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Executive age and the readability of financial reports

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ABSTRACT

Concerns have been raised by regulators and investors about the increasingly complex financial reports that are becoming incomprehensible to ordinary investors. The readability literature attributes unreadable financial reports to the reporting firms' operational complexity and/or the desire to obfuscate poor performance. At the same time, upper echelons theory from the management literature posits that top managers' characteristics will impact the way the firm is managed, while business and social science research posits that individuals become more capable and ethical as they grow older. We expect older CEOs and executives to be more capable of explaining operating complexities and staying ethical in reporting, thus leading to more readable financial reports. Our results support this view.

1. Introduction

Financial reports are expected to convey information to outsiders who are not privy to inside information of the firm. Therefore, clarity of financial reports becomes important in order to ensure that the general investing public is able to understand the information in such reports and thus use them to make informed decisions about the firm. In fact, 'understandability' is one of the qualitative characteristics of financial reports highlighted in FASB's conceptual framework for financial reporting (FASB, 2010).

The readability of annual reports is an issue of concern for regulators and investors. Christopher Cox, the then chair of the SEC states that investors are turning away from reading annual reports due to increasing verbosity and jargon. More worryingly, he states that increased verbosity may be used to hide fraud (SEC, 2007). These sentiments are echoed by Warren Buffet as well (SEC, 2007). Confirming these concerns, research has shown that poor readability scores are associated with fraud (Blanco & Dhole, 2017), poor performance (Li, 2008), and earnings management (Lo, Ramos, & Rogo, 2017). Therefore, factors that improve the readability of financial reports would be of interest to regulators and investors.

The upper echelons theory posits that the top management team (hereinafter the TMT) significantly impacts the strategy, direction, and operations of the firm (Hambrick & Mason, 1984). Wiersema and Bantel (1992) argue that TMT characteristics and demographics can predict the functioning of the TMT. This paper investigates the impact of executive age on the readability of annual financial reports. Humans mature as they grow older. This maturity will impact the business acumen, communication skills, and the ethical sensitivities of people. Research has shown that as people grow older and become more experienced, their decision-making skills improve (Huang, Rose-Green, & Lee, 2012; Li, Mayhew, & Kourtzi, 2009; Liden, Stilwell, & Ferris, 1996). Furthermore, older executives have better communication skills due to experience. Older individuals write better because they are more likely to activate both hemispheres of the brain in writing (Gray-Grant, 2013). Finally, research also shows older people exhibit greater ethical sensitivities compared to younger people (Borkowski & Ugras, 1998; Mudrack, 1989; Peterson, Rhoads, & Vaught, 2001; Sundaram & Yermack, 2007; Wimalasiri, 2001). These arguments have been used by Huang et al. (2012) to show that a firm's earnings quality improves with CEO age.

Applying these arguments to financial reporting, we posit that less readable financial reports could be due to two factors: complexity of business and deliberate obfuscation. We argue that older executives will alleviate poor readability in both circumstances. First, with better communication skills, older executives will be able to communicate even complex business propositions using more readable language. Second, being more sensitive to ethics, older executives will refrain from attempting to deliberately obfuscate financial reports to cover up fraud or poor performance.

In this paper, we empirically examine the impact of executive age on the readability of financial reports. Accounting research has

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borrowed readability measurements from linguistics to examine the clarity of financial reports. Christopher Cox (2007) stated that the 'Gunning-Fog' and 'Flesch-Kincaid' measures (two popular measures of readability) may become as widely accepted in determining the readability of financial reports as the Black-Scholes model in determining the value of executive stock options. We download 10-K statements from the SEC's EDGAR website and compute readability based on measures well established in computational linguistic. Given the debate over the comparative merits of readability measures (Loughran & McDonald, 2014), we do not limit our study to a specific measure. Instead, we compute a battery of readability measures to evaluate our hypothesis. Research so far has come to no consensus on whether the 10-K or the management disclosure and analysis (hereinafter MD&A) is the more desirable document for evaluating financial report readability (Lehavy, Li, & Merkley, 2011; Lo et al., 2017). We acknowledge the merits of both documents, and investigate the readability of each of them. Finally, we obtain the age of TMT executives from the Execucomp database.

Using the different readability proxies, we show that as the age of the CEO, the mean age of TMT executives, or the age of the chief financial officer (hereinafter CFO) increases, the readability of the MD&A section and that of the overall annual report (the 10-K statement) improves. Our results are robust to different readability measures, elimination of outliers, one-way clustering by firm, and two-way clustering by firm and year. Our results are also robust to self-selection correction per the Heckman two-step procedure.

We make several contributions to the literature. First of all, we link executive age to improved readability of financial reports. Given the concerns raised by regulators and investors about poor readability of the financial reports and insidious efforts to deliberately obfuscate information with complex language, our findings that including older executives in the TMT can improve readability will be of interest to many constituents. Second, we contribute to the stream of research that investigates the impact of the personal traits of managers on corporate outcomes. Our research is even more pertinent since it focuses on the much more limited literature on executive age, which according to Walter and Scheibe (2013, p. 883) is one of the most relevant, but not adequately researched, TMT trait variables. Third, age discrimination in the workplace is a persistent issue evoking ethical and moral concerns (Kunze, Boehm, & Bruch, 2011; Lahey, 2008; Lipnic, 2018; Wanberg, Kanfer, Hamann, & Zhang, 2016). Our research makes a business case for employing older executives to generate a competitive advantage. Finally, we achieve consistent results across all measures of readability adopted for this study, which points to the convergence of these proxies.

We organize the rest of the article in the following manner. Section 2 reviews the literature and develops the hypothesis. Section 3 describes our data sample and the research methodology. Section 4 reports and discusses our results, and last of all, Section 5 concludes.

2. Literature review and hypothesis development

The increasing verbosity of financial reports has become a concern for investors and regulators for some time. Warren Buffet, for instance, has stated that he is often unable to understand what is being said in the annual financial reports and wonders whether anything is being said at all. He goes on to speculate that the writers of financial reports either do not understand what they are writing about, or more ominously, deliberately confuse the reader in mandated communications (SEC, 1998). Addressing these concerns, the SEC introduced the "Plain English" initiative to encourage firms to use 'plain' English in order to create more informative financial reports (SEC, 1998). Buffett's concern is echoed by Christopher Cox who stated that "…kicking a lot of dust up in the air [*with reference to using confusing language in financial reports*] is exactly what cover-up artists intend to do" (SEC, 2007 – *italics ours*).

The first study into readability of financial reports was conducted by Li (2008). In this seminal study, he uses the Fog Index, a measure of the readability of written text developed by the computational linguistics discipline, to evaluate the link between financial report readability and firms' profitability. He finds that profitable firms and firms with more persistent earnings (i.e., higher quality earnings) issue more readable financial reports. Extending this line of research, Lo et al. (2017) find that firms that manage their earnings upwards to beat prior year's levels issue less readable financial reports. They also find a marginal link between poor readability and future financial misstatements. Blanco and Dhole (2017) find that firms with less readable financial reports tend to commit more frauds in the future, and that readability of the reports improves after frauds are discovered, presumably because the firms are attempting to be more transparent in order to regain the investors' trust.

