.5)	(3.3)	(3.4)
Logged assets		0.13		0.12
		(22.3)		(16.0)
OROA		-0.78		-0.84
		(-14.1)		(-12.6)
Sales growth		-0.03		-0.03
		(-2.4)		(-2.4)
Family firm, not family managed		-0.28		-0.31
		(-6.9)		(-6.6)
Family firm, family managed		-0.77		-0.73
		(-8.3)		(-6.5)
Listed firm		-0.11		-0.18
		(-1.6)		(-2.4)
Government-owned firm		-0.45		-0.55
		(-7.4)		(-7.3)
Controls				
Age	Yes	Yes	Yes	Yes
Gender	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes
Early-life traits and education	No	No	Yes	Yes
Mean dependent variable	3.39	3.39	3.43	3.43
Number of observations	15,462	15,462	11,193	11,193

Table 6

Effect of CEO appointment on health

This table reports results of an event study that estimates the impact of becoming a CEO on health. The dependent variable is predicted days of sick leave, defined in Table 2. The independent variables are indicators for years around a CEO turnover event interacted with indicators for an executive appointed to a CEO position. The sample includes the four highest paid executives in the firm in the year prior to the CEO turnover and the person appointed as the CEO in case of an external appointment. We further require that none of these people have been in a CEO position prior to the turnover event. Specifications 1–3 (4–6) include events in which the executives can be followed for two years prior and two (four) years after CEO turnover. All regressions include year, age, and gender indicators, and fixed effects for each CEO turnover event. The unit of observation is an individual in a year and the *t*-values below coefficients assume clustering at the level of the CEO turnover event. The unit of reporting is days.

Dependent variable	Predicted sick leave, days					
Follow-up period	Two years			Four years		
Specification	Mental health	Physical health	Both	Mental health	Physical health	Both
	1	2	3	4	5	6
After appointment	0.07	0.06	0.13	0.04	0.06	0.10
	(1.3)	(0.8)	(1.4)	(0.7)	(0.6)	(0.9)
Appointed to CEO	0.12	-0.02	0.11	-0.04	-0.06	-0.10
	(0.9)	(-0.1)	(0.5)	(-0.2)	(-0.4)	(-0.4)
Appointed to CEO × After	-0.07	0.03	-0.03	-0.01	0.17	0.15
	(-0.8)	(0.3)	(-0.2)	(-0.1)	(1.2)	(0.9)
Controls						
Age	Yes	Yes	Yes	Yes	Yes	Yes
Gender	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
Turnover event FE	Yes	Yes	Yes	Yes	Yes	Yes
Mean dependent variable	1.25	1.91	3.16	1.28	1.97	3.25
Adjusted R^2	0.132	0.098	0.124	0.140	0.101	0.128
Number of observations	83,378	83,378	83,378	76,640	76,640	76,640

Table 7

CEO health before and after retirement

This table reports on health before and after retirement, both for CEOs and non-CEOs. The sample consists of individuals who are born in 1942–48. These individuals do not belong to the core sample in Tables 1–3 because they are born before the earliest year an individual can enter the core sample. Panel A reports on descriptive statistics on these individuals. Panel B reports on regressions that explain predicted days of sick leave, defined in Table 2, with an indicator for CEOs. This indicator is interacted with a dummy variable for the years after the median retirement age of 66. All regressions include year and gender indicators (the construction of the sample around the age of 66 requires the removal of age indicators). The unit of observation is an individual in a year, the *t*-values below coefficients assume clustering at the individual level, and the unit of reporting is days.

Panel A: Descriptive statistics on retirement sample		
	Non-CEO	CEO
Age, years	64.0	64.0
Female, %	50.5	5.1
Level of education, %		
Basic	29.5	15.6
High school	43.1	41.3
Vocational	6.3	11.5
University	21.1	31.6
Income, SEK thousand	301	1,962
Number of individuals	680,185	1,000

