Old captains at the helm: Chairman age and firm performance

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This paper asks whether the chairmen of the board (COB) impose their life-cycles on the firms they preside. In a large sample of unlisted firms we find a statistically and economically significant negative relation between COB age and firm performance. This relation survives a battery of robustness tests. COBs age much like 'ordinary' people. Their cognitive abilities deteriorate and they experience significant shifts in motivation. When taken to the test, deteriorating cognitive abilities seem to be the main driver of the COB age effect we observe. Mandatory retirement age limits cannot solve the apparent succession planning problems in unlisted firms.

Keywords: age, chairman of the board, firm performance, corporate governance, unlisted firms.

JEL codes: G30, L20

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1. Introduction

Extensive literature in economics, psychology, and sociology document a negative relation between an individual's age and job performance. Accordingly, older individuals perform, on average, poorer in a broad spectrum of cognitive tasks (see, for example, Verhaeghen and Cerellas, 2002; Verhaeghen and Salthouse, 1997), they experience a shift in motivation (see, for example, Ebner, Freund, and Baltes, 2006), and they seem to prefer a more quite life (Bertrand and Mullainathan, 2003; Li, Low, and Makhija, 2011). The effects often start to show before the age of 50 and then evolve progressively as individuals grow older. This paper asks whether aging agents affect firm performance and why that could be the case. Because firms, in principle, can adjust their control structures if it is optimal to do so, one would expect performance to be unrelated to the age of their captain.

The data tell a different story. Using a unique dataset from a recent survey of more than 1,500 chairmen of the board (COB) of unlisted corporations in Switzerland, we document a strong and robust negative relation between COB age and various measures of firm performance. In a linear estimation the numbers indicate that an increase in COB age by one standard deviation (10 years) is associated with a drop in return on equity by 1.44 percentage points. This corresponds to a performance decline of roughly 12 percent for the average firm. Non-parametric regressions reveal that the deleterious effects of aging start around COB age 50 and bottom out around age 65—Switzerland's official retirement age. Therefore, it looks as if underperforming COBs use the official retirement age as a face-saving exit option. To the best of our knowledge we are the first to document this COB age effect.

The puzzling question is why, on average, COBs can overstay. Several tests indicate that the answer to this question is related to the relatively weak corporate governance standards of unlisted firms. When we replicate our analysis for a comparison sample of listed Swiss firms, we

find profitability to be unrelated to the individual age of the COB (and other top managers). This is consistent with previous studies for the U.S. (see, for example, Bhagat, Bolton, and Subramanian, 2010; Loderer and Waelchli, 2011). Therefore, our results seem to apply to unlisted firms and not to firms at large. Despite the fact that unlisted firms are the backbone of every economy, we still know relatively little about their governance structures (see, for example, Zingales, 2000). Our paper should contribute to a better understanding of the dynamics within these firms. Also, within the sample of unlisted firms, corporate governance plays an important role. For example, we find the COB age effect to be stronger for firms with a more dispersed ownership structure, possibly because collective action problems among shareholders make it more difficult to detect and remove underperforming COBs.

Problems such as small sample size, insufficient control variables, and simultaneity concerns often plague papers based on surveys. While we are aware of these concerns, we believe that they do not significantly affect the interpretability of our results. First, our investigation is based on over 1,500 usable questionnaires. This is more than three times the sample size of recent studies such as Graham and Harvey (2001) and Brav, Graham, Harvey, and Michaely (2005). Second, the questionnaire itself was quite extensive (11 pages). This allowed us to collect important control variables such as tenure, firm size, firm age, leverage, and industry, along with information about the firms' ownership structure, board composition, and family affiliation. Third, for economic reasons discussed in more detail below, we believe that endogeneity is not a major concern in our investigation.

Previous literature shows that the greater experience of older individuals can at least partially counteract the deleterious effects of aging (see Korniotis and Kumar, 2011, among others). This is true also for our sample. However, the combined effect of age and experience is still negative and significant. In addition to experience, for which we control throughout the investigation,

Salthouse (2012) argues that an individual's cognitive abilities ("can do") and motivation ("will do") are the two main age-related determinants of job performance. Our dataset allows us to construct various measures of these determinants of job performance and to investigate whether they change as COBs grow older. Consistent with the extant literature, we find that cognitive abilities decline in age: older COBs perform significantly poorer on a simple speed measure—the time it takes them to fill in the questionnaire (see, among others, Park and Reuter-Lorenz, 2009)-—and they are more likely to concede that job complexity has increased. Also the "will do"-function seems to deteriorate in age: 1) older COBs are less likely to focus on shareholder value maximization; 2) they prefer 'bureaucratic' activities over strategic tasks; and 3) they are less appreciative ofperformance sensitive compensation. This evidence is broadly consistent with typical patterns of older individuals as documented in the extant literature.

Next, we want to know whether the changes in abilities and motivation we observe explain why firm performance deteriorates in COB age. This step of the investigation should help us crack open the black box surrounding age and contribute to a better understanding of the relevant channels through which aging agents hamper performance. The evidence suggests that the age-related performance decay we observe is mainly driven by declining cognitive abilities of older agents. We find that firms presided by "slow" COBs significantly underperform firms with "quick" COBs. Moreover, COB age per se becomes insignificant once we include this proxy for cognitive abilities in the performance regression. Also motivational factors seem to affect firm performance, albeit to a lesser extent. Accordingly, COBs who are committed to maximize shareholder value are associated with slightly better firm profitability and so are COBs who are dedicated to spending more time on strategic initiatives.

The results imply that succession planning problems are real, at least in unlisted firms. Various corporate governance standards, including the report of NACD's Blue Ribbon

Commission on Director Professionalism (2005), stipulate mandatory retirement age limits to prevent directors from such behavior. Our data cast doubt on the effectiveness of mandatory retirement policies to induce a timely succession planning. We find that COB age is higher in firms with mandatory retirement age limits. The presence of an age limit in itself leaves the relation between COB age and firm performance unaffected. This suggests that the ongoing debate about board retirement policies should be taken with a grain of salt.

The paper proceeds as follows. Section 2 presents our investigative approach in more detail. Section 3 studies the relation between COB age and firm performance. Section 4 asks how cognitive abilities and motivation change as COBs grow older. Section 5 asks whether changes in abilities and motivation help explain the COB age effect. Section 6 concludes.

2. Related Literature and Methodology

2.1. COB age and profitability

We survey COBs because they are focal players in the organization. Mace (1986) reports that the powers of control in most instances rest with the COB, who is often also the current (Faleye, 2011) or former CEO (Brickley, Coles, and Jarrell, 1997; Brickley, Coles, and Linck, 1999; Fahlenbrach, Minton, and Pan, 2011). Formally, the COB sets the agenda for the board meetings, conducts these meetings, has the final ballot in the case of a tie vote, and also conducts the meetings of shareholders. Unlike other directors (Fahlenbrach, Low, and Stulz, 2010), this additional public exposure would seem to make it hard for COBs to simply walk away to protect their reputation when dark clouds gather on the horizon. Note that our investigation assumes that the COBs' actions and behavior are relevant for firm performance. Yermack (2006) shows that individual directors can have a significant impact on share prices.

In what we refer to as our standard regression, we regress various measures of firm profitability on COB age and a broad range of variables that should help us control for potential confounding effects:

$$\textit{Profitability} = f(\textit{COB age}, \textit{COB tenure}, \textit{CEO-COB duality}, \textit{Board size}, \textit{Board independence}, \textit{Family status}, \textit{Block ownership}, \textit{Inside ownership}, \textit{Firm age}, \textit{Size}, \textit{Leverage}, \textit{Industry}). \quad (1)$$

Aging is a manifold collection of changes that render human beings progressively more likely to die (Medawar, 1952). Of the many physical, psychological, and social changes that are associated with aging, declining cognitive abilities and shifting preferences of older individuals seem to be particularly relevant to our investigation. According to Verhaeghen and Salthouse (1997), cognitive abilities such as efficiency and effectiveness of information processing (e.g., speed, reasoning and memory) start declining before age 50, on average, and deteriorate progressively thereafter. Executive functions seem to be particularly prone to aging effects (see, for example, Rhodes, 2004). Consistent with that, Taylor (1975) documents that managerial decision-making performance goes down in age.

Aging also seems to affect an individual's motivation. Ebner, Freund, and Baltes (2006) report that younger individuals are more likely to strive for gains, whereas older individuals tend to maintain the status quo and aim at preventing loss. This pattern finds support in the finance literature, according to which young CEOs pursue more acquisitions (Yim, 2010) and invest more aggressively than their older peers (Li, Low, and Makhija, 2011). Moreover, Ferris, Jagannathan, and Pritchard (2003) argue that older directors are prone to last-period problems such as the reluctance to update their skills and a lower willingness to work hard (Jagannathan and Loon, 2011). Based on this literature, we hypothesize a negative relation between the age of the COB and her job performance.

It is well documented that the adverse effects of cognitive aging operate jointly with learning processes. As noted by Korniotis and Kumar (2011), among others, it is important to control for experience when investigating potential age effects. Studying the portfolio positions and investment behavior of more than 60,000 private investors, the authors find that, whereas investment skills deteriorate with age, older investors' portfolio decisions reflect greater knowledge about investing. We use the COB's tenure as a proxy for experience and expect it to be positively related to performance (see also Sturman, 2003).