The readability of financial reports may cause substantial economic consequences for the firm. Biddle, Hilary, and Verdi (2009) show that improved readability will lead to more efficient investments, suggesting that more readable financial reports alleviate moral hazard and adverse selection problems associated with agency conflicts. Lehavy et al. (2011) show that more analysts tend to follow, and put more effort into, firms with less readable 10-K statements, suggesting that less readable 10-K statements create greater information asymmetry. Furthermore, they find that less readable 10-Ks are linked to lower accuracy, larger dispersion, and higher uncertainty in forecasts. Ertugrul, Lei, Qiu, and Wan (2017) find that firms with less readable 10-Ks are symptomatic of 'managerial information hoarding' and can lead to higher costs of external financing. Kim, Wang, and Zhang (2018) show that there is a greater risk of stock price crashes for firms with less readable 10-Ks. Therefore, improving readability of financial reports will have positive consequences for both firms and investors.

Expositional complexity of financial reports can arise from operational complexity (ontological explanation), and/or deliberate obfuscation on the part of the firm's executives (opportunistic explanation). In his discussion of Li (2008), Bloomfield (2008) posits the ontological explanation as one possible reason for the link between poor readability and poor financial results, by arguing that firms who are making losses are, in most circumstances, facing complex environments. Therefore, it requires complex language to communicate the results to investors. Bloomfield (2008) and Lo et al. (2017) posit obfuscation as a reason for poor readability. This reasoning is supported by empirical research that shows lower readability for firms with poor performance (Li, 2008) and poor earnings quality (Lehavy et al., 2011; Li, 2008; Lo et al., 2017).

Given the negative consequences of poor financial report readability, it is important to study factors that influence readability. In this paper, we suggest that older CEOs and older TMT executives lead to more readable financial reports. Hambrick and Mason (1984) introduced the upper echelons theory, which predicts a significant influence on the organization from the top management team. The theory posits that strategies, operations, and the ways that organizations react to their environments are largely a function of the characteristics and background of the TMT. Thus, the organization's outcomes are shaped to a significant degree by the perspectives and cognitive biases of the TMT. While certain characteristics of the TMT are not readily isolated or easily categorized, age is easily identified as a distinct trait, and considered as such in the upper echelons theory literature (Carpenter, Geletkanycz, & Sanders, 2004; Nishii, Gotte, & Raver, 2007).

Executives become more effective as they gain experience. Goll and Rasheed (2005) show that there is more rationality in the decision-making of senior executives. Falato, Li, and Milbourn (2015) evaluate the link between CEO experience and performance in S&P1500 firms and find that experienced CEOs perform better and obtain more compensation. Wang, Holmes, Oh, and Zhu (2016), in a meta-analysis of 308 studies, document a positive link between CEO age (among other factors) and firm performance. The same factors that influence the link between CEOs and performance would also influence other executives in the TMT. Thus, we argue that older executives will be associated with

better firm performance, partially negating the necessity for obfuscating language in financial reports. We further argue that communication is a specific ability necessary for executives. This ability too will improve with age (Gray-Grant, 2013), allowing older executives to communicate complex business matters using more understandable language.

Social science research shows that individuals become more ethical as they grow older. Blonigen (2010) find that anti-social behavior and criminal proclivities diminish with age. Mudrack (1989) argues that since older people have been exposed to the norms of society, and experienced the pressures to conform for a longer period, older people will be more ethical compared to younger ones. Wimalasiri (2001) finds that older students exhibit superior moral judgement compared to their younger counterparts. Peterson et al. (2001), in a study of business professionals, finds older executives to exhibit superior ethical beliefs. Weller and Thulin (2012) associate honesty with risk aversion in the corporate setting while Hambrick and Mason (1984) highlight older executives' avoidance of risky projects, which in combination, indirectly link age to honesty. From a financial reporting perspective, Huang et al. (2012) find that CEO age is negatively associated with earnings manipulation. Since deliberate obfuscation is suggested as one reason for poor readability of financial reports, we argue that the increasing ethical sensitivity of older executives will lead to more readable financial reports.

Accordingly, we posit that both CEO age and executive age will have a significant impact on the readability of financial reports. First, we argue that older executives will be associated with better firm performance, thus minimizing one potential reason for obfuscating language in the financial reports. Second, we argue that even if firms face poor performance, older executives will make more ethical decisions that will preclude them from obfuscating financial reports. Finally, we argue that executives' communications skills will improve with age enabling them to more clearly communicate complex business situations. Thus, in combination, we argue that executive age and CEO age will be linked to more readable financial reports. Taken together, we posit our hypothesis as:

Hypothesis. Readability of financial reports will improve with the age of the CEO and the age of the top management team.

3. Data and research methodology

3.1. Data

Data for this study is collected from publicly available sources. The readability measures are computed using well established procedures (described in the next section), from 10-K files downloaded from the SEC's EDGAR website. The main variables of interest, CEO age and the average age of the TMT are obtained from the Execucomp database. Other control variables are obtained from the Compustat and CRSP databases. We separately analyze the CEO age and the average TMT age in relation to readability measures based on the 10-K and MD&A reports. From 1993 to 2015, we obtain 16,341 firm-years for the CEO/10-K analysis, 12,190 firm-years for the CEO/MD&A analysis, 15,408 firm-years for the TMT/10-K analysis, and finally 11,452 firm-years for the TMT/MD&A analysis. Our sample is smaller than Li (2008) because observations are lost upon merging with the Execucomp database.

3.2. Methodology

3.2.1. Readability proxies

Despite a concerted call for more readable financial reports, the choices of readability proxies and target documents are contentious. While computational linguistics measures such as the Gunning-Fog index (Kim et al., 2018; Li, 2008; Lo et al., 2017) and the Flesch-Kincaid reading ease index (Blanco & Dhole, 2017; Li, 2008) are extensively used to evaluate the readability of financial reports, Loughran and McDonald (2014) point to conceptual issues in these two measures. They argue that these measures, borrowed from a different discipline, would incorrectly classify commonly used business terms such as *corporation, company, agreement, management, and operations* as complex and difficult. To avoid this contention, we use multiple proxies of readability that have found acceptance in the literature. These measures are described below.