Panel B: Effect of retirement on health						
Dependent variable	Predicted sick leave, days					
Follow-up period	Two years			Four years		
Specification	Mental health	Physical health	Both	Mental health	Physical health	Both
	1	2	3	4	5	6
After retirement	0.18	1.69	1.87	0.10	1.27	1.37
	(12.1)	(69.8)	(59.3)	(4.3)	(35.0)	(28.3)
CEO	-1.17	-1.60	-2.77	-1.04	-1.62	-2.65
	(-7.2)	(-4.9)	(-7.0)	(-5.7)	(-3.8)	(-5.3)
CEO × After retirement	-0.09	0.55	0.46	-0.27	0.26	-0.01
	(-0.7)	(1.5)	(1.1)	(-2.0)	(0.6)	(-0.02)
Controls						
Gender	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
Mean dependent variable	4.19	8.88	13.08	4.21	9.30	13.51
Adjusted R^2	0.015	0.005	0.005	0.017	0.009	0.009
Number of observations	3,405,218	3,405,218	3,405,218	3,021,683	3,021,683	3,021,683

Table 8

CEO health and firm policies

This table reports regressions that explain a firm characteristic in a year with the firm's CEO's predicted sick leave and control variables in the previous year. In Panel A, CEO health is measured using the overall health index, which combines physical and mental components. Panel B decomposes the health index into its mental and physical health subcomponents based on the diagnoses listed in Table 2 Panel A. The firm characteristics are logged total assets (measured in SEK), an indicator for firms either managed or owned by at least two members of the same family, and indicators for listed companies and firms fully owned by the national, regional, or local government. Acquisitions refer to purchases of a control interest in another firm with at least ten employees. Plant opening is defined as opening of a new establishment with at least ten employees. Investment is calculated as gross investments during a year divided by total assets at the beginning of the year. OROA is winsorized at the 5 and 95 percentiles. All regressions include year, age, and gender indicators, and indicators for industry based on two-digit SNI codes. The unit of observation is a CEO-firm in a year and the *t*-values below coefficients assume clustering at the CEO level. The coefficients, mean dependent variable, and change per one standard deviation in health are multiplied by one hundred.

Panel A: Entering mental and physical health jointly					
Dependent variable	Firm policies				OROA
	Sales growth	Acqui-sition	Plant opening	Invest-ment	
Specification	1	2	3	4	5
Mental and physical health	-0.036	-0.007	-0.010	-0.007	-0.012
	(-2.1)	(-2.1)	(-2.0)	(-2.3)	(-1.2)
Logged assets	-2.603	0.925	1.639	-0.150	-0.551
	(-16.0)	(15.3)	(18.6)	(-6.4)	(-6.8)
Family firm, not family managed	0.091	-0.383	-0.677	0.014	-0.105
	(0.1)	(-2.7)	(-2.9)	(0.1)	(-0.3)
Family firm, family managed	-3.730	-0.650	-1.033	0.240	-0.820
	(-6.7)	(-6.2)	(-6.9)	(1.6)	(-2.7)
Listed firm	20.258	-2.677	-1.561	-0.350	-8.517
	(6.3)	(-6.8)	(-1.5)	(-1.2)	(-8.9)
Government-owned firm	-1.536	-1.022	-0.946	1.951	-3.143
	(-1.4)	(-3.4)	(-1.7)	(7.3)	(-4.5)
Controls					
Age	Yes	Yes	Yes	Yes	Yes
Gender	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes
Change per sd in health	-0.42	-0.08	-0.11	-0.08	-0.14
Mean dependent variable	10.71	1.15	1.99	4.13	8.32
Adjusted R^2	0.022	0.022	0.050	0.048	0.032
Number of observations	101,380	101,380	101,380	101,380	101,380