Because longer tenure could also lead to higher entrenchment (see, among many others, Rose and Shepard, 1997; Yim, 2010), we include additional variables suggested by the literature to capture potential entrenchment effects. In particular, we control for board size (Jensen, 1993; Lipton and Lorsch, 1992; Yermack, 1996; Eisenberg, Sundgren, and Wells, 1998), board independence (Bhagat and Black, 2002), CEO-COB duality (Dalton and Rechner, 1991), family status (Anderson and Reeb, 2003; Sraer and Thesmar, 2007), inside ownership (Morck, Shleifer, and Vishny, 1988; McConnell and Servaes, 1990; Himmelberg, Hubbard, and Palia, 1999) as well as for the presence of blockholders (Demsetz and Lehn, 1985; Holderness and Sheehan, 1988; Holderness, 2003).

Finally, we control for firm age, size, and leverage to disentangle the life-cycle of the COB from that of the firm. Loderer and Waelchli (2011) document a strong negative relation between firm age and profitability, which they ascribe to the older firms' inability to retain key employees and ideas. If old COBs are more likely to preside old firms, the negative relation between COB age and performance could in fact reflect more general geriatric problems in older organizations. Similar arguments can be made for firm size (Cooley and Quadrini, 2001) and financial leverage

(Jensen, 1986). Together with the industry dummies, financial leverage should also help us control for risk.[1]

2.2. The survey

Our data come from a survey which was conducted early 2007. The questionnaire of 11 pages contained 38 questions (most of them with sub-questions), and was written in German and French—Switzerland's two major languages. It was divided into five sections, to collect information on 1) board composition; 2) board compensation; 3) the COB's tasks and responsibilities; 4) ownership structure; and 5) other firm characteristics such as age, industry, and financial performance. The respondents also had the possibility to identify such questions that were difficult to understand and to give general comments. Before sending it out, we pre-tested the questionnaire with a group of carefully selected COBs and communication experts as well as a marketing professional specialized in survey designing.[2]

To obtain a representative sample of corporate Switzerland we started the sample selection procedure with Dun & Bradstreet's database, which covers the vast majority of Swiss corporations. Similar to Brounen, de Jong, and Koedijk (2006), we selected firms with more than 25 full-time equivalent employees, sales above CHF 3 million, and at least two directors. This procedure left us with 11,865 firms. To avoid multiple deliveries to the same individual, we also excluded 2,432 firms that did not have a unique COB.[3] Therefore, the final sample consists of 9,443 COBs, who received a hard copy of our questionnaire in February 2007, along with a pre-stamped envelope and a response form to order a free summary report. We guaranteed full

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1 In later regressions, we will also include the COBs' subjective risk assessment as a further control for risk. The inclusion of this variable does not alter the results, which is why we exclude it from the main investigation.

2 A copy of the survey is available from the authors upon request.

3 If successful individuals are more likely to chair multiple companies, this restriction could exclude a disproportionately high fraction of well-performing firms. However, when we compare firms with and without a unique COB, we find no difference in sales, number of employees, and board size, suggesting that our sample is not tilted towards poorly performing firms.

anonymity and pledged to publish aggregate results only. To increase the response rate, we established a telephone hotline to answer questions related to the survey and resent the questionnaire to all 9,443 COBs in March 2007.

A total of 1,514 COBs returned the questionnaire, at a comparatively high response rate of 16.2 percent.[4] Following Graham and Harvey (2001), we ran tests for sample selection and non-response bias. We find the responding firms to be representative in terms of sales, geographic distribution, and general industry classification. This holds for the 9,443 firms we initially targeted, as well as for the broader population of corporate Switzerland as described by the Swiss Federal Statistical Office. Moreover, we compare early and late respondents and find no significant difference in their answers. Therefore, we conclude that neither sample selection nor non-response bias significantly affect our investigation.

3. COB age and firm performance

3.1. Descriptive statistics

Let's now turn to the results of our investigation. Table 1 describes the data we have collected in the survey. Correlation coefficients are shown in Table 2 and variable definitions can be found in Table 10 at the end of the paper. As shown in Panel A of Table 1, the median sample firm has CHF 10 million assets, sales of CHF 15 million, a net income of CHF 390,000, and a debt ratio of 44 percent.[5] Not surprisingly, our firms are substantially smaller than those usually studied in the literature. Still, they are comparable in size to other studies of unlisted firms, such as Bennedsen, Kongsted, and Nielsen (2008). The typical sample firm has been in business for 43 years and is,

[4] From the 9,443 mailed surveys, 98 were undeliverable and are therefore excluded from the calculation of the response rate. Typical response rates of surveys in North America are 16% in Brav, Graham, Harvey, and Michaely (2005), 10% in Graham, Harvey, and Rajgopal (2005), and 9% in Graham and Harvey (2001). In Europe, Brounen, de Jong, and Koedijk (2006) obtained a response rate of 5%. In Loderer and Waelchli's (2010) survey of Swiss COBs, 21% have participated.

[5] At the time of the survey, the CHF traded at an exchange rate of approximately 0.84 USD.

therefore, almost 20 years older than the typical listed firm in the U.S. (Loderer and Waelchli, 2011).

Panel B shows descriptive statistics for the age of the COBs as well as their tenure in office, our proxy for experience (Vafeas, 2003; Korniotis and Kumar, 2011). Median COB age is 57 years, which is the same as reported in Grinstein and Valles (2008) for a large sample of S&P 1500 firms. Median tenure is 14 years and slightly higher than what studies in other countries find. There is considerable cross-sectional variation in the two variables, as indicated by a standard deviation of 10 and 11 years for COB age and tenure, respectively. Taken together, the numbers imply that the typical sample firm has been in business for approximately 30 years before the COB took office. This should help us disentangle the life-cycle of the firm from that of its COB.

Panel C summarizes the various performance measures. Our main metric of firm profitability is return on equity (*ROE*; median 7.2 percent), defined as net income divided by book value of equity. For robustness tests, we collect additional performance metrics, namely net profit margin, return per employee, as well as the sales-to-asset ratio. Panel D shows the various control variables. In approximately 50 percent of the cases, the COB is also the CEO of the firm (*bCEO-COB duality*). This percentage is much higher than that for listed Swiss firms (20 percent, according Loderer and Waelchli, 2010) but considerably lower than the proportion of U.S. firms with a unitary leadership structure (Grinstein and Valles, 2008). The typical sample firm has four directors (*Board size*), of which one is independent (*Independence*) and one or two are members of the founding family (*Family directors*). Overall, the board structures of our sample firms seem to be roughly comparable to those in other studies of unlisted firms (e.g., Bennedsen, Kongsted, and Nielsen, 2008). The panel also shows that the sample firms are relatively closely held. Typically, the largest shareholder controls 53 percent of the voting rights (*vr Largest*) and is

usually an insider (*vr Executives*; median 60 percent). The members of the founding family (*vr Family*; median 42 percent) also play a key role in the ownership structure of unlisted firms. Loderer and Waelchli (2010) report similar ownership structures for large unlisted Swiss firms.

3.2. Multivariate regressions

This section studies the relation between COB age and firm performance by estimating the standard regression described in equation (1) above. To account for industry specific differences in firm performance, we include industry fixed effects based on the Industry Classification Benchmark (ICB) provided by Dow Jones and FTSE.[6] Standard errors are heteroscedasticity-consistent (Huber-White). Table 3 shows the results for our main performance measure ROE (regression 1), as well as the three additional performance metrics (regressions 2 to 4).

Performance declines as COBs grow older. The coefficient of *COB age* is always negative and significantly different from zero in three of the four regressions. Moreover, the magnitude of the effect is quite remarkable. An increase in *COB age* by 10 years (approximately one standard deviation) is associated with a drop in *ROE* by 1.44 percentage points. Given a sample mean *ROE* of 12 percent, this corresponds to a performance decline of 12 percent. Similarly, both *NPM* and *ROEMP* drop by approximately 10 percent if COB age increases by one standard deviation. Only in regression (4), where the dependent variable is the sales-to-asset ratio, do we find no significant association with *COB age*. One possible interpretation could be that firms headed by old COBs do not have lower output, as measured by sales, but less efficient cost structures.

To find out more about the functional form of the relation between COB age and firm performance, we estimate piecewise linear regressions that allow for changes in the COB age

[6] Our investigation includes 61 firms from the financial industry. The results are qualitatively and quantitatively the same if we exclude these firms.

coefficient at ages 50 and 65. We choose 50 as the lower turning point because, according to Sturman (2003) and Verhaegen and Salthouse (1997), job performance starts deteriorating after age 49. The upper turning point of 65 years denotes the official retirement age in Switzerland. Therefore, in order to implement the piecewise approach, we replace *COB age* with the following three variables in our regression:

$$
\begin{aligned}
\textit{COB age}<50 \quad &= \quad \textit{COB age if COB age} < 50 \\
&= \quad 49 \textit{ if COB age} \geq 50 \\
\\
50 \leq \textit{COB age} < 65 \quad &= \quad 0 \textit{ if COB age} < 50 \\
&= \quad (\textit{COB age} - 49) \textit{ if } 50 \leq \textit{COB age} < 65 \\
&= \quad 15 \textit{ if COB age} \geq 65 \\
\\
65 \leq \textit{COB age} \quad &= \quad 0 \textit{ if COB age} < 65 \\
&\quad\quad\; (\textit{COB age} - 64) \textit{ if COB age} \geq 65
\end{aligned}
$$

If, for instance, COB age is 68, *COB age<50* takes a value of 49, *50≤COB age<65* is 15, and *65≤COB age* is 4. The results of the piecewise linear regressions are shown Table 4. Accordingly, COB age is unrelated to firm performance until age 50. Thereafter, and consistent with previous literature, performance slips as COBs grow older. *ROE*, for example, drops by 0.25 percentage points or 2 percent for each additional year of COB age. Again, the exception is the sales-to-assets ratio, which is unrelated to COB age. After COB age 65, performance seems to bottom out (*ROE*) or even rebound slightly (*NPM* and *ROEMP*). Presumably, COBs can step down without losing face when they reach the official retirement age. It looks as if underperforming COBs are more likely to exercise this exit option. However, because of the relatively few observations at the far end of the COB age distribution, the coefficient of *65≤COB age* should be interpreted with caution.