Fog Index (FOG), Flesch reading ease level (FLESCH), and Flesch-Kincaid grade level score (KINCAID) are widely used measures of English text readability. FLESCH, based on a 100-point scale, estimates the ease of reading. A higher FLESCH means a more readable text. On the other hand, both FOG and KINCAID are measures of the education level appropriate for comprehending a document. FOG estimates the number of years of formal education a reader needs to understand a given text. KINCAID calculates the grade school level necessary for understanding a given text. Thus, a lower FOG or KINCAID means a more readable text. The formulas are as follows:

$$\text{FOG} = (\text{words\_per\_sentence} + \text{percent\_complex\_words}) \times 0.4$$

$$\text{FLESCH} = 206.835 - (1.015 \times \text{words\_per\_sentence}) - (84.6 \times \text{syllables\_per\_word})$$

$$\text{KINCAID} = (11.8 \times \text{syllables\_per\_word}) + (0.39 \times \text{words\_per\_sentence}) - 15.59$$

The LENGTH variable is the natural logarithm of the text length of a document. Loughran and McDonald (2014) find the length of the 10-K complete submission text file to be highly correlated with alternative measures of readability, and regard the file length as a superior readability proxy and "an omnibus measure capturing the many dimensions of readability". For the sake of simplicity in programming, Loughran and McDonald (2014, p. 1653) do not remove binary content (such as encoded and human-unreadable attachments) and HTML markup tags before determining file length. We remove binary content and markup tags, if any, before determining text length. Loughran and McDonald (2016, p. 1197) affirm such removal as a more appealing approach. As in Loughran and McDonald (2014, p. 1650), we clean abbreviations, headings, and numbers off the remaining text.

The WORDS variable represents the natural logarithm of word count, after the same removal procedures as for the LENGTH variable. This variable could be viewed as a word-based variant of Loughran and McDonald's (2014) 10-K complete submission text file length. The natural logarithm of word count is also used as a proxy for annual report readability in Li (2008), Miller (2010), and Lawrence (2013), and analyst report readability in De Franco, Hope, Vyas, and Zhou (2015).

The DIMENSION variable, as used in Ball, Hoberg, and Maksimovic (2015) to measure the size of vocabulary, is the natural logarithm of number of distinct words in a document. Dolch (1949) and Stahl (2003) argue for a robust relationship between difficulties in reading and vocabulary limitation.

In this article, for expositional clarity, we replace FLESCH with a new variable FLESCH_A which is '-1 × FLESCH'. As a result, just like all other readability proxies used in this study, FLESCH_A is an inverse measure of readability. In other words, all our proxies measure reading difficulty.

3.2.2. Type of financial report

Another debate is over the report to be used in computing readability. A comprehensive annual report filed with the SEC, the 10-K contains information such as the primary financial reports, stock price information during the financial year, five year summary of financial data, company history, organizational structure, disclosures of risks faced by the firm including pending lawsuits against the firm, etc. (Gibson, 2011).[1] The readability for the entire 10-K is used in several

studies such as Li (2008) and Lehavy et al. (2011). Lehavy et al. (2011) choose to examine 10-K filings, which are mandatory and are criticized by the SEC and investors for obfuscating language (Schroeder, 2002). On the other hand, Lo et al. (2017) analyze the MD&A section of the 10-K filings, arguing that (1) the MD&A section is also mandatory, (2) it is mainly narrative in nature (as opposed to the 10-K that will contain many tables and figures), and (3) the management has substantial leeway in determining its layout. Avoiding the debate on the relative merits of the two documents, we compute readability measures for both the 10-K file and MD&A section.

3.2.3. Multivariate regression

We use the following multivariate regression to test our hypothesis

$$\begin{aligned} READ = {} & a_0 + a_1 \times EXEAGE + a_2 \times Earnings + a_3 \times SIZE + a_4 \times MTB \\ & + a_5 \times CO\_AGE + a_6 \times SI + a_7 \times Ret\_Vol + a_8 \times Earn\_Vol \\ & + a_9 \times Ln\_NBSeg + a_{10} \times Ln\_NGSeg + a_{11} \times Ln\_Nitem \\ & + a_{12} \times MA + a_{13} \times DLW + a_{14} \times SEO \\ & + Year \text{ and } Industry \text{ Dummies} + e \end{aligned} \quad [1]$$

READ is the readability proxy. It is taken from the following set of variables described in the previous section: FOG, FLESCH_A, KINCAID, LENGTH, WORDS, and DIMENSION. As explained earlier, these measures are all inverse proxies of readability. We estimate Model [1] separately for each variable in the set. The main variable of interest is EXEAGE, which represents the age of the CEO (i.e., CEO_AGE) or the average age of all the executives in the TMT (i.e., TMT_AGE).[2] Management research has traditionally evaluated the impact of the CEO on different aspects of firm performance (Hambrick & Quigley, 2014; Quigley & Hambrick, 2015), but the upper echelons theory posits that the entire top management can impact the firm. We acknowledge the merits of both arguments and therefore consider the impact of both the CEO age and the average age of the TMT on the readability of the financial reports. As per our hypothesis, we expect a_1, the coefficient of EXEAGE to be negative and significant for all readability proxies.

Our control variables are based on Li (2008). Earnings is computed as operating earnings scaled by book value of assets. As the literature argues for various roles of a firm's earnings, we do not specify an a priori direction for its coefficient. SIZE, computed as the natural logarithm of the market value of equity, captures a firm's operational complexity and political cost. Larger firms may have longer reports, but also more resources and better skilled personnel to prepare more readable reports. Hence, we do not have an a priori expectation for a direction. MTB is computed as the sum of market value of equity and book value of liabilities scaled by the book value of total assets. MTB proxies for the firm's growth opportunities and complexity. We expect higher MTB to be associated with more complex reports. CO_AGE is the age of the firm computed as the number of years since the firm's first appearance in CRSP. Older firms generally have better information environments and less information asymmetry. Thus, we expect older firms to have simpler financial reports. SI, the amount of special items divided by book value of assets, is associated with more operational complexity and hence more complex financial reports. We compute Ret_Vol as the standard deviation of monthly stock returns in the prior year and Earn_Vol as the standard deviation of operating earnings during the previous five years. Both Ret_Vol and Earn_Vol are associated with more complex financial reports. NBSeg is the number of the firm's business segments and Ln_NBSeg is its natural logarithmic transformation. Similarly, Ln_NGSeg is the natural logarithm of the number of geographic segments. A larger number of business or geographic segments contribute to greater operational and financial reporting complexity.

Nitem is the number of non-missing items in Compustat, and Ln_Nitem is its natural logarithmic transformation. More complex firms are expected to report more items in their filings, leading to more reported Compustat data items. Thus, larger values of Nitem indicate greater reporting complexity. If the firm engages in a merger or acquisition in the current year, MA is set to one, and zero otherwise. SEO equals one if the firm makes a seasoned equity offering during the year according to SDC Platinum's record, and zero otherwise. Both MA and SEO are dummy variables, proxying for operational complexity that leads to corresponding financial reporting complexity. DLW equals one if the firm is incorporated in Delaware, else zero. DLW proxies for unique regulations that apply to firms registered in that state, which may in turn impact financial reporting (Table 1).