Panel B: Entering mental and physical health separately					
Dependent variable	Firm policies				OROA
	Sales growth	Acqui- sition	Plant opening	Invest- ment	
Specification	1	2	3	4	5
Mental health	-0.071	-0.008	-0.008	-0.009	-0.026
	(-2.5)	(-1.4)	(-0.8)	(-1.6)	(-1.6)
Physical health	-0.015	-0.006	-0.011	-0.006	-0.003
	(-0.6)	(-1.4)	(-1.8)	(-1.6)	(-0.2)
Logged assets	-2.602	0.925	1.638	-0.150	-0.550
	(-15.9)	(15.3)	(18.6)	(-6.4)	(-6.8)
Family firm, not family managed	0.093	-0.383	-0.678	0.014	-0.104
	(0.1)	(-2.7)	(-2.9)	(0.1)	(-0.3)
Family firm, family managed	-3.730	-0.650	-1.033	0.240	-0.820
	(-6.7)	(-6.2)	(-6.9)	(1.6)	(-2.7)
Listed firm	20.265	-2.677	-1.562	-0.350	-8.514
	(6.3)	(-6.8)	(-1.5)	(-1.2)	(-8.9)
Government-owned firm	-1.539	-1.022	-0.946	1.951	-3.144
	(-1.4)	(-3.4)	(-1.7)	(7.3)	(-4.5)
Controls					
Age	Yes	Yes	Yes	Yes	Yes
Gender	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes
Change per sd in mental health	-1.17	-0.14	-0.13	-0.14	-0.43
Change per sd in physical health	-0.13	-0.05	-0.09	-0.05	-0.02
Mean dependent variable	10.71	1.15	1.99	4.13	8.32
Adjusted R^2	0.022	0.022	0.050	0.048	0.032
Number of observations	101,380	101,380	101,380	101,380	101,380