Finally, we also estimate non-parametric kernel regressions. To preserve space, Figure 1 only reports the results for our main performance measure *ROE*. The graphical illustration confirms the functional form of the age-performance relation from the piecewise linear regressions. For

reading convenience, we switch back to the linear age measure for the remaining investigation. To avoid clutter we only report the results for ROE. The results for NPM and ROEMP are qualitatively the same throughout the analysis.

Before inquiring into the robustness of the results, let's briefly turn to the control variables in our standard regression. Contrary to our predictions, *COB tenure* is statistically zero in all regressions. Therefore, greater experience does not seem to increase performance, on average. Older firms generally exhibit poorer performance, which is consistent with Loderer and Waelchli's (2011) findings for the U.S. *Board size*, and *Board independence* have generally negative but insignificant coefficients. The same is true of *vr Family* and *vr Executives*. We find, however, that *ROE* of firms with CEO-COB duality is approximately 2.5 percentage points lower than for firms with a dual leadership structure. Also, a high fraction of family directors on the board is associated with lower *ROE*. We find a positive association between *vr Largest shareholder* and *ROE*. This suggests that large shareholders are an important governance mechanism in unlisted firms. Finally, the coefficients of *Leverage* and *Size* are in line with previous literature. High leverage increases the shareholder's required rate of return but eats into the profit margin, whereas larger firms have lower *ROE* (Cooley and Quadrini, 2001) but higher *NPM*, possibly because of economies of scale.

3.3. Robustness tests

3.3.1. Listing status

Previous studies, most of which have been conducted for listed U.S. firms, document that the demographics of individual managers, typically the CEO, can affect corporate policy (see, for example, Bertrand and Schoar, 2003; Yim, 2010; Li, Low, and Makhija, 2011; however, see also Fee, Hadlock, and Pierce, 2011). Individual age seems to be unrelated to firm profitability, at

least after controlling for firm age (Loderer and Waelchli, 2011). This raises the question of how the negative relation between COB age and profitability documented in this paper can be interpreted. Is it a genuinely Swiss effect or could it be the result of much weaker formal governance rules in unlisted firms?

To shed some light on this question, we reestimate our standard regression from Table 3 for a control sample of 197 listed Swiss firms in 2006, the year to which the financial data in our survey refer.[7] In untabulated regressions, we find no relation between COB age and firm performance, regardless of how we measure profitability. Neither is an extended panel that covers all listed Swiss firms over the period 1995 to 2009 able to produce a significant relation between COB age and firm performance. Possibly, the relatively strict rules that govern listed Swiss firms prevent COBs from overstaying, as seems the case in other countries. Therefore, the results of our investigation exclusively apply to unlisted firms.

3.3.2. Owner-managed firms

A firm which is fully controlled by insiders need not necessarily focus on financial profitability to foster shareholder value. Instead, the owner-managers could consume private benefits of control such as excessive salaries, quiet life, or other perks, including company resources for private use.[8] Therefore, declining profitability metrics do not necessarily imply that shareholders are worse off. If old COBs are more likely to be such owner-managers, what looks like a decline in performance could actually be a tax-efficient way to disseminate shareholder value. It is difficult to believe, however, that this tax argument can be extended to firms with a relatively dispersed

[7] Most data are from Waelchli (2009). We update the information on director age, board composition, and ownership structure. Financial data are from Compustat Global.

[8] Because of the double-taxation of dividend payments, such behavior could constitute a tax-efficient way to extract cash from the firm.

ownership structure, because (external) minority shareholders typically have no direct access to the company's resources.

In regression (1) of Table 5, we therefore extend our standard regression with an indicator variable which equals 1 if the minority shareholders together own less than 10 percent of the voting rights (*bClosely held*),as well as an interaction term of this indicator with *COB age*. The coefficients of both variables are statistically zero, indicating that the age-related decline in profitability is not restricted to very closely held firms. The same results are obtained when we identify firms in which minority shareholders together control up to 50 percent of the shares (*bMajority shareholder*) and interact this indicator with *COB age*. In fact, the coefficient of that interaction term is positive and significant in a one-sided test, suggesting that the age-related performance decline is actually stronger in firms with significant minority shareholders. This is in line with the predictions from standard agency theory. The reduced monitoring function of minority shareholders seems to aggravate the detection and removal of underperforming COBs. It could also be that a dispersed ownership structure invites COBs to consume more private benefits of control, as they have to bear a smaller fraction of the associated costs. In either case, aging COBs seem to posit a real agency problem in unlisted firms.

3.3.3. The old guard and the superstars

To the extent that former CEOs retire to the chairmanship (Brickley, Coles, and Jarrell, 1997; Brickley, Coles, and Linck, 1999; Fahlenbrach, Minton, and Pan, 2011), it could be that they maintain a significant amount of control over the firm's activities and thereby undermine the authority of the new CEO. Hence, what looks like a negative relation between COB age and performance could actually be the result of governance voids caused by members of the old guard who are reluctant to hand over the reins.

Under this alternative hypothesis, we would expect firms with CEO-COB duality to outperform firms with a dual leadership structure. As we have seen in Tables 3 and 4, this does not seem to be the case, as CEO-COB duality is generally associated with *lower* profitability levels. If we add an interaction term of *bCEO-COB d*uality and *COB age* to the standard regression, its coefficient is insignificant. This suggests that the COB age-performance relation is not driven by firms with a dual leadership structure (not shown).

Similar arguments could be made for founders who fail to relinquish full control to their successors. However, as we have mentioned above, our typical sample firm has been in business for approximately 30 years before the current COB took office. Hence, the typical COB is not the founder of the company. It turns out that only 22 percent of the COBs have been involved with the company from its inception and could, therefore, be classified as founders. To find out whether these founders drive our results, we identify them with a dummy variable and add an interaction term with *COB age*. The coefficients of the additional variables are insignificant. It seems difficult to believe that members of the old guard are the driving force behind the negative relation between COB age and performance.

Finally, one could also argue that, because there is considerable cross-sectional variation in abilities, the age at which a COB takes office could be a proxy for talent. If particularly talented individuals are appointed COB at a relatively young age, the negative relation between COB age and performance could reflect such differences in talent. To test this alternative interpretation, we follow Korniotis and Kumar (2011) and sort our sample by the age at which the COB took office. We then reestimate our standard regression for the sub-samples of firms with relatively low and relatively high COB appointment age, respectively. The COB age effect is statistically the same in the two sub-samples (not shown). Therefore, our results do not seem to be driven by superstar COBs who are appointed at young age.

3.3.4. Endogeneity

Obviously, endogeneity concerns resulting from omitted variables, simultaneity, and measurement error are very hard, if not impossible, to rule out in our investigation. In particular, an open issue is whether we can interpret our results as simple correlations or as causal relations. Econometrically, there is little we can do to address these concerns. Economically, however, we find it hard to believe that the physical age of the COB could be driven by the profitability of the firm in a way that could explain our results. For poor performance to increase COB age, one would either have to posit that poor performance *reduces* the turnover probability, which is rejected by the extant evidence (see, for example, Brickley, 2003), also for Switzerland (Waelchli, 2009). Or one would have to assume that poorly performing firms are more likely to hire old COBs, whereas well-performing firms attract younger COBs. If that were the case, we would expect poorly performing firms to be chaired by old COBs with relatively short tenure.

We test this proposition and the data tell us a different story. In a univariate analysis, COB age and tenure are *positively* correlated in a sub-sample of poorly performing firms (not shown). Moreover, we identify all COBs with tenure below 5 years (*bTenure* < *5*) and interact this dummy variable with *COB age* in our standard regression. It is difficult to believe that the poor performance that could have led to the appointment of an old COB is still visible in the data five years after the COB took over. Therefore, under the alternative hypothesis that poorly performing firms attract old COBs, we would expect the interaction term to pick up the COB age effect. That is not the case. As shown in regression (4) of Table 5, the coefficients of the indicator variable and the interaction term are both insignificant, whereas *COB age* maintains its significantly negative coefficient.

4. Age related changes in abilities and motivation

So far, we have established a fairly robust negative relation between COB age and firm performance. In what follows, we try to crack open the black box surrounding "aging" and investigate which of the many factors that change as individuals grow older could be responsible for the performance decay we observe. We start by asking how age affects the COBs' cognitive abilities and motivation, two of the main age-related determinants of job performance, according to Salthouse (2012).

4.1. COB age and cognitive abilities

To measure the COBs' cognitive abilities, we use a speed proxy as well as the self-reported perception of job complexity. The concept of speed is well established in the literature and considered the strongest predictor of age-related declines in cognitive abilities currently available, according to Verhaegen and Salthouse (1997), Baltes, Staudinger, and Lindenberger (1999), and Park and Reuter-Lorenz (2009), among others. Because slowing is task-independent (Birren and Fisher, 1995), a broad range of speed measures can proxy for cognitive abilities. Our speed measure is the (self-reported) time in minutes it took the COBs to fill in the questionnaire (*Survey time*). We have also asked the COBs to assess the complexity of their tasks (*Complexity*). We use this variable as an alternative proxy for cognitive abilities. It is indicated on a 5-point Likert scale with 1 being the lowest and 5 the highest level of complexity. Descriptive statistics of the two variables are shown in Panel A of Table 6. Panel B reports the results of multivariate regressions of the two variables on *COB age* and the standard set of control variables.