4. Results

4.1. Descriptive statistics

Table 2 reports the descriptive statistics. The dependent variables are our six proxies for readability. Our Fog index for the 10-K (MD&A) statements has a mean value of 18.30 (17.38). This is comparable to Li's (2008) mean Fog index value of 19.39 (18.23) for the 10-K (MD&A). Our mean Fog index is also comparable to Lo et al.'s (2017) Fog index of 18.02 (MD&A) and Loughran and McDonald's (2014) Fog index of 18.68 ($10-K$).

The mean value of the variable WORDS of 11.04 (8.89) for the 10-K (MD&A) is comparable to, but larger than Li's (2008) natural logarithm of word count of 10.08 (8.03) and Lawrence's (2013) natural logarithm of the 10-K word count of 10.08. These differences are attributable to variations in sample periods. Our sample period of 1993–2015 includes substantially more recent years than Li's (2008) period of 1993–2003 or Lawrence's (2013) period of January 1994 to December 1996. As Loughran and McDonald (2014) observe, there are significantly more words in recent year filings. Our mean values of WORDS before logarithmic transformation for 10-K and MD&A are 91,206 and 8767 respectively. Accordingly, the word count of the 10-K is about 10.4 times that of the MD&A, which is comparable with Li's (2008) ratio of 11.6.

The mean 10-K LENGTH of 12.98 in our sample is comparable to Loughran and McDonald's (2014, p. 1652) 10-K LENGTH of 14.17.[3] Our shorter mean LENGTH value is attributed to the removal of binary content and markup tags. Our mean values of 10-Ks and MD&A LENGTH before logarithmic transformation are 661,166 and 59,224. Dividing these lengths by the word counts yields 7.25 (6.76) characters, including one space separator, per word for 10-K (MD&A). The word lengths net of the space separator are 6.25 and 5.76, which are consistent with the 5–6 character length for general English writing.[4]

The average CEO is 56.09 years old, and the average TMT executive is 54.00 years old. The typical firm has a market value of equity of $4939.21 million (untabulated) and a return on assets (i.e., Earnings) of 9.6%. The average firm is 26.39 years old and operates in 4.3 business segments and 4.8 geographic segments. 51% of sampled firms engage in acquisition activity during the year. These values are broadly similar to those reported by Li (2008).

Table 3 presents our correlation statistics. Because of the inverse nature of the dependent variables (i.e., FOG, FLESCH_A, KINCAID, LENGTH, WORDS, and DIMENSION capturing reading difficulty), we expect them to be increasing with the complexity of the report. These six dependent variables are in general positively correlated with each

[1] See more detailed description on the SEC website at https://www.sec.gov/oiea/Article/edgarguide.html

[2] Consistent with Bebchuk et al. (2011), we define TMT as the group of top five highest paid executives of the firm.

[3] Loughran and McDonald's (2014, p. 1652) report average file size of 1.43 megabytes or 1,430,000 bytes, which corresponds to 14.17 after logarithmic transformation.

[4] Source: https://en.wikipedia.org/wiki/Word_count.

Table 1
Sample selection.

	Firm-Years
Firm-years from 1993 to 2015 in Compustat with CIK number	213,068
Less	
Firm-years missing CEO age data from Execucomp	(173,051)
Financial Firms (SIC 4400–5000 and 6000–6999)	(10,083)
Firm-years with insufficient data to calculate variables	(13,593)
Final sample	16,341

Table 2
Descriptive statistics.

Variable	N	Mean	Standard Deviation	q1	Median	q3
CEO_AGE	16,341	56.091	7.287	51.000	56.000	61.000
TMT_AGE	15,408	53.995	5.235	50.600	54.000	57.200
Earnings	16,341	0.096	0.115	0.057	0.098	0.146
SIZE	16,341	7.320	1.547	6.240	7.214	8.319
MTB	16,341	2.055	1.487	1.245	1.633	2.337
CO_AGE	16,341	26.391	17.717	13.000	22.000	36.000
SI	16,341	−0.016	0.053	−0.014	−0.002	0.000
Ret_Vol	16,341	0.149	0.485	−0.134	0.097	0.343
Earn_Vol	16,341	0.046	0.056	0.016	0.029	0.054
Ln_NBSeg	16,341	1.437	0.646	0.693	1.386	1.946
NBSeg	16,341	4.262	3.910	1.000	3.000	6.000
Ln_NGSeg	16,341	1.553	0.612	1.099	1.386	1.946
NGSeg	16,341	4.821	4.343	2.000	3.000	6.000
Ln_Nitem	16,341	5.789	0.136	5.663	5.832	5.908
Nitem	16,341	329.673	43.430	288.000	341.000	368.000
MA	16,341	0.506	0.500	0.000	1.000	1.000
DLW	16,341	0.618	0.486	0.000	1.000	1.000
SEO	16,341	0.029	0.168	0.000	0.000	0.000
Whole annual report (10-K)						
FOG (10-K)	16,341	18.295	1.530	17.507	18.361	19.162
FLESCH_A (10-K)	16,341	−24.548	5.666	−27.900	−24.457	−20.807
KINCAID (10-K)	16,341	14.105	1.450	13.336	14.209	14.898
LENGTH (10-K)	16,341	12.983	0.910	12.317	12.799	13.749
WORDS (10-K)	16,341	11.036	0.882	10.391	10.895	11.785
DIMENSION (10-K)	16,341	8.546	0.408	8.272	8.538	8.821
MD&A section (MD&A)						
FOG (MD&A)	12,190	17.378	1.818	16.137	17.147	18.406
FLESCH_A (MD&A)	12,190	−27.422	5.528	−31.058	−27.834	−24.151
KINCAID (MD&A)	12,190	13.300	1.647	12.165	13.065	14.225
LENGTH (MD&A)	12,190	10.801	0.698	10.512	10.930	11.250
WORDS (MD &A)	12,190	8.891	0.698	8.608	9.022	9.338
DIMENSION (MD&A)	12,190	7.248	0.463	7.079	7.344	7.541

other.

The independent variables of interest are CEO_AGE and TMT_AGE. We expect a negative relationship between these two variables and the dependent variables FOG, FLESCH_A, KINCAID, LENGTH, WORDS, and DIMENSION. Corresponding correlation values in Table 3 are consistent with these expectations for both 10-K reports and MD&As, thus providing preliminary support for our hypothesis. Since a few correlation values such as between CO_AGE and SIZE, and among Ln_NBSeg, Ln_NGSeg and Ln_Nitem are considerable, we test for multi-collinearity using variance-inflation factors.

4.2. Multivariate analyses

Multivariate regression results based on the 10-K report are presented in Table 4. Panel A (B) presents the results when EXECAGE is proxied by CEO_AGE (TMT_AGE). Panel A shows that CEO_AGE's coefficients are negative and significant for all six dependent variables. The dependent variables, representing the difficulty of reading, are found to be positively related to report complexity. These results are consistent with our theoretical justification and support our hypothesis that older CEOs are linked to more readable 10-K statements.