Internet Appendix for

CEO Health and Corporate Governance

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April 20, 2020

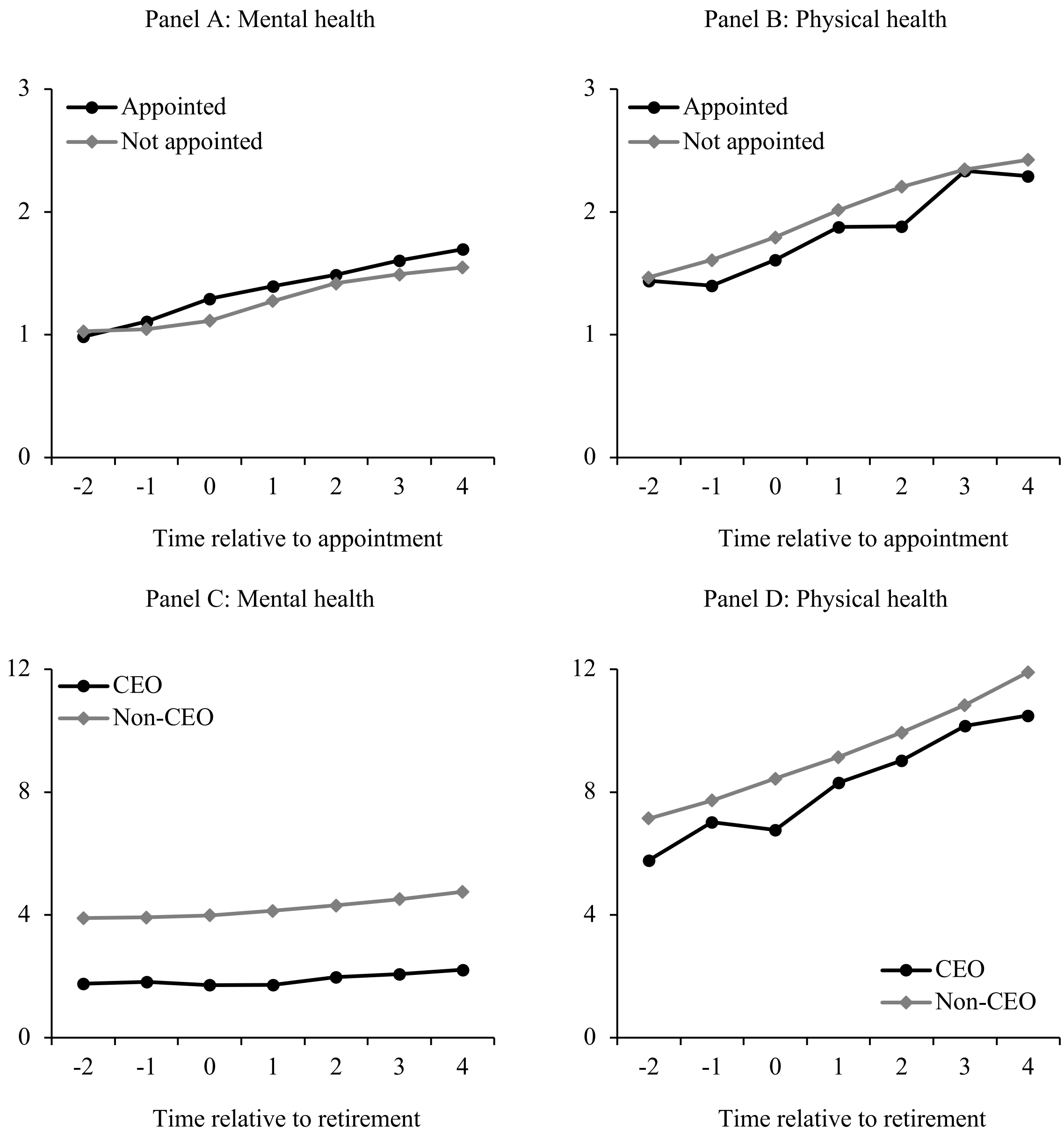

Figure IA1. Health around CEO appointment and retirement
This figure plots the raw data on the indices of mental and physical health used in Tables 6 and 7. The health indices calculate the predicted number of days of next-year sick leave for each individual-year observation using information on the diagnoses an individual has in a given year. Panels A and B plot the health indices around CEO appointments, separately for executives who were and were not appointed to CEOs. Panels C and D plot the health indices around the median retirement age of 66 separately for people in and not in a CEO position prior to retirement. Unit of reporting is days.

Table IA1

Descriptive statistics on firms

This table reports average firm characteristics for all sample firms, small firms, and larger firms. The firm characteristics are total assets (measured in SEK), operating return on assets, sales growth calculated as relative change from last year, an indicator for firms either managed or owned by at least two members of the same family, and indicators for listed companies and firms fully owned by the national, regional, or local government. Plant opening is defined as opening of a new establishment with at least 10 employees. Acquisitions refer to purchases of a control interest in another firm with at least 10 employees. Investment is calculated as gross investments during a year divided by total assets at the beginning of the year. OROA and sales growth are winsorized at the 5 and 95 percentiles.

	All CEOs	CEOs by firm size	
		Total assets <100 million	Total assets ≥100 million
Total assets, million SEK	421.69	27.85	1757.05
Family firm, not family managed	0.144	0.140	0.155
Family firm, family managed	0.059	0.068	0.025
Listed firm	0.013	0.005	0.042
Government-owned firm	0.039	0.014	0.124
Sales growth	0.176	0.177	0.170
Acquisition	0.014	0.007	0.037
Plant opening	0.022	0.012	0.055
Investment	0.043	0.043	0.043
OROA	0.085	0.092	0.061
Number of observations	115,609	89,278	26,331

Table IA2

Defining Rx-Risk comorbidity classes using ATC and ICD-10 codes

This table reports the correspondence of the Rx-Risk comorbidity classes reported in Table 2 Panels A and B and used to construct the health indices in Table 2 Panel C to the ATC codes observed in the drug prescription data and the ICD-10 codes in the specialized care and hospitalization data. We follow Quinzler et al. (2019) in mapping the ATC codes into Rx-Risk comorbidity categories, except when the codes in Quinzler et al. are at a finer level than in our ATC data. In these cases, we use a coarser ATC specification unless this results in an overlap between different comorbidity categories in the index, in which case we omit the codes in question. For four rare conditions (HIV, cystic fibrosis, ESRD, and transplant), the use of coarser ATC data generates an incidence rate that materially differs from that of the population in Sweden. We drop these conditions from the index. To our knowledge, no direct translation of the Rx-Risk categories to ICD codes is available, so we use the medical literature for this translation.