In line with the predictions from previous literature, speed significantly decreases as COBs grow older. According to regression (1), an increase in *COB age* by 10 years (one standard

deviation) increases *Survey time* by 2.4 minutes. Given a sample mean of 21.6 minutes, this corresponds to a time increase of 11 percent. More importantly, the piecewise linear regression (2) reveals that the largest change in speed occurs between ages 50 and 65, which is consistent with the extant literature. The regressions for *Complexity*, our alternative proxy for cognitive abilities, corroborate these findings. Older COBs are significantly more likely to concede that job complexity has increased in recent years—and the main effect again takes place between ages 50 and 65 years. This is consistent with Rhodes (2004), who documents that individuals find it increasingly difficult to execute complex tasks as they grow older.[9] Taken together, and consistent with the extant literature, we conclude that the cognitive abilities of our COBs decrease significantly as they grow older.

4.2. COB age and motivation

4.2.1. Business objectives

To assess whether the motivation changes as well as COBs grow older, we use a variety of different measures regarding business objectives, job activities, and compensation. With respect to business objectives, we have asked the COBs to indicate which ultimate goal they pursue with their activities. More specifically, they could indicate on a Likert scale from 1 to 5 whether they believed that the interests of the shareholders were more important than those of the other stakeholders. Previous studies find that older individuals are less money driven (Ebner, Freund, and Baltes, 2006) and more strongly committed to organizational citizenship behavior (Ng and Feldman, 2008). Accordingly, we would expect older COBs to shift away from shareholder value to a broader corporate target that embraces all stakeholders.

[9] Note that, because the coefficient of *COB tenure* is negative and significant in these regressions, this result does not seem to be driven by the older COBs' greater job experience or better ability to make intertemporal comparisons.

This prediction is supported by the data. The descriptive statistics in Panel A of Table 7 show that, with a mean score of 1.8 out of 5, the typical COB only expresses a lukewarm commitment to shareholder value to begin with. In the multivariate framework reported in regression 1 of Panel C, *COB age* takes on a significantly negative coefficient, indicating that shareholder value maximization indeed becomes less important as COBs grow older.

4.2.2. Job activities

Also job activities seem to shift in age. In particular, according to Ng and Feldman (2008) among others, older individuals prefer clearly defined tasks over less structured activities. Moreover, they seem to favor the status quo (Ebner, Freund, and Baltes, 2006), are more resistant to change (Cornelis, Van Hiel, Roets and Kossowska, 2009), and have fewer career concerns (Li, Low, and Makhija, 2011).

To find out whether job activities change as COBs grow older, we have asked them to indicate the actual amount of time (in percent) as well as the subjective optimal amount of time (in percent) they spend on a) strategic tasks, b) monitoring, c) controlling, reporting, and auditing, d) interaction with business partners, as well as e) other activities, which they could freely list. If older COBs indeed prefer more structured activities, we would expect them to shift their preferences from strategic tasks to controlling, reporting, and auditing activities.

Panel B of Table 7 describes the data. As one would expect, COBs spend most of their time on controlling, reporting, and auditing (28 percent), monitoring activities (28 percent), and strategic tasks (27 percent). Interestingly, according to the last column of the panel, there are some notable differences between the actual and the target time allocation. In particular, COBs, on average, would prefer to spend significantly more time on the firm's strategy and significantly less on monitoring and financial planning.

To find out whether the activities and job preferences change as COBs grow older, we estimate a multivariate fractional logit model with a quasi-maximum likelihood estimator, as proposed by Papke and Wooldridge (1996).[10] The results in Panel D of Table 7 are generally in line with our predictions. Each row of the panel reports the coefficients from a separate regression of the time allocated to a specific task on *COB age*, *COB tenure*, and our standard set of control variables (including industry fixed effects). For reading convenience, we only report the coefficients of *COB age* and *COB tenure*. The left part of the panel refers to the actual time allocation whereas the right part shows the target time allocation.

With respect to the COBs' actual activities, we find that the time spent on controlling, reporting, and auditing increases significantly in age, which is consistent with increased safety performance of older individuals. Moreover, older COBs also spend more time on "other activities," which they could freely list. Popular other activities include "alumni reunion", "art and culture", "colleagues and friends", "use of fleet", and "visit expositions"—most of which seem to be indicators of quiet life.

It is important to note that the same age-related differences obtain if we look at the target time allocation. Hence, old COBs actually prefer to spend more time on 'bureaucratic' tasks and other activities. Moreover, the coefficient of *COB age* is borderline significant (p-value of 0.102) in the regression involving the target time allocation to strategic tasks. Because strategic initiatives can be disruptive to the organization and its products and processes, this result could indicate higher resistance to change of older COBs.

[10] This is the method of choice if the dependent variables are continuous and bound between zero and one. The results remain qualitatively the same if we estimate a fractional multinomial logit model to account for the fact that, by construction, the time proportions allocated to the various tasks are negatively correlated.

4.2.3. COB age and compensation

Finally, we take a brief look at the compensation packages of COBs. According to Adams, Hermalin, and Weisbach (2010), financial incentives are important, also in the board room. We have asked the COBs whether they participate in an incentive plan (*bVariable compensation*) and whether they would prefer a more performance-sensitive compensation (*Higher incentives*). Descriptive statistics are reported in Panel A of Table 7. Only 19 percent of the COBs receive variable compensation.[11] Moreover, the typical COB does not seem to prefer a more performance-sensitive compensation plan.

Panel C takes the COBs' compensation packages to the multivariate framework and asks whether the actual and the desired structure of the compensation is related to the age of the COB. According to regression 2, older COBs are significantly less likely to receive variable compensation. Based on the coefficient estimates, an increase in COB age by 1 standard deviation reduces the probability of receiving variable pay by approximately 5 percent (from 19 to 14 percent). Hence, firms do not seem to increase the performance sensitivity of compensation to counteract potential last period problems of older COBs (see, among others, Bryan, Hwang, Lilien, 2000; Ferris, Jagannathan, and Pritchard, 2003; Jagannathan and Loon, 2011). Moreover, as regression (3) shows, the desire for variable compensation also goes down as COBs age. Therefore, older managers do not seem to be willing to accept additional risks, even though they tend to be wealthier (Loderer, Lewellen, and Martin, 1987).

An alternative interpretation could be that older COBs are more risk-averse and, therefore, request more stable compensation packages (Morin and Fernandez Suarez, 1983). To shed some light on the COBs' risk assessment and whether it drives compensation preferences, we have asked the COBs whether they believed that being a director has become riskier in recent years

[11] For the average COB with an incentive plan, approximately 48 percent of total compensation depends on firm performance (not shown).

(*Risk perception*). 81 percent of the respondents agree to this statement. When we add *Risk perception* to the regression, *COB age* remains negative and significant (regression 4). Interestingly, and contrary to the presumption of risk-averse COBs, the coefficient of Risk perception is positive and significant with confidence 0.9, indicating that COBs actually want to participate financially in the risks they take. Adding an interaction term of *Risk perception* and *COB age* does not alter this result (not shown). We conclude that risk affects the compensation COBs desire, but cannot explain the negative relation between age and performance.

Taken together, this section documents significant age-related shifts in the COBs' cognitive abilities, business objectives, job activities, and compensation packages. Our COBs seem to age much like 'ordinary' people do. As we have already mentioned, cognitive abilities and motivation are two of the main age-related channels to drive job performance (Salthouse, 2012). In what follows we want to find out whether these channels drive the performance decline we observe.

5. What drives the relation between COB age and firm performance?

5.1. Results

To find out whether changes in cognitive abilities and motivation help explain the COB age effect, we extend our standard performance regression with the proxies presented in the previous section. The results are shown in Table 8. For reading convenience, regression (1) repeats the coefficients from our standard regression in Table 3. When we add *Survey time*, our main measure of cognitive abilities (regression 2), the coefficient of *COB age* drops in magnitude and loses most of its significance (p-value of 0.103). Instead, *Survey time* takes on a negative and highly significant coefficient, suggesting that much of the COB age effect we observe can be ascribed to a decline in cognitive abilities.

The changes in motivation can also help explain parts of the COB age effect we observe. We find that COBs, whose business objective is to foster shareholder value, are associated with better profitability (regression 3). This result is in line with Loderer and Waelchli (2010), who document that firms walk the talk when it comes to commitments to shareholder value maximization. Similarly, COBs who are involved in the firm's strategic activities are associated with better performance, whereas the time spent on "bureaucratic" activities is unrelated to ROE, according to regression (4).[12] Also COBs with a preference for more performance sensitivity in compensation leave profitability unaffected (regression 5). Note that in all three regressions involving the proxies for motivation, the coefficient of *COB age* remains negative and significant. Finally, regression (6) includes all five proxies for cognitive abilities and motivation. Again, the decline in cognitive abilities is the main driver of performance. None of the four indicators of motivation are significant—and their joint effect is also insignificant.

5.2. Discussion

Using proxies for two of the main determinants of job performance, we find that the COB age effect is mainly driven by declining cognitive abilities of older COBs. Also, changes in motivation seem to play a role though their relevance for performance is less pronounced. An open question is, whether there is a simple remedy against overstaying COBs. In fact, unassertive retirement policies in corporate boards have attracted considerable attention of shareholder activists, policy makers, and the popular press. Various codes of best practice around the world stipulate that firms enforce a mandatory retirement age to prevent directors from overstaying. NACD's Blue Ribbon Commission on Director Professionalism (2005), for

[12] The correlation coefficient between the time spent on strategic tasks and the time spent on controlling, reporting, and auditing is –0.22. Hence, multicollinearity does not seem to be a major concern when including these two variables to the same regression.

example, states that "the board should establish procedures for the retirement or replacement of board members. These procedures may, for example, include a mandatory retirement age [...]."