Panel B presents results when EXECAGE is proxied by TMT_AGE, which stands for the average age of the TMT. As in Panel A, TMT_AGE's coefficients are negative and significant for all the dependent variables, indicating more readable financial reports as the average age of the TMT increases. Therefore, taken together, Panels A and B support our hypothesis and point to a link between executive age and the readability of financial reports. The control variables' coefficients are broadly in line with those of Li (2008). There are some differences, which are attributable to our significantly different sample period. The adjusted R-squared when the dependent variable is the FOG index in both Panels A & B is 9.4%, which is comparable to the adjusted R-squared of 8% reported by Li (2008).

Multivariate regression results based on the MD&A are presented in Table 5. Table 5 is organized in the same way as Table 4, with EXECAGE being proxied by CEO_AGE (TMT_AGE) in Panel A (B). In Panel A, CEO_AGE's coefficients are negative and significant for all dependent variables. Similarly, Panel B shows that TMT_AGE's coefficients are negatively related to all dependent variables. These results together suggest that as executive age increases, the MD&As become more readable, again supporting our hypothesis. The control variables, similar to those in Table 4, are comparable to Li (2008). The adjusted R-squared of 11.1% (11.5%) in Panel A (Panel B) Column (1) is slightly higher than the adjusted R-squared of 9% reported by Li (2008).

Taken together, the results based on 10-Ks and MD&As provide strong evidence to support our hypothesis that the readability of a firm's financial reports is linked to the age of its executives.

4.3. Additional analyses

While the CEO (Chang, Dasgupta, & Hilary, 2010) and the TMT can influence the firm's operations in general, the CFO can significantly influence the firm's financial operations, including financial reporting. Therefore, as an additional analysis, we evaluate the impact of CFO age on financial report readability. We do so by estimating regression Model [1] with CFO_AGE (the age of the CFO in the current year) proxying for EXECAGE. The results of this estimation are reported in Table 6.

We re-estimate Model [1] using the six readability proxies computed for both the 10-K report (Panel A) and the MD&A (Panel B), yielding 12 tests in total. The results in Table 6 show that CFO_AGE's coefficient is negative and significant for all 12 tests, demonstrating a positive link between the age of the CFO and more readable financial reports. Consistent with Tables 4 and 5, Table 6 indicates improving readability of financial reports as the age of executives increase. The control variables are qualitatively similar to Tables 4 and 5, but are omitted for brevity.

4.4. Sensitivity analysis

The impact of executive age on financial report readability is a combined influence from the improved ethical sensitivity of individuals as they age, the increased business acumen acquired through experience, and firm-specific knowledge gained through tenure. We contend that executive age, among the data available, is the best and most precise proxy to capture the effect of the executives' experience and the resultant impact on readability. Experience is gained over a lifetime of

Table 3
Correlations.

	Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1)	FOG(10-K)	1.000								
(2)	FLESCH_A(10-K)	0.639***	1.000							
(3)	KINCAID(10-K)	0.979***	0.683***	1.000						
(4)	LENGTH(10-K)	0.068***	0.378***	0.146***	1.000					
(5)	WORDS(10-K)	0.079***	0.346***	0.155***	0.997***	1.000				
(6)	DIMENSION(10-K)	−0.027***	0.092***	0.041***	0.876***	0.896***	1.000			
(7)	FOG(MD&A)	0.153***	0.122***	0.130***	0.087***	0.088***	0.077***	1.000		
(8)	FLESCH_A(MD&A)	0.124***	0.175***	0.121***	0.139***	0.137***	0.128***	0.928***	1.000	
(9)	KINCAID(MD&A)	0.117***	0.127***	0.113***	0.124***	0.124***	0.107***	0.981***	0.930***	1.000
(10)	LENGTH(MD&A)	−0.028***	0.191***	0.013	0.524***	0.531***	0.486***	0.009	0.049***	0.054***
(11)	WORDS(MD&A)	−0.028***	0.188***	0.013	0.522***	0.530***	0.484***	0.003	0.036***	0.048***
(12)	DIMENSION(MD&A)	−0.030***	0.176***	0.012	0.494***	0.502***	0.472***	−0.054***	−0.007	−0.011
(13)	CEO_AGE	−0.053***	−0.009	−0.050***	0.001	−0.003	−0.009	−0.029***	−0.025***	−0.020**
(14)	TMT_AGE	−0.074***	−0.066***	−0.076***	−0.071***	−0.074***	−0.062***	−0.036***	−0.031***	−0.026***
(15)	Earnings	−0.072***	−0.046***	−0.072***	−0.077***	−0.083***	−0.100***	−0.054***	−0.029***	−0.046***
(16)	SIZE	−0.147***	0.041***	−0.104***	0.288***	0.282***	0.272***	−0.036***	0.066***	−0.004
(17)	MTB	0.012	0.012	0.025***	−0.072***	−0.074***	−0.061***	−0.061***	−0.052***	−0.069***
(18)	CO_AGE	−0.146***	0.005	−0.116***	0.171***	0.163***	0.136***	−0.040***	0.040***	−0.002
(19)	SI	−0.030***	−0.011	−0.033***	−0.020***	−0.024***	−0.038***	−0.027***	−0.030***	−0.030***
(20)	Ret_Vol	0.037***	0.032***	0.029***	0.015*	0.017**	0.007	0.015*	0.012	0.014
(21)	Earn_Vol	0.086***	0.020**	0.081***	−0.027***	−0.022***	−0.009	−0.019**	−0.065***	−0.033***
(22)	Ln_NBSeg	−0.070***	0.323***	−0.019**	0.576***	0.558***	0.444***	0.035***	0.121***	0.081***
(23)	Ln_NGSeg	−0.059***	0.351***	0.004	0.550***	0.532***	0.425***	0.019**	0.096***	0.063***
(24)	Ln_Nitem	−0.075***	0.338***	−0.022***	0.630***	0.623***	0.511***	0.005	0.062***	0.057***
(25)	MA	−0.001	0.055***	0.008	0.091***	0.089***	0.098***	0.038***	0.098***	0.044***
(26)	DLW	0.010	0.019**	0.012	0.081***	0.082***	0.080***	0.051***	0.045***	0.047***
(27)	SEO	0.032***	−0.006	0.026***	−0.020**	−0.017**	−0.008	0.005	−0.008	−0.001