RxRisk class	Assigned ATC codes[1]	Assigned IDC-10 codes	Reference for ICD-10 assignment
Anxiety and tension	N05B, N05C	F40-F41	Schafer et al. (2010)
Asthma	R03BA01, R03BA02, R03BA05,R03BA07, R03BA08, R03A-R03D	J45	Tonelli et al. (2015)
Bipolar disorder	N05AN01	F30-F31	Larsson et al. (2013)
Cardiac disease	C01B, C01D, C03C, C03E	I20, I44-I49, I50	Halfon (2013); Miller and Wadsworth (2009)[2]
Coronary, peripheral vascular disease	B01A, C04A	I21-I25, I70, I71, I73.1, I73.8, I73.9, I77.1 ,I79.0, I79.2, K55.1, K55.8, K55.9,Z95.8, Z95.9	Eriksson et al. (2001); Quan et al. (2005)[3]
Depression	N06A	F32-F33	Schafer et al. (2010)
Diabetes	A10A, A10B	E10-E14	Tonelli et al. (2015)
Epilepsy	N03A	G40-G41	Tonelli et al. (2015)
Gastric acid disorder	A02B	K20-K31, not K230 and K231	Halfon et al. (2013)[4]
Gout	M04A	M10	Halfon et al. (2013)
Heart disease, hypertension	C07A, C07F, C07, C08	I11	Seidler et al. (2016)
Hyperlipidemia	C10A, C10B	E780-E785	Halfon et al. (2013)
Hypertension	C02, C02C, C03A, C03D, C09A-C09D, C09X	I10, I12-I13, I15	Tonelli et al. (2015)[5]
Irritable bowel syndrome	A07A	K58	Tonelli et al. (2015)
Liver disease	A05B, A06A	B18, I85, I86.4, I98.2, K70, K71.1, K71.3-K71.5, K71.7, K72-K74, K76.0, K76.2-K76.9, Z94.4	Quan et al. (2005) (Elixhauser mapping)
Malignancies	C05B, L01A, L01B, L01D, L01X, L02A, L02B, L03A, L04A	C00-C97	Halfon et al. (2013)
Parkinson‘s disease	N04B	G20-G22	Tonelli et al. (2015)

Table IA2 continued			
RxRisk Class	Assigned ATC Codes[1]	Assigned IDC-10 Codes	Reference for ICD-10 Assignment
Psychotic illness	N06, N05AA01, N05AA02, N05AA04, N05AA06, N05AB01, N05AB02, NO5AB03, N05AB04, N05AB06, N05AC01, N05AC02, N05AD01, N05AD03, N05AD05, N05AD08, N05AE04, N05AE03, N05AF01, N05AF03, N05AF05, N05AG01, N05AG02, N05AH01, N05AH02, N05AH03, N05AH04, N05AL01, N05AL03, N05AL05, N05AX08, N05AX12, N05AX13	F20-F29	Wils et al. (2017)
Renal disease	V03A	I12.0, I13.1, N03.2-N03.7, N05.2–N05.7, N18 (except N18.5), N19, N25.0, Z49.0-Z49.2, Z94.0, Z99.2	Quan et al. (2005)
Rheumatoid arthritis	H02, H02A, M01B, M01C	M05, M06, M31.5, M32-M34, M35.1, M35.3, M36.0	Tonelli et al. (2015)
Thyroid disorder	H03A	E00-E07	Halfon et al. (2013)
Tuberculosis	J04A	A15-A19, B90, K230, K673, K930, M011, M490, M900, N330, N740, N741, O980, P370	Halfon et al. (2013)

[1] Using Quinzler et al. (2019), but truncating to coarser ATC codes whenever Quinzler et al. (2019) uses a more granular ATC code than our data allows.

[2] The medication list in Halfon (2013) is used to map I44–I49 and I50. C01D includes organic nitrates which according to e.g. Miller and Wadsworth (2009) are mainly used to treat Angina Pectoris [ICD-10: I20].

[3] ICD codes corresponding to coronary heart disease come from Eriksson et al. (2001), excluding I20 that is included in "Cardiac disease". ICD-codes for peripheral vascular disease come from Quan et al. (2005).

[4] The ICD codes are found by comparing the medication list in Halfon et al. (2013) to that in Quinzler et al. (2019).

[5] Excluding hypertensive heart disease [ICD-10: I11] from the list in Tonelli et al. (2015).

Table IA3

Incidence of diagnoses

This table reports the annual incidence of diagnoses concerning mental and physical health, broken down into the Rx-Risk categories detailed in Table IA2, on the 3.6 million individuals born in 1951–78 over the 2006–15 observation period. Diagnoses in the specialized care, hospitalization and drug prescription registers enter the calculation. The statistics are calculated separately for all individuals in the population, for high-skill professionals in law, engineering, and finance, and for CEOs by firm size (measured by total assets in SEK). The unit of observation is an individual in a year.