Our results cast doubt on the effectiveness of such policies. It is difficult to believe that enforcing a strict retirement age or limiting tenure can prevent the performance decline we observe. As we have seen, aging is a gradual process that sets in relatively early but also has considerable cross-sectional variation. Therefore, a general age limit appears to be an inefficient mechanism to prevent COBs from overstaying. A more promising approach could be to have key agents undergo routine tests of their physical and mental fitness to fulfill their tasks—similar to what pilots are subjected to in order to maintain their license. In fact, setting a mandatory retirement age could even be counterproductive. As we have seen, the kink in the age-performance relation around age 65 suggests that the official retirement age of 65 offers aging COBs a face-saving exit option. In practice, firms often set mandatory retirement age at 70 or older, which could dilute the attractiveness of the "official" exit option and induce COBs to stay longer.

Tentative evidence is unable to reject this conjecture. We have asked the COBs whether their position is subject to any age restrictions (*bAge limit*). As it turns out, only 19 percent of our sample firms set a maximum retirement age. According to Panel A of Table 9, average COB age is slightly higher, on average (57.7 vs. 56.5 years), whereas *Survey time*, our proxy for cognitive abilities, is statistically the same in both sub-samples.[13] In regression (1) of Panel B, we extend the standard performance model with *bAge limit* as well as an interaction term of *bAge limit* and *COB age*. The coefficients of both additional variables are statistically zero, whereas *COB age* maintains its sign and significance. When we add *Survey time*, the coefficient of *COB age* again drops in magnitude and significance. More importantly, *bAge limit* and the interaction term are

[13] We have also asked the COBs whether the firms restrict board tenure. Only 6 percent of the firms have such restrictions.

unaffected by the inclusion of this variable. Setting a mandatory retirement age, therefore, does not seem to help firms overcome the agency problems associated with aging COBs. A more thorough analysis of the unlisted firms' apparent succession planning problem has to be left open for future research.

6. Conclusion

Around the world, life expectancy has been increasing for decades and so has the median age of the working population. A large body of literature in economics, psychology, and sociology examines the challenges posed by this demographic change. Recently, the finance literature has jumped the bandwagon by investigating, among other things, how investment and financing decisions are related to the physical age of the CEO. This paper takes the issue to the board room of unlisted firms, the backbone of every economy. We want to know whether aging COBs affects firm performance, and if so, why that could be the case. The data come from a recent survey of almost 10,000 COBs of unlisted Swiss firms. The resulting sample is representative of corporate Switzerland in various ways.

We find a statistically and economically significant negative relation between COB age and various measures of firm profitability. The deleterious effect of age kicks in around 50. It looks as if COBs, on average, manage to impose their own life-cycle on the firm they chair. Moreover, and consistent with standard agency theory, the age effect is stronger in firms with significant minority shareholders. To the best of our knowledge, we are the first to document such a COB age effect. The dataset allows us to take the analysis one step further and crack open the black box surrounding "aging." Previous literature finds that cognitive abilities and motivation are two of the main age-related determinants of job performance. Consistent with this literature, we show

that older COBs are significantly slower and experience substantial shifts in motivation. COBs seem to age much like 'ordinary' people do.

Finally, we ask whether the changes in abilities and motivation help explain the age effect we observe. The negative relation between COB age and firm performance is mainly driven by the deterioration of the captain's cognitive abilities. Motivation also seems to play a role, but its effect is considerably smaller.

Taken together, our results suggest that unlisted firms have a problem when it comes to succession planning. Various codes of best practice stipulate mandatory retirement age limits to prevent COBs from overstaying. Tentative evidence casts doubts on the effectiveness of this simple remedy against aging COBs. If anything, COB age is higher in firms with such clauses. Moreover, the presence of board age limits leaves the relation between COB age and firm performance unaffected. This implies that the ongoing debate on board retirement policies should be taken with a grain of salt.

References

Adams, R.B., B.E. Hermalin, and M.S. Weisbach (2010): The role of boards of directors in corporate governance: A conceptual framework and survey. *Journal of Economic Literature* 48, 58-107.

Anderson, R., and D.M. Reeb (2003): Founding family ownership and firm performance: Evidence from the S&P 500. *Journal of Finance* 58, 1301-1328.

Baltes, P.B., and U.M. Staudinger (1999): Lifespan psychology: Theory and application to intellectual functioning. *Annual Review of Psychology* 50, 471.

Bennedsen, M., H.C. Kongsted, and K.M. Nielsen (2008): The causal effect of board size in the performance of small and medium-sized firms. *Journal of Banking and Finance* 32, 1098-1109.

Bertrand, M., and S. Mullainathan (2003): Enjoying the quiet life? Corporate governance and managerial preferences. *Journal of Political Economy* 111, 1043-1075.

Bertrand, M., and A. Schoar (2003): Managing with style: The effect of managers on firm policies. *Quarterly Journal of Economics* 118, 1169-1208.

Bhagat, S., B. Bolton, and A. Subramanian (2010): CEO education, CEO turnover, and firm performance. Working paper, University of Colorado at Boulder.

Bhagat, S., and B.S. Black (2002): The non-correlation between board independence and long-term firm performance. *Journal of Corporation Law* 27, 231-273.

Birren, J.E., and L.M. Fisher (1995): Aging and speed of behavior: Possible consequences for psychological functioning. *Annual Review of Psychology* 46, 329.

Brav, A., J.R. Graham, C.R. Harvey, and R. Michaely (2005): Payout policy in the 21st century. *Journal of Financial Economics* 77, 483-527.

Brickley, J.A. (2003): Empirical research on CEO turnover and firm-performance: A discussion. *Journal of Accounting and Economics* 36, 227-233.

Brickley, J.A., J.L. Coles, and G. Jarrell (1997): Leadership structure: Separating the CEO and chairman of the board. *Journal of Corporate Finance* 3, 189-220.

Brickley, J.A., J.S. Linck, and J.L. Coles (1999): What happens to CEOs after they retire? New evidence on career concerns, horizon problems, and CEO incentives. *Journal of Financial Economics* 52, 341-377.

Brounen, D., A. de Jong, and K. Koedijk (2006): Capital structure policies in Europe: Survey evidence. *Journal of Banking and Finance* 30, 1409-1442.

Bryan, S., L. Hwang, and S. Lilien (2000): CEO stock-based compensation: An empirical analysis of incentive-intensity, relative mix, and economic determinants. *Journal of Business* 73, 661-693.

Cooley, T.F., and V. Quadrini (2001): Financial markets and firm dynamics. *American Economic Review* 91, 1286-1310.

Cornelis, I., A. Van Hiel, A. Roets, and M. Kossowska (2009): Age differences in conservatism: Evidence on the mediating effects of personality and cognitive style. *Journal of Personality* 77, 51-88.

Dalton, P.L., and D.R. Rechner (1991): CEO duality and organizational performance: A longitudinal analysis. *Strategic Management Journal* 12, 155-160.

Demsetz, H., and K. Lehn (1985): The structure of corporate ownership: Causes and consequences. *Journal of Political Economy* 93, 1155-1177.

Ebner, N.C., A.M. Freund, and P.B. Baltes (2006): Developmental changes in personal goal orientation from young to late adulthood: From striving for gains to maintenance and prevention of losses. *Psychology and Aging* 21, 664-678.

Eisenberg, T., S. Sundgren, and M.T. Wells (1998): Larger board size and decreasing firm value in small firms. *Journal of Financial Economics* 48, 35-54.

Fahlenbrach, R., A. Low, and R.M. Stulz (2010): The dark side of outside directors: Do they quit when they are most needed? Swiss Finance Institute Working Paper 10-17.

Fahlenbrach R., B. Minton, and C. Pan (2011): Former CEO directors: Lingering CEOs or valuable resources? *Review of Financial Studies* 24, 3486-3518.

Faleye, O. (2011): CEO directors, executive incentives, and corporate strategic initiatives. *Journal of Financial Research*, 34, 241-277.

Fee, C.E., C.J. Hadlock, and J.R. Pierce (2011): Managers who lack style: Evidence from exogenous CEO changes. Working paper, Michigan State University.

Ferris, S.P., M. Jagannathan, and A.C. Pritchard (2003): Too busy to mind the business? Monitoring by directors with multiple board appointments. *Journal of Finance* 58, 1087-1111.

Graham, J.R., and C.R. Harvey (2001): The theory and practice of corporate finance: Evidence from the field. *Journal of Financial Economics* 60, 187-243.

Graham, J.R., C.R. Harvey, and S. Rajgopal (2005): The economic implications of corporate financial reporting. *Journal of Accounting and Economics* 40, 3-73.

Grinstein, Y., and Y. Valles (2008): Separating the CEO from the chairman position: Determinants of changes after the new corporate governance regulation. Working paper, Cornell University.

Himmelberg, C.P., R.G. Hubbard, and D. Palia (1999): Understanding the determinants of managerial ownership and the link between ownership and performance. *Journal of Financial Economics* 53, 353-384.

Holderness, C.G. (2003): A survey of blockholders and corporate control. *FRBNY Economic Policy Review*, April 2003, 51-64.

Holderness, C.G., and D.P. Sheehan (1988): The role of majority shareholders in publicly held corporations. *Journal of Financial Economics* 20, 317-346.