	Variables	(10)	(11)	(12)	(13)	(14)	(15)	(16)
(10)	LENGTH(MD&A)	1.000						
(11)	WORDS(MD&A)	1.000***	1.000					
(12)	DIMENSION(MD&A)	0.980***	0.980***	1.000				
(13)	CEO_AGE	−0.036***	−0.035***	−0.032***	1.000			
(14)	TMT_AGE	−0.098***	−0.099***	−0.091***	0.657***	1.000		
(15)	Earnings	−0.115***	−0.118***	−0.117***	0.031***	0.039***	1.000	
(16)	SIZE	0.244***	0.237***	0.243***	0.021***	0.057***	0.322***	1.000
(17)	MTB	−0.077***	−0.078***	−0.069***	−0.091***	−0.105***	0.227***	0.295***
(18)	CO_AGE	0.092***	0.088***	0.091***	0.131***	0.210***	0.051***	0.358***
(19)	SI	−0.071***	−0.071***	−0.069***	0.051***	0.068***	0.198***	0.104***
(20)	Ret_Vol	0.013	0.013	0.010	−0.014*	−0.014*	−0.020***	−0.108***
(21)	Earn_Vol	0.017*	0.020**	0.024***	−0.105***	−0.134***	−0.269***	−0.214***
(22)	Ln_NBSeg	0.365***	0.360***	0.332***	0.086***	0.067***	−0.004	0.262***
(23)	Ln_NGSeg	0.321***	0.318***	0.310***	0.012	−0.038***	−0.019**	0.229***
(24)	Ln_Nitem	0.611***	0.610***	0.596***	−0.017**	−0.102***	−0.050***	0.187***
(25)	MA	0.096***	0.091***	0.095***	−0.004	0.004	0.065***	0.175***
(26)	DLW	0.077***	0.076***	0.070***	−0.015*	−0.037***	−0.052***	0.074***
(27)	SEO	−0.021**	−0.020**	−0.020**	−0.014*	−0.016**	−0.035***	−0.001

	Variables	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)
(17)	MTB	1.000										
(18)	CO_AGE	−0.120***	1.000									
(19)	SI	0.029***	0.053***	1.000								
(20)	Ret_Vol	−0.085***	−0.016**	−0.087***	1.000							
(21)	Earn_Vol	0.212***	−0.207***	−0.066***	0.018**	1.000						
(22)	Ln_NBSeg	−0.161***	0.344***	0.011	0.018**	−0.149***	1.000					
(23)	Ln_NGSeg	−0.021***	0.195***	−0.022***	0.020**	−0.057***	0.506***	1.000				
(24)	Ln_Nitem	−0.066***	0.136***	−0.030***	−0.003	−0.002	0.511***	0.513***	1.000			
(25)	MA	−0.040***	0.064***	−0.040***	−0.028***	−0.141***	0.152***	0.133***	0.073***	1.000		
(26)	DLW	0.044***	−0.121***	−0.034***	0.008	0.091***	0.009	0.052***	0.039***	0.018**	1.000	
(27)	SEO	0.037***	−0.050***	−0.009	0.009	0.044***	−0.037***	−0.029***	−0.048***	0.008	0.013*	1.000

*,**,*** indicate significance (two-tailed) at 0.10, 0.05, and 0.01 levels, respectively.

observations, decisions, and actions taken and not taken. In the absence of a specific variable that captures this effect, we argue that age is the most promising proxy for lifelong experience. While it is possible to compute tenure for the current position, this too captures only the firm-specific tenure of the individual, but not the experience gathered in other firms and positions. Therefore, while age and tenure, which are highly correlated, both impact readability, age is a more precise proxy for the executive's lifelong experience. However, as a sensitivity analysis, we include executive tenure (i.e., CEO tenure, the average tenure of TMT, or CFO tenure) in the current firm as an additional control variable in Model [1], which produces results (untabulated) consistent with our main results in Tables 4, 5 & 6.

While executives' ethical sensitivity and business acumen sharpen with age, age also comes with some deleterious effects. Research

Table 4
Age and 10-K readability.

Panel A: CEO age and 10-K readability

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	FOG	FLESCH_A	KINCAID	LENGTH	WORDS	DIMENSION
Intercept	24.623***	−14.739	19.486***	5.512***	3.677***	4.951***
	(7.318)	(−1.496)	(6.084)	(5.594)	(3.610)	(7.862)
CEO_AGE	−0.006**	−0.016*	−0.006**	−0.003***	−0.003***	−0.001**
	(−2.123)	(−1.806)	(−2.340)	(−3.523)	(−3.487)	(−1.971)
Earnings	−0.476**	−0.769	−0.494**	−0.650***	−0.663***	−0.402***
	(−2.231)	(−1.128)	(−2.272)	(−9.455)	(−9.322)	(−8.570)
SIZE	−0.087***	−0.113	−0.059**	0.122***	0.119***	0.063***
	(−3.573)	(−1.520)	(−2.521)	(18.090)	(17.079)	(12.873)
MTB	0.032*	0.089	0.033*	−0.047***	−0.047***	−0.023***
	(1.774)	(1.567)	(1.818)	(−7.656)	(−7.286)	(−6.140)
CO_AGE	−0.005***	−0.015**	−0.005**	−0.001**	−0.001**	−0.001**
	(−2.631)	(−2.414)	(−2.514)	(−2.295)	(−2.436)	(−2.472)
SI	−0.125	−0.727	−0.241	−0.497***	−0.496***	−0.227***
	(−0.518)	(−1.027)	(−1.034)	(−6.050)	(−5.813)	(−4.392)
Ret_Vol	0.017	0.084	0.023	0.019**	0.019**	0.007
	(0.676)	(1.127)	(0.958)	(2.281)	(2.219)	(1.430)
Earn_Vol	0.766**	1.194	0.880***	0.350***	0.359***	0.167**
	(2.279)	(1.141)	(2.698)	(3.266)	(3.259)	(2.468)
Ln_NBSeg	0.054	0.487***	0.066	0.109***	0.104***	0.051***
	(0.966)	(2.677)	(1.216)	(6.911)	(6.418)	(4.481)
Ln_NGSeg	−0.037	0.227	0.007	0.051***	0.048***	0.030**
	(−0.648)	(1.215)	(0.134)	(3.136)	(2.899)	(2.324)
Ln_Nitem	−0.986*	−2.324	−0.849	1.095***	1.087***	0.528***
	(−1.652)	(−1.321)	(−1.491)	(6.241)	(5.985)	(4.668)
MA	0.046	0.252**	0.049	0.029**	0.027**	0.017**
	(1.176)	(2.112)	(1.295)	(2.516)	(2.315)	(2.127)
DLW	−0.013	−0.193	−0.015	0.046***	0.047***	0.019
	(−0.209)	(−1.048)	(−0.260)	(2.677)	(2.691)	(1.614)
SEO	0.180**	0.378*	0.151*	0.063**	0.067**	0.030*
	(2.176)	(1.755)	(1.879)	(2.414)	(2.454)	(1.922)
Year and industry fixed effects included						
Observations	16,341	16,341	16,341	16,341	16,341	16,341
Adjusted R^2	0.094	0.370	0.060	0.707	0.666	0.429