Annual incidence of diagnoses in population						
	Incidence in population, %	Incidence for CEOs and high-skill professionals, %				
		High-skill professional			CEO by firm size	
		Law	Engineering	Finance	<100 million	≥100 million
Mental health diagnosis	16.1	12.1	7.8	9.2	8.2	8.0
Anxiety and tension	10.4	7.9	4.5	6.1	6.0	6.3
Depression	10.2	7.5	5.1	5.0	3.6	3.0
Psychotic illness	1.6	0.5	0.4	0.3	0.1	0.1
Bipolar disorder	0.5	0.3	0.2	0.2	0.07	0.01
Physical health diagnosis	32.3	26.3	20.7	23.9	29.0	28.8
Hypertension	8.7	5.7	4.4	4.6	9.7	9.5
Gastric acid disorder	8.1	4.2	3.4	3.7	5.5	4.8
Heart disease	6.1	4.1	2.8	3.2	5.0	4.9
Hyperlipidemia	5.3	3.6	2.8	3.0	6.5	7.0
Rheumatoid arthritis	4.3	3.6	2.7	3.6	3.9	4.0
Coronary, peripheral vascular disease	4.1	3.0	2.1	2.3	4.2	3.8
Thyroid disorder	3.9	3.7	2.3	2.9	1.3	1.3
Liver disease	3.8	2.9	2.3	2.8	2.6	2.5
Diabetes	3.1	1.5	1.4	1.1	2.1	1.4
Asthma	5.9	5.3	4.2	4.8	4.6	3.9
Cardiac disease	2.8	1.5	1.2	1.1	2.1	2.0
Epilepsy	2.2	1.1	0.7	0.7	0.7	0.6
Malignancies	1.9	1.9	1.4	1.6	1.4	1.6
Gout	0.5	0.3	0.3	0.2	0.9	0.7
Irritable bowel syndrome	0.5	0.4	0.2	0.3	0.2	0.2
Parkinson's disease	0.4	0.2	0.2	0.1	0.2	0.1
Renal disease	0.2	0.18	0.14	0.15	0.17	0.2
Tuberculosis	0.04	0.01	0.01	0.01	0.02	0.02

Table IA4

Regressions used to calculate health indices

This table reports regressions that explain annual days of sick leave next year with the individual's medical conditions in the current year along with age, gender, and year indicators. The diagnoses come from specialized care, hospitalizations, and drug prescriptions for individuals who are born in 1951–78 and who are reported to receive some labor income. For each Rx-Risk category, the regression includes three mutually exclusive variables that indicate the diagnoses related to the Rx-Risk category appear in prescription data only, specialized care data but not in hospitalization data, or in hospitalization data. The *t*-values are reported in parentheses below the coefficients and assume clustering at the individual level.

Dependent variable	Number of sick leave days		
	Coefficients for…		
	Prescriptions	Specialized care	Hospitalizations
Mental health			
Anxiety and tension	12.2	25.5	36.7
	(180.8)	(73.5)	(38.9)
Depression	14.4	41.2	58.4
	(207.5)	(125.0)	(81.6)
Psychotic illness	19.0	16.9	50.6
	(47.0)	(24.0)	(33.0)
Bipolar disorder	-1.9	9.9	40.7
	(-2.4)	(16.4)	(27.6)
Physical health			
Hypertension	1.2	3.8	14.5
	(21.7)	(21.8)	(48.3)
Gastric acid disorder	8.6	6.5	12.9
	(128.0)	(36.0)	(21.9)
Heart disease, hypertension	0.4	3.3	12.2
	(5.7)	(2.5)	(3.9)
Hyperlipidemia	-1.4	-2.5	-0.2
	(-17.8)	(-8.8)	(-0.4)
Coronary, peripheral vascular disease	6.2	11.7	27.9
	(81.9)	(35.7)	(23.5)
Rheumatoid arthritis	6.0	6.4	12.0
	(61.3)	(17.4)	(23.7)
Thyroid disorder	0.8	4.0	6.1
	(10.1)	(17.4)	(14.1)
Liver disease	9.0	8.5	28.0
	(91.5)	(24.6)	(25.7)
Diabetes	2.4	3.9	14.7
	(20.9)	(24.6)	(30.7)
Asthma	1.6	2.3	9.7
	(27.4)	(10.2)	(16.9)
Cardiac disease	4.8	3.2	9.8
	(34.8)	(14.9)	(28.7)
Epilepsy	24.1	9.1	36.4
	(103.2)	(24.0)	(33.4)
Malignancies	6.6	14.4	69.2
	(36.4)	(70.0)	(130.0)