Jagannathan, M., and Y.C. Loon (2011): Mandatory retirement policies for CEOs. Working paper, SUNY Binghampton.

Jensen, M. (1986): Agency costs of free cash flow, corporate finance, and takeovers. *The American Economic Review* 76, 323-329.

Jensen, M. (1993): The modern industrial revolution, exit, and the failure of internal control systems. *Journal of Finance* 48, 831-880.

Korniotis, G.M, and A. Kumar (2011): Do older investors make better investment decisions? *Review of Economics and Statistics* 93, 244-265.

Li, X., A. Low, and A.K. Makhija (2011): Career concerns and the busy life of the young CEO. Working paper, Cheung Kong Graduate School of Business, Nanyang Technological University, and Ohio State University.

Lipton, M., and J. Lorsch (1992): A modest proposal for improved corporate governance. *Business Lawyer* 48, 59-77.

Loderer, C., W. Lewellen, and K. Martin (1987): Executive compensation and executive incentive problems: An empirical analysis. *Journal of Accounting and Economics* 9, 287-310.

Loderer, C., and U. Waelchli (2011): Firm age and governance. Working paper, University of Bern.

Loderer, C., and U. Waelchli (2010): Protecting minority shareholders: Listed versus unlisted firms. *Financial Management* 39, 33-57.

Mace, M. (1986): *Directors: Myth and reality*. Harvard University Press, Boston, MA.

McConnel, J.J., and H. Servaes (1990): Additional evidence on equity ownership and corporate value. *Journal of Financial Economics* 27, 163-184.

Medawar, P.B. (1952): An Unsolved Problem of Biology. H. K. Lewis, London.

Morck, R., A. Shleifer, and R.W. Vishny (1988): Management ownership and market valuation: An empirical Analysis. *Journal of Financial Economics* 20, 293-315.

Morin, R.A., and A. Fernandez Suarez (1983): Risk aversion revisited. *Journal of Finance* 38, 1201-1216.

Ng, T.W.H., and D.C. Feldman (2008): The relationship of age to ten dimensions of job performance. *Journal of Applied Psychology* 93, 392-423.

Papke, L.E., and J.M. Wooldridge (1996): Econometric methods for fractional response variables with an application to 401(k) plan participation rates. *Journal of Applied Econometrics* 11, 619-632.

Park, D.C., and P. Reuter-Lorenz (2009): The adaptive brain: Aging and neurocognitive scaffolding, *Annual Review of Psychology* 60, 173-196.

Rhodes, M.G. (2004): Age-related differences in performance on the Wisconsin card sorting test: A meta-analytic review. *Psychology and Aging* 19, 482-494.

Rose, N.L., and A. Shepard (1997): Firm diversification and CEO compensation: Managerial ability or executive entrenchment? *RAND Journal of Economics* 28, 489-514.

Salthouse, T.A. (2012): Consequences of age-related cognitive declines. *Annual Review of Psychology* 63, 5.1–5.26.

Sraer, D., and D. Thesmar (2007): Performance and behavior of family firms: Evidence from the French stock market. *Journal of the European Economic Association* 5, 709-751.

Sturman, M.C. (2003): Searching for the inverted u-shaped relationship between time and performance: Meta-analyses of the experience/performance, tenure/performance, and age/performance relationships. *Journal of Management* 29, 609-640.

Taylor, R.N. (1975): Age and experience as determinants of managerial information processing and decision making performance. *The Academy of Management Journal* 18, 74-81.

Vafeas, N. (2003): Length of board tenure and outside director independence. *Journal of Business Finance and Accounting* 30, 1043-1064.

Verhaeghen, P., and J. Cerella (2002): Aging, executive control, and attention: A review of meta-analyses. *Neuroscience and Biobehavioral Reviews* 26, 849-857.

Verhaeghen, P., and T.A. Salthouse (1997): Meta-analyses of age-cognition relations in adulthood: Estimates of linear and nonlinear age effects and structural models. *Psychological Bulletin* 122, 231-249.

Waelchli, U. (2009): *Corporate Governance von Schweizer Verwaltungsräten*. Dissertation, Verlag im Internet GmbH.

Yermack, D. (1996): Higher market valuation of companies with a small board of directors. *Journal of Financial Economics* 40, 185-211.

Yermack, D. (2006): Board members and company value. *Financial Markets and Portfolio Management* 20, 33-47.

Yim, S. (2010): The acquisitiveness of youth: CEO age and acquisition behavior. Working paper, Emory University.

Zingales, L. (2000): In search of new foundations. *Journal of Finance* 55, 1623-1653.

Figure 1: Non-parametric regressions

The Figure shows the results of kernel-weighted local polynomial regressions to investigate the functional form of the COB age-performance relation. As the dependent variable, the graph uses residuals from OLS regressions of ROE on the same control variables as in Table 3, except for COB age. The independent variable is COB age, winsorized at the bottom and top decile. The values are obtained using an Epanechnikov kernel function with at rule-of-thumb bandwidth estimator and local-mean smoothing. The dashed lines plot the 90-percent confidence band.

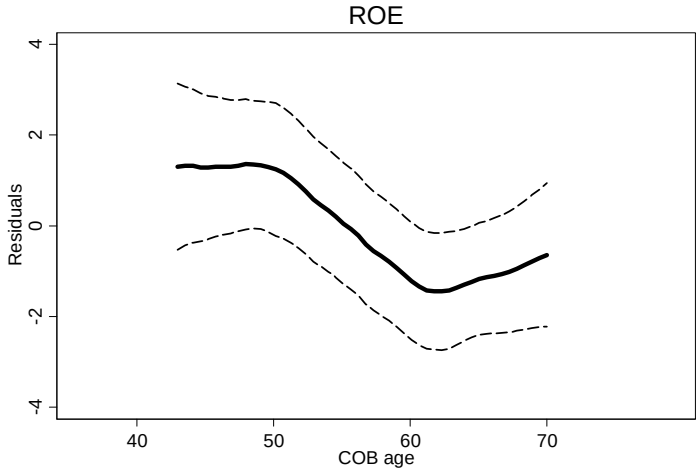

Table 1: Descriptive Statistics

The table shows the descriptive statistics. Variable definitions are in Table 10 at the end of the paper. All variables are winsorized at the 5th and the 95th percentile of their distribution (except the binary variable *bCEO-COB duality*). The data refer to unlisted Swiss firms in 2006.

	Mean	Std.	p25	Med.	p75	N
			Panel A: Firm characteristics			
Assets (mio. CHF)	28	47	4	10	25	1'101
Sales (mio. CHF)	35	51	6	15	35	1'342
Net income (mio. CHF)	1.36	2.45	0.10	0.39	1.20	1'133
Leverage	0.43	0.27	0.19	0.44	0.66	1'022
Firm age (years)	51.18	37.4	19.0	43.0	77.0	1'479
			Panel B: COB characteristics			
COB age (years)	56.8	9.6	49.0	57.0	64.0	1'502
COB tenure (years)	15.5	10.3	7.0	14.0	22.0	1'488
			Panel C: Firm performance measures			
ROE (%)	11.98	13.43	2.64	7.20	16.67	950
NPM (%)	4.30	4.57	0.96	2.83	6.25	1'110
ROEMP (thousand CHF)	14.39	19.89	1.82	6.07	16.90	1'110
Sales-to-assets ratio	1.85	1.26	0.92	1.54	2.50	1'081
			Panel D: Control Variables			
bCEO-COB duality	0.47	–	–	–	–	1'503
Board size	3.90	1.48	3.00	4.00	5.00	1'500
Board independence	0.24	0.30	0.00	0.00	0.40	1'487
Family directors	0.38	0.37	0.00	0.33	0.67	1'487
vr Largest shareholder	0.59	0.31	0.35	0.53	0.90	1'354
vr Founders	0.46	0.45	0.00	0.42	1.00	1'176
vr Executives	0.56	0.41	0.05	0.60	1.00	1'246

Table 2: Correlation coefficients between pairs of control variables and performance measures

The table shows Pearson correlation coefficients. Variable definitions are in Table 10 at the end of the paper. The data refer to unlisted Swiss firms in 2006.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
(1) ROE (%)	1.00														
(2) NPM (%)	0.58	1.00													
(3) ROEMP (1'000 CHF)	0.46	0.76	1.00												
(4) Sales-to-assets ratio	0.30	-0.22	-0.08	1.00											
(5) COB age	-0.07	-0.05	-0.03	-0.10	1.00										
(6) COB tenure	-0.05	0.02	-0.01	-0.12	0.49	1.00									
(7) Firm age	-0.15	-0.02	0.00	-0.20	0.09	0.19	1.00								
(8) bCEO-COB duality	-0.05	-0.07	-0.09	0.06	-0.21	0.13	-0.08	1.00							
(9) Board size	-0.05	0.09	0.13	-0.11	0.04	-0.09	0.07	-0.28	1.00						
(10) Board independence	0.02	0.05	0.09	-0.04	0.02	-0.13	0.03	-0.23	0.30	1.00					
(11) Family directors	-0.09	-0.12	-0.09	-0.04	0.08	0.27	0.10	0.22	-0.28	-0.35	1.00				
(12) vr Largest shareholder	0.07	0.02	0.04	0.07	0.01	0.09	0.07	0.12	-0.22	0.09	0.02	1.00			
(13) vr Founders	0.04	-0.01	0.00	0.14	0.07	-0.02	-0.40	0.09	-0.08	-0.04	0.00	0.02	1.00		
(14) vr Executives	-0.01	-0.08	-0.14	0.07	-0.08	0.16	-0.05	0.47	-0.34	-0.29	0.28	0.07	0.07	1.00	
(15) Leverage	0.10	-0.19	-0.17	-0.10	0.04	-0.05	0.04	-0.06	-0.04	0.03	0.07	-0.04	-0.05	-0.04	1.00
(16) Assets	-0.10	0.21	0.35	-0.24	0.05	-0.03	0.14	-0.19	0.34	0.26	-0.17	-0.01	-0.05	-0.26	0.01

Table 3: COB age and firm performance

The table investigates the relation between COB age and firm performance. Variable definitions are in Table 10 at the end of the paper. In regressions (1), the dependent variable is *ROE*. In regressions (2), (3), and (4), the dependent variable is *NPM*, *ROEMP*, and *Sales-to-asset* respectively. All regressions are estimated with OLS. Robust standard errors are reported in parentheses. ***, **, and * denote statistical significance with confidence 99%, 95%, and 90%, respectively. The data refer to Swiss firms in 2006.