Panel B: TMT age and 10-K readability

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	FOG	FLESCH_A	KINCAID	LENGTH	WORDS	DIMENSION
Intercept	24.739***	−15.172	19.780***	6.054***	4.235***	5.312***
	(7.061)	(−1.477)	(5.950)	(5.976)	(4.034)	(7.970)
TMT_AGE	−0.010**	−0.027**	−0.011***	−0.006***	−0.006***	−0.003***
	(−2.366)	(−2.076)	(−2.839)	(−4.551)	(−4.528)	(−3.228)
Earnings	−0.628***	−1.091*	−0.624***	−0.651***	−0.667***	−0.409***
	(−2.979)	(−1.660)	(−2.956)	(−8.492)	(−8.473)	(−8.460)
SIZE	−0.080***	−0.092	−0.052**	0.118***	0.115***	0.062***
	(−3.083)	(−1.160)	(−2.086)	(16.524)	(15.576)	(11.763)
MTB	0.026	0.066	0.027	−0.048***	−0.047***	−0.023***
	(1.380)	(1.122)	(1.475)	(−6.942)	(−6.633)	(−5.869)
CO_AGE	−0.005**	−0.014**	−0.005**	−0.001*	−0.001*	−0.001*
	(−2.301)	(−2.216)	(−2.175)	(−1.823)	(−1.941)	(−1.950)
SI	−0.237	−0.838	−0.337	−0.528***	−0.529***	−0.233***
	(−0.929)	(−1.142)	(−1.376)	(−6.090)	(−5.860)	(−4.286)
Ret_Vol	0.011	0.060	0.017	0.020**	0.020**	0.007
	(0.398)	(0.771)	(0.675)	(2.190)	(2.124)	(1.335)
Earn_Vol	0.865**	1.339	0.966**	0.361***	0.367***	0.149**
	(2.251)	(1.173)	(2.568)	(2.999)	(2.949)	(2.007)
Ln_NBSeg	0.045	0.443**	0.056	0.107***	0.102***	0.051***
	(0.757)	(2.319)	(0.976)	(6.677)	(6.194)	(4.350)
Ln_NGSeg	−0.042	0.233	0.002	0.047***	0.044**	0.027**
	(−0.681)	(1.177)	(0.027)	(2.795)	(2.551)	(2.019)
Ln_Nitem	−0.999	−2.199	−0.884	1.027***	1.017***	0.480***
	(−1.605)	(−1.197)	(−1.493)	(5.666)	(5.410)	(4.001)
MA	0.028	0.188	0.031	0.025**	0.024**	0.016*
	(0.676)	(1.518)	(0.773)	(2.159)	(1.997)	(1.943)
DLW	−0.033	−0.236	−0.034	0.042**	0.044**	0.018
	(−0.520)	(−1.241)	(−0.561)	(2.375)	(2.400)	(1.491)
SEO	0.211**	0.430*	0.181**	0.069**	0.073**	0.034**
	(2.433)	(1.907)	(2.151)	(2.504)	(2.545)	(2.115)

(*continued on next page*)

Table 4 (*continued*)

Panel B: TMT age and 10-K readability						
Variables	(1)	(2)	(3)	(4)	(5)	(6)
	FOG	FLESCH_A	KINCAID	LENGTH	WORDS	DIMENSION
Year and industry fixed effects included						
Observations	15,408	15,408	15,408	15,408	15,408	15,408
Adjusted R^2	0.094	0.367	0.061	0.702	0.660	0.420

*,**,*** indicate significance (two-tailed) at 0.10, 0.05, and 0.01 levels, respectively. Standard errors are robust to heteroscedasticity and clustering by firm. T-statistics are presented in parentheses below the coefficients.

negatively links age with declining memory, reasoning skills and cognitive abilities in general (Salthouse, 1996). In management and finance research, Hambrick and Mason (1984) and Serfling (2014) show that older executives are more risk averse. While excessive risk-taking maybe undesirable, sometimes it is appropriate for firms to take risks. Therefore, age may both positively and negatively affect executives' performance. However, we argue that corporate pressure will build up to remove older executives with declining cognitive abilities, retaining only those with unimpaired cognitive abilities. Therefore, we do not expect to observe the deleterious effects of age on financial report readability. Nevertheless, as a sensitivity measure, we empirically evaluate whether age has a curvilinear effect on the readability of financial reports. We include a mean-centered age-squared variable (Huang et al., 2012) in regression Model [1] to evaluate the curvilinear impact of age on our results. Untabulated results show that the main results reported in Tables 4, 5 & 6 are unchanged. The age variables' coefficients for all 36 regressions are significant, while those of the mean-centered age-squared variable are inconsistent.[5]

All analyses reported in Tables 4, 5 & 6 have been clustered by firm to correct for heteroscedasticity. We also re-run Model [1] by including two-way clustering by firm and year. Untabulated results indicate that our findings are robust to two-way clustering by firm and year. In addition, we check for the effect of outliers and find our results to be robust to outlier elimination. We test for multi-collinearity by computing the variance-inflation factors (VIF). VIFs for all regressions are less than the threshold value of 10, except for Ln_Nitem's value of 14. Therefore, we run regression Model [1] without this variable to check the validity of our results. Untabulated results show that our findings, reported in Tables 4, 5 & 6, are not affected by the exclusion of Ln_Nitem.

A host of other factors, notably earnings management, loss, change in EPS, gender of executives, and audit quality, may influence readability of financial reports. Through potential correlation with executive age, these factors may also impact the relationship between executive age and readability.[6] Therefore, we include proxies for these factors as additional control variables in Model [1] as a sensitivity analysis. PosEM, a dummy variable coded one if discretionary accruals (estimated with Kothari, Leone, and Wasley's (2005) performance-matched model) are positive and zero otherwise, is used to proxy for earnings management. LOSS is a dummy variable coded one if operating earnings are negative and zero otherwise. CH_EPS is the change of earnings per share from year *t*-1 to year *t*. FEMALE (TMT_FEMALE, CFO_FEMALE) is a dummy variable equal to 1 if the CEO is female (if there is any female executive in the TMT or if the CFO is a female respectively) and zero otherwise. Finally, BIG4 is a dummy variable set to one if the auditor firm is a Big 4 auditor and zero otherwise. We add these control variables, one at a time to Model [1], and estimate it over the six readability proxies, two documents (10-K and MD&A), and three executive age measures (CEO_AGE, TMT_AGE, and CFO_AGE).[7] Untabulated results from the 36 estimations of Model [1] show that our main findings (i.e., the relationship between executive age and readability) remain unchanged. Thus, these sensitivity analyses suggest that our results are robust to the inclusion of a variety of factors that may presumably impact the relationship between executive age and financial report readability.