Table IA4 continued			
	Coefficients for…		
	Prescriptions	Specialized care	Hospitalizations
Irritable bowel syndrome	4.0	4.7	9.0
	(14.8)	(5.9)	(4.2)
Gout	9.7	3.2	19.7
	(30.2)	(6.5)	(8.6)
Parkinson's disease	7.8	37.4	66.4
	(20.4)	(23.9)	(14.7)
Renal disease	37.2	7.8	50.3
	(15.5)	(13.9)	(30.7)
Tuberculosis	28.1	7.2	24.1
	(18.3)	(5.1)	(6.2)
Mean dependent variable		8.71	
Adjusted R^2		0.105	
Number of observations		25,563,310	

Table IA5

Alternative health indices based on early retirement and mortality

This table reports results in Table 2 Panel C using health indices based on early retirement (Panel A) and mortality (Panel B). These indices regress indicators for an individual receiving early retirement benefits in a year or an individual being deceased in a year against all the diagnosis indicators defined in Table 2. The sample includes individuals who are born in 1951–78. Health index in Panel A is reported percentage points whereas its unit of observation in Panel B is basis points.

Panel A: Health index based on early retirement

	Index in population, %	Age-gender-adjusted index relative to population, %				
		High-skill professional			CEO by firm size	
		Law	Engineering	Finance	<100 million	≥100 million
Mental health	1.8	64.1	52.2	52.0	42.5	39.5
Physical health	1.6	67.8	62.4	60.7	62.9	47.9
Mental and physical health	3.5	65.8	57.0	56.1	52.1	43.5

Panel B: Health index based on mortality

	Index in population, ‱	Age-gender-adjusted index relative to population, %				
		High-skill professional			CEO by firm size	
		Law	Engineering	Finance	<100 million	≥100 million
Mental health	3.1	69.6	52.6	58.3	53.0	52.5
Physical health	13.1	82.2	71.6	74.5	69.9	67.8
Mental and physical health	16.2	79.8	68.0	71.4	66.7	64.9

Table IA6

Entering mental and physical health jointly in CEO turnover regressions

This table replaces the mental and physical health indices in Table 5 Panel A with a combined mental and physical health index. We report results on a survival analysis that explains the number of years it takes a CEO leaves her current company. All regressions include age, year, and gender indicators, and indicators for industry based on two-digit SNI codes. Specifications 2 and 4 also include the firm characteristics defined in Table 5. Specifications 3 and 4 add early-life traits and the level of education, defined in Table 1. The unit of observation is a year of a CEO's spell at a firm, the *t*-values below coefficients assume clustering at the CEO level. Coefficients for health are multiplied by one hundred.

Dependent variable	Years to CEO turnover			
Sample	Full sample		Sample with early-life traits	
Specification	1	2	3	4
Mental and physical health	0.48	0.50	0.56	0.54
	(6.7)	(7.0)	(6.7)	(6.4)
Logged assets		0.17		0.15
		(36.2)		(27.2)
OROA		-1.13		-1.13
		(-25.7)		(-21.9)
Sales growth		-0.09		-0.10
		(-7.3)		(-6.9)
Family firm, family managed		-0.21		-0.23
		(-6.4)		(-6.1)
Family firm, not family managed		-0.92		-0.89
		(-15.5)		(-12.9)
Listed firm		-0.25		-0.29
		(-4.0)		(-4.3)
Government-owned firm		-0.44		-0.49
		(-9.2)		(-8.7)
Controls				
Age	Yes	Yes	Yes	Yes
Gender	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes
Early-life traits and education	No	No	Yes	Yes
Mean dependent variable	6.39	6.39	6.64	6.64
Number of observations	101,594	101,594	77,067	77,067