	ROE	NPM	ROEMP	Sales-to-asset
	(1)	(2)	(3)	(4)
COB age	–0.144**	–0.042**	–0.151*	–0.004
	(0.067)	(0.020)	(0.085)	(0.006)
COB tenure	0.072	0.033	0.083	–0.006
	(0.067)	(0.020)	(0.087)	(0.006)
ln(firm age)	–1.538**	–0.111	–1.366	–0.168***
	(0.669)	(0.233)	(0.863)	(0.061)
bCEO-COB duality	–2.662**	–0.495	–1.329	–0.043
	(1.192)	(0.384)	(1.531)	(0.107)
Board size	–0.254	0.002	–0.452	–0.000
	(0.433)	(0.146)	(0.596)	(0.035)
Board independence	–1.162	–0.240	–0.564	0.076
	(1.972)	(0.646)	(2.681)	(0.180)
Family directors	–3.790**	–0.860*	–0.948	–0.136
	(1.654)	(0.516)	(2.038)	(0.135)
vr Largest shareholder	4.539**	0.516	1.936	0.331**
	(1.908)	(0.567)	(2.276)	(0.160)
vr Founders	0.073	0.183	0.543	0.069
	(1.294)	(0.425)	(1.585)	(0.107)
vr Executives	–0.686	–0.086	–1.232	–0.050
	(1.528)	(0.506)	(1.907)	(0.138)
Leverage	6.127***	–2.707***	–12.277***	–0.361**
	(2.118)	(0.603)	(2.392)	(0.163)
ln(assets)	–1.340***	0.622***	5.583***	–0.330***
	(0.465)	(0.172)	(0.716)	(0.046)
Constant	23.056***	8.015***	31.070***	3.245***
	(5.690)	(2.472)	(10.396)	(0.524)
Industry fixed effects	Incl.	Incl.	Incl.	Incl.
Observations	685	684	683	722
Adjusted R-squared	0.058	0.141	0.227	0.162

Table 4: Piecewise COB age and firm performance

The table investigates the functional form of the relation between COB age and firm performance by estimating piecewise linear regressions. Variable definitions are in Table 10 at the end of the paper. The dependent variables are the same as in Table 3. All regressions are estimated with OLS. Robust standard errors are reported in parentheses. ***, **, and * denote statistical significance with confidence 99%, 95%, and 90%, respectively. The data refer to Swiss firms in 2006.

	ROE	NPM	ROEMP	Sales-to-asset
	(1)	(2)	(3)	(4)
COB age < 50	–0.063	–0.007	0.230	0.005
	(0.271)	(0.081)	(0.282)	(0.022)
50 ≤ COB age < 65	–0.248**	–0.119***	–0.471***	–0.003
	(0.126)	(0.039)	(0.156)	(0.010)
65 ≤ COB age	0.123	0.178***	0.542**	–0.020
	(0.212)	(0.068)	(0.246)	(0.022)
COB tenure	0.064	0.028	0.059	–0.006
	(0.067)	(0.020)	(0.087)	(0.006)
ln(firm age)	–1.526**	–0.107	–1.287	–0.164***
	(0.675)	(0.232)	(0.857)	(0.062)
bCEO-COB duality	–2.536**	–0.380	–0.964	–0.055
	(1.205)	(0.382)	(1.527)	(0.109)
Board size	–0.232	0.020	–0.366	0.000
	(0.430)	(0.145)	(0.591)	(0.036)
Board independence	–1.036	–0.183	–0.203	0.077
	(1.977)	(0.649)	(2.679)	(0.180)
Family directors	–3.796**	–0.910*	–0.767	–0.120
	(1.664)	(0.514)	(2.014)	(0.137)
vr Largest shareholder	4.458**	0.437	1.774	0.340**
	(1.923)	(0.566)	(2.288)	(0.161)
vr Founders	0.003	0.115	0.401	0.077
	(1.287)	(0.419)	(1.561)	(0.109)
vr Executives	–0.760	–0.155	–1.434	–0.044
	(1.538)	(0.507)	(1.894)	(0.139)
Leverage	6.089***	–2.775***	–12.267***	–0.354**
	(2.125)	(0.604)	(2.386)	(0.163)
ln(assets)	–1.341***	0.632***	5.575***	–0.333***
	(0.464)	(0.171)	(0.707)	(0.046)
Constant	19.651	6.541	13.831	2.769**
	(13.559)	(4.313)	(15.317)	(1.183)
Industry fixed effects	Incl.	Incl.	Incl.	Incl.
Observations	685	684	683	722
Adjusted R-squared	0.057	0.150	0.233	0.161

Table 5: Robustness tests

The table tests the robustness of the results in Table 3. Variable definitions are in Table 10 at the end of the paper. The dependent variable is *ROE*. We interact COB age (demeaned) with the following dummy variables: (1) *bClosely held*: firms with a single shareholder who owns more than 90% of the voting rights; (2) *bMajority shareholder*: firms in which a single shareholder owns more than 50% of the voting rights; (3) *bNot founder*: firms where the COB is not founder; and (4) *bTenure < 5*: firms with COB tenure below 5 years; All regressions are estimated with OLS. To preserve space, we do not report the coefficients of the control variables. Robust standard errors are reported in parentheses. ***, **, and * denote statistical significance with confidence 99%, 95%, and 90%, respectively. The data refer to Swiss firms in 2006.

	Dependent variable: *ROE*			
	(1)	(2)	(3)	(4)
COB age	–0.187**	–0.257**	–0.320**	–0.152**
	(0.074)	(0.105)	(0.132)	(0.071)
bClosely held	0.048			
	(1.996)			
COB age × bClosely held	0.167			
	(0.128)			
bMajority shareholder		–0.320		
		(1.649)		
COB age × bMajority shareholder		0.168		
		(0.118)		
bNot founder			–1.054	
			(1.590)	
COB age × bNot founder			0.225	
			(0.142)	
bTenure < 5				1.266
				(1.919)
COB age × bTenure < 5				0.050
				(0.181)
COB tenure	0.072	0.074	0.055	0.093
	(0.068)	(0.067)	(0.068)	(0.073)
Other controls	Incl.	Incl.	Incl.	Incl.
Industry fixed effects	Incl.	Incl.	Incl.	Incl.
Observations	685	685	685	685
Adjusted R-squared	0.057	0.058	0.059	0.055

Table 6: COB age and cognitive abilities

The table asks whether the COBs' cognitive abilities change with age. Our proxies for cognitive abilities are *Survey time* and *Complexity*, respectively. Variable definitions are shown in Table 10 at the end of the paper. Panel A reports descriptive statistics. Panel B shows the results from multivariate OLS (regressions 1 and 2) and ordered logit regressions (3 and 4). In regression (1) and (2), the dependent variable is *Survey time*. Regression (3) and (4) investigates the determining factors of *Complexity*. In addition to the linear COB age measure (regressions 1 and 3) we also estimate piecewise linear models (regressions 2 and 4). Robust standard errors are reported in parentheses. ***, **, and * denote statistical significance with confidence 99%, 95%, and 90%, respectively. The data refer to Swiss firms in 2006.

Panel A: Descriptive statistics

	Mean	Std.	Med.	N
Survey time	21.56	9.34	20.00	1'347
Complexity	4.11	1.20	5.00	1'449

Panel B: Multivariate regressions

	Dependent variable: *Survey time*		Dependent variable: *Complexity*	
	(1)	(2)	(3)	(4)
COB age	0.243***		0.020**	
	(0.047)		(0.009)	
COB age < 50		0.147		0.009
		(0.149)		(0.034)
50 ≤ COB age < 65		0.269***		0.046**
		(0.088)		(0.018)
65 ≤ COB age		0.261		-0.051
		(0.186)		(0.033)
COB tenure	0.023	0.024	-0.018**	-0.017*
	(0.045)	(0.045)	(0.009)	(0.009)
Other controls	Incl.	Incl.	Incl.	Incl.
Industry fixed effects	Incl.	Incl.	Incl.	Incl.
Observations	697	697	719	719
Adjusted R-squared	0.084	0.082	0.033	0.036
Wald chi-2			62.525***	67.567***

Table 7: COB age and motivation

The table asks whether the COBs' job-related motivation changes with age. Variable definitions are in Table 10 at the end of the paper. Our proxy for business objectives is *Shareholder value*. To examine the COBs' job activities, we investigate how much time the COBs actually dedicate to a) strategic tasks, b) monitoring activities, c) controlling, reporting, and auditing, d) interaction with external stakeholders, and e) other activities. We both measure the actual as well as the target time allocation to these functions. To assess the COBs' financial incentives, we use the actual structure of the compensation package (*bVariable compensation*) as well as the desired structure (*Higher incentives*). Panel A shows descriptive statistics for the COBs' business objectives and compensation packages. Panel B summarizes the COBs' actual and desired job activities. Panel C shows the results from multivariate regressions of business objectives and compensation on COB age and controls. Regressions (1), (3), and (4) are estimated with an ordered logit model. Regression (2) uses a logit model. Finally, Panel D studies the relation between COB age and job activities in a multivariate framework. Each row shows the results of two separate regressions of the job activity listed to the left of the table on *COB age*, *COB tenure*, and the standard controls (including industry fixed effects, IFE). To preserve space, we only report the coefficients of *COB age* and *COB tenure*. The left part of the table refers to the COBs' actual time allocation whereas the right part studies the target time allocation. Robust standard errors are reported in parentheses. ***, **, and * denote statistical significance with confidence 99%, 95%, and 90%, respectively. The data refer to Swiss firms in 2006.

Panel A: Descriptive statistics for business objectives and compensation

	Mean	Std.	Med.	N
Shareholder value	1.82	1.17	1.00	1'443
bVariable compensation	0.19	–	–	1'144
Higher incentives	2.18	1.38	2.00	1'434
bRisk perception	0.81	–	–	1'448

Panel B: Descriptive statistics for job activities

	Actual time allocation				*Target time allocation*				*Mean*
	Mean	Std.	Med.	N	Mean	Std.	Med.	N	*comparison*
Strategic tasks	0.272	0.186	0.20	1'255	0.312	0.172	30.00	831	***
Monitoring activities	0.278	0.158	0.26	1'251	0.262	0.139	25.00	831	**
Controlling, reporting, and auditing	0.280	0.172	0.25	1'255	0.253	0.147	25.00	832	***
Interaction with external stakeholders	0.145	0.168	0.10	1'253	0.151	0.155	10.00	831	–
Other activities	0.036	0.103	0.00	1'228	0.028	0.081	0.00	808	**

Panel C: Multivariate regressions for business objectives and compensation

	Shareholder value	bVariable compensation	Higher incentives	
	(1)	(2)	(3)	(4)
COB age	–0.024**	–0.032**	–0.023**	–0.022**
	(0.010)	(0.014)	(0.010)	(0.010)
COB tenure	–0.009	0.031**	–0.004	–0.004
	(0.010)	(0.014)	(0.009)	(0.009)
bRisk perception				0.300*
				(0.181)
Other controls	Incl.	Incl.	Incl.	Incl.
IFE	Incl.	Incl.	Incl.	Incl.
Observations	718	595	715	713
Adjusted R-squared	0.040	0.063	0.019	0.020
Wald chi-2	61.180***	35.088***	792.579***	853.604***

Panel D: Multivariate regressions for job activities

	Actual time allocation			*Target time allocation*		
	COB age	COB tenure	Controls, IFE	COB age	COB tenure	Controls, IFE
Strategic tasks	–0.003	–0.003	Incl.	–0.007	–0.005	Incl.
	(0.005)	(0.004)		(0.005)	(0.004)	
Monitoring activities	0.000	–0.007*	Incl.	0.000	–0.003	Incl.
	(0.004)	(0.004)		(0.005)	(0.004)	
Controlling, reporting, and auditing	0.012***	0.002	Incl.	0.011**	0.002	Incl.
	(0.004)	(0.004)		(0.005)	(0.005)	
Interaction with external stakeholders	–0.010*	0.009	Incl.	–0.005	0.009	Incl.
	(0.006)	(0.006)		(0.006)	(0.007)	
Other activities	0.027**	–0.007	Incl.	0.053***	–0.020	Incl.
	(0.013)	(0.014)		(0.017)	(0.017)	

Table 8: COB age, determinants of job performance, and firm performance

The table asks whether changes in cognitive abilities and motivation help explain the COB age effect we observe. Variable definitions are in Table 10 at the end of the paper. The dependent variable is *ROE*. All regressions are estimated with OLS. To preserve space, we only report the coefficients of COB age, COB tenure, the proxies for abilities and motivation, as well as various interaction terms. Robust standard errors are reported in parentheses. ***, **, and * denote statistical significance with confidence 99%, 95%, and 90%, respectively. The data refer to Swiss firms in 2006.

	Dependent variable: *ROE*					
	(1)	(2)	(3)	(4)	(5)	(6)
COB age	–0.144**	–0.114	–0.122*	–0.124*	–0.132*	–0.073
	(0.067)	(0.070)	(0.068)	(0.072)	(0.068)	(0.076)
Cognitive abilities						
Survey time		–0.157***				–0.159***
		(0.053)				(0.059)
Motivation						
Shareholder value			0.917*			0.845
			(0.531)			(0.581)
Strategic tasks (actual)				5.203*		4.993
				(3.000)		(3.300)
Controlling, reporting, and auditing (actual)				–0.033		1.237
				(3.397)		(3.611)
Higher incentives					0.133	–0.035
					(1.308)	(0.419)
COB tenure	0.072	0.082	0.066	0.083	0.063	0.083
	(0.067)	(0.071)	(0.068)	(0.074)	(0.069)	(0.080)
Other controls	Incl.	Incl.	Incl.	Incl.	Incl.	Incl.
IFE	Incl.	Incl.	Incl.	Incl.	Incl.	Incl.
Observations	685	652	672	611	669	575
Adjusted R-squared	0.058	0.068	0.061	0.056	0.054	0.067

Table 9: Firm performance and board retirement policy

This table investigates whether the presence of a mandatory retirement age (*bAge limit*) affects the relation between COB age and firm performance. Variable definitions are in Table 10 at the end of the paper. Panel A performs a mean comparison test of *COB age* and *Survey time* for firms with and without *bAge limit*. Panel B shows the results from multivariate OLS. The dependent variable is *ROE*. To preserve space we do not report the coefficients of the control variables. Robust standard errors are reported in parentheses. ***, **, and * denote statistical significance with confidence 99%, 95%, and 90%, respectively. The data refer to Swiss firms in 2006.

Panel A: Univariate results

	bAge limit = 1		*bAge limit = 0*		*Mean comparison*
	Mean	N	Mean	N	
COB age	57.68	285	56.52	1'195	**
Survey time	21.82	257	21.51	1'074	–

Panel B: Multivariate regressions

	Dependent variable: *ROE*	
	(1)	(2)
COB age	–0.168**	–0.139*
	(0.071)	(0.074)
bAge limit	0.232	0.473
	(1.511)	(1.542)
COB age × bAge limit	0.236	0.235
	(0.184)	(0.187)
Survey time		–0.166***
		(0.054)
COB tenure	0.073	0.086
	(0.068)	(0.072)
Other controls	Incl.	Incl.
Industry fixed effects	Incl.	Incl.
Observations	681	649
Adjusted R-squared	0.058	0.069

Table 10: Variable Definitions

Variable	Definition
Assets	The firm's total assets (millions of CHF).
bAge limit	Binary variable equal to 1 if the firm has a mandatory retirement policy, and equal to 0 otherwise.
bCEO-COB duality	Binary variable equal to 1 if the same person is simultaneously CEO and COB, and equal to 0 otherwise.
bClosely held	Binary variable equal to 1 if a single shareholder owns more than 90 percent of the voting rights, and equal to 0 otherwise.
bMajority shareholder	Binary variable equal to 1 if a single shareholder owns more than 50 percent of the voting rights, and equal to 0 otherwise.
bNot founder	Binary variable equal to 1 if the COB is not founder, and equal to 0 otherwise.
bRisk perception	Binary variable equal to 1 if the COB agreed to the statement "The risks associated with a directorship have increased in recent years", and equal to 0 otherwise.
bTenure < 5	Binary variable equal to 1 if the COB's tenure is below 5 years, and equal to 0 otherwise.
bVariable compensation	Binary variable equal to 1 if the COB receives performance sensitive compensation, and equal to 0 otherwise.
Board independence	Fraction of independent directors on the board. A director is classified as independent if he does not have business-ties to the firm and did not have so over the preceding three years.
Board size	Number of directors on the board.
COB age	Age of the COB (years).
COB tenure	Term during which the COB held his position (years).
Complexity	The COB's assessment of the statement "in recent years, it has become more difficult to be a director", measured on a 5-point Likert scale.
Family directors	Fraction of directors which are members of the founding family.
Firm age	Number of years since the incorporation of the company (years).
Higher incentives	The COB's assessment of the statement "the COB prefers a more performance sensitive compensation package", measured on an ordinal 5-point Likert scale.
Leverage	The firm's leverage, calculated as the book value of debt divided by total assets.
ROE	The firm's return on equity, calculated as the net income divided by the book value of the firm's equity times 100.
ROEMP	The firm's annual return per full time equivalent employee, calculated as the net income divided by the number of full time equivalent employees (thousand CHF).
NPM	The firm's net profit margin, also known as return on sales, calculated as the net income divided by the total annual sales of the firm times 100.
Sales	The firm's annual sales.
Sales-to-assets	The firm's ratio of annual sales to total assets.
Shareholder value	Based on the COB's assessment of the statement "for our board the firm's interests come prior to the shareholders' interest"; measured on an ordinal 5-point Likert scale. To enhance readability, we compute Shareholder value as 6 minus the COB's answer to the above statement.
Survey time	The time it took the COB to fill in the questionnaire (minutes)
vr Executives	Fraction of voting rights controlled by all executives.
vr Founders	Fraction of voting rights controlled by the founders.
vr Largest shareholder	Fraction of voting rights controlled by the largest blockholder.