Table IA7

Entering mental and physical health separately at the time of appointment in CEO turnover regressions

This table enters the mental and physical health indices in Table 5 Panel B separately. We report results on a survival analysis that explains the number of years it takes a CEO leaves her current company. For CEOs appointed after 2006, we regress the number of years to turnover on mental and physical index values at the time of appointment. All regressions include age, year, and gender indicators, and indicators for industry based on two-digit SNI codes. Specifications 2 and 4 also include the firm characteristics defined in Table 5. Specifications 3 and 4 add early-life traits and the level of education, defined in Table 1. The unit of observation is a CEO's spell at a firm and the *t*-values below coefficients assume clustering at the CEO level. Coefficients for health are multiplied by one hundred.

Dependent variable	Years to CEO turnover			
Sample	Full sample		Sample with early-life traits	
Specification	1	2	3	4
Mental health at appointment	0.36	0.37	0.59	0.56
	(1.8)	(1.9)	(2.4)	(2.4)
Physical health at appointment	0.13	0.25	0.38	0.43
	(0.7)	(1.4)	(1.9)	(2.1)
Logged assets		0.13		0.12
		(22.3)		(16.0)
OROA		-0.78		-0.84
		(-14.1)		(-12.6)
Sales growth		-0.03		-0.03
		(-2.4)		(-2.4)
Family firm, family managed		-0.28		-0.31
		(-6.9)		(-6.6)
Family firm, not family managed		-0.77		-0.73
		(-8.3)		(-6.5)
Listed firm		-0.11		-0.18
		(-1.6)		(-2.4)
Government-owned firm		-0.45		-0.55
		(-7.4)		(-7.3)
Controls				
Age	Yes	Yes	Yes	Yes
Gender	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes
Early-life traits and education	No	No	Yes	Yes
Mean dependent variable	3.39	3.39	3.43	3.43
Number of observations	15,462	15,462	11,193	11,193

Table IA8

Association of CEO appointments with income

This table reports results of an event study that estimates the impact of becoming a CEO on income. The dependent variable is logged income. The independent variables are indicators for years around a CEO turnover event interacted with indicators for an executive promoted to a CEO position. The sample includes the four highest paid executives in the firm in the year prior to the CEO turnover and the person appointed as the CEO in case of an external appointment. Specification 1 (2) includes events in which the executives can be followed for two years prior and two (four) years after CEO turnover. All regressions include year, age, and gender indicators, and fixed effects for each CEO turnover event. The unit of observation is an individual in a year and the *t*-values below coefficients assume clustering at the level of the CEO turnover event.

Dependent variable	Log income	
Follow-up period	Two years	Four years
Specification	1	2
After appointment	-51.71	-42.58
	(-4.2)	(-3.0)
Appointed to CEO	568.22	568.44
	(11.9)	(10.2)
Appointed to CEO × After appointment	172.47	138.36
	(9.3)	(4.9)
Controls		
Age	Yes	Yes
Gender	Yes	Yes
Year	Yes	Yes
Turnover event FE	Yes	Yes
Mean dependent variable	984.56	963.07
Adjusted R^2	0.495	0.475
Number of observations	83,378	76,640

Appendix 1. Institutional details on health care in Sweden

In Sweden, all residents are entitled to publicly funded, affordable health care. County councils are the major financiers and providers of health care. Patient fees only account for about 3 percent of the total revenues; for example, the daily fee for staying at a public hospital is about USD 15 (Grönqvist et al., 2012). Supplemental private health insurance is available, but uncommon. Almost all hospitals are public hospitals (Nilsson and Paul, 2018).

When a patient wishes to visit a health care provider due to a new health problem, she first calls her local health care center. An appointment cannot be made by the patient alone; rather, the nurse answering the phone acts as a gatekeeper and provides advice when needed. The gatekeeper is only able to make an appointment with the local health care center. If the patient needs to see a specialist, she will need to visit a general practitioner at the local health care center and obtain a referral (Nilsson and Paul, 2018). Likewise, the place of residence largely determines the hospital the patient will be admitted to when in need of health care (Advic, 2016).