Finally, we conduct a Heckman two-stage test to evaluate the impact of self-selection in our results. In the first stage, we model the probability of a firm employing an older CEO, TMT or CFO (i.e., older than our sample's median CEO age, TMT average age, or median CFO age) and compute the Inverse Mills ratio (MILLS). In the second stage, we include this MILLS in Model [1]. Untabulated results show that our results reported in Tables 4, 5 & 6 are not affected by self-selection biases.[8]

5. Conclusion and discussion

Readability of financial reports has become an issue of significant concern for investors and regulators. Prominent investors such as Warren Buffet have pointed out that the complexity of financial reports makes it difficult to understand the information being conveyed. If

[5] As in Huang et al. (2012), we use the mean-centered age-squared variable (as opposed to Age × Age) to avoid potential multi-collinearity. Mean-centered age-squared is computed as $(Age - M\_Age)^2$, where M_Age is the mean age of the executives. The coefficient of this variable is inconsistent, being variously positive and significant, insignificant, and negative and significant in the 36 regressions.

[6] We thank an anonymous reviewer for suggesting that we control for these additional factors.

[7] This approach results in 36 estimations of the model for each additional factor we control for in this section.

[8] We follow Lennox, Francis, and Wang (2012) in formulating the Heckman two-stage procedure. For analyses relating to CEO age, we define the first stage model as follows:

$$CEO\_HAGE = a_0 + a_1 \times CEO\_IND + Control\_Variables + Year\ and\ Industry\ Dummies + e \quad [A1]$$

The second stage model is defined as:

$$READ = a_0 + a_1 \times CEO\_HAGE + a_2 \times MILLS + Control\_Variables + Year\ and\ Industry\ Dummies + e \quad [A2]$$

where CEO_HAGE is a dummy variable coded as one if CEO_AGE is above the sample median, and zero otherwise. CEO_IND is industry median CEO_AGE excluding the firm itself. Eq. [A1] estimates the probability of a firm employing an older CEO by using probit regression. CEO_IND is the exclusion restriction. We assume that CEO_IND has no direct impact on READ but is associated with CEO_HAGE. The Inverse Mills ratio (MILLS) is computed in the standard way from Model [A1]. Control variables are identical to those used in Model [1].

We follow the same two-stage procedure for analyses relating to TMT age and CFO age. Consistent with our major findings, the age variables in the second stage (i.e. CEO_HAGE, TMT_HAGE, and CFO_HAGE) carry negative and significant coefficients in 35 out of 36 regressions (corresponding to our 2 × 3 × 6 design).

Table 5
Age and MD&A section readability.

Panel A: CEO age and MD&A section readability

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	FOG	FLESCH_A	KINCAID	LENGTH	WORDS	DIMENSION
Intercept	23.656***	−20.454	18.509***	0.243	−1.619	0.986
	(4.858)	(−1.379)	(4.225)	(0.173)	(−1.150)	(1.035)
CEO_AGE	−0.008*	−0.030**	−0.008*	−0.004***	−0.004***	−0.002***
	(−1.780)	(−2.122)	(−1.840)	(−2.815)	(−2.772)	(−2.649)
Earnings	−1.763***	−5.023***	−1.672***	−0.667***	−0.664***	−0.452***
	(−5.736)	(−5.099)	(−5.866)	(−8.768)	(−8.709)	(−8.861)
SIZE	0.189***	0.778***	0.208***	0.083***	0.081***	0.058***
	(5.155)	(7.110)	(6.200)	(8.453)	(8.170)	(8.934)
MTB	−0.017	−0.091	−0.018	−0.035***	−0.035***	−0.023***
	(−0.640)	(−1.109)	(−0.727)	(−4.912)	(−4.874)	(−4.726)
CO_AGE	0.004	0.020**	0.005*	−0.003***	−0.003***	−0.002***
	(1.381)	(2.213)	(1.907)	(−3.155)	(−3.215)	(−2.947)
SI	−0.045	−0.833	−0.282	−0.647***	−0.648***	−0.404***
	(−0.136)	(−0.874)	(−0.955)	(−7.342)	(−7.348)	(−6.825)
Ret_Vol	0.094***	0.308***	0.089***	0.012	0.012	0.007
	(2.802)	(3.018)	(2.929)	(1.138)	(1.069)	(0.917)
Earn_Vol	1.697***	2.984*	1.748***	0.467***	0.482***	0.321***
	(3.310)	(1.960)	(3.668)	(3.245)	(3.305)	(3.371)
Ln_NBSeg	0.114	0.780***	0.150*	0.111***	0.106***	0.047***
	(1.307)	(3.020)	(1.871)	(5.070)	(4.817)	(3.320)
Ln_NGSeg	−0.105	−0.236	−0.059	0.067***	0.067***	0.045***
	(−1.238)	(−0.968)	(−0.755)	(2.833)	(2.853)	(2.982)
Ln_Nitem	−1.450*	−2.551	−1.272	1.613***	1.609***	0.947***
	(−1.656)	(−0.958)	(−1.614)	(6.353)	(6.328)	(5.507)
MA	−0.062	0.171	−0.060	0.019	0.016	0.017
	(−1.060)	(1.003)	(−1.133)	(1.168)	(0.996)	(1.548)
DLW	0.089	0.259	0.098	0.058**	0.057**	0.032*
	(0.949)	(0.943)	(1.159)	(2.265)	(2.252)	(1.933)
SEO	0.045	0.035	0.014	0.022	0.023	0.013
	(0.438)	(0.106)	(0.151)	(0.668)	(0.703)	(0.579)
Year and industry fixed effects included						
Observations	12,190	12,190	12,190	12,190	12,190	12,190
Adjusted R^2	0.111	0.139	0.114	0.493	0.492	0.480

Panel B: TMT age and MD&A section readability

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	FOG	FLESCH_A	KINCAID	LENGTH	WORDS	DIMENSION
Intercept	25.899***	−11.690	20.363***	1.261	−0.624	1.766*
	(5.106)	(−0.774)	(4.466)	(0.838)	(−0.414)	(1.729)
TMT_AGE	−0.019***	−0.070***	−0.018***	−0.010***	−0.010***	−0.007***
	(−2.839)	(−3.421)	(−2.947)	(−5.253)	(−5.187)	(−4.926)
Earnings	−1.880***	−5.319***	−1.741***	−0.642***	−0.638***	−0.428***
	(−6.002)	(−5.478)	(−6.077)	(−7.502)	(−7.427)	(−7.437)
SIZE	0.216***	0.866***	0.231***	0.077***	0.074***	0.054***
	(5.633)	(7.665)	(6.612)	(7.411)	(7.130)	(7.993)
MTB	−0.034	−0.142*	−0.031	−0.036***	−0.036***	−0.025***
	(−1.261)	(−1.770)	(−1.263)	(−4.597)	(−4.557)	(−4.484)
CO_AGE	0.004	0.021**	0.006**	−0.003***	−0.003***	−0.002**
	(1.393)	(2.222)	(1.967)	(−2.687)	(−2.739)	(−2.519)
SI	−0.080	−0.961	−0.312	−0.632***	−0.633***	−0.404***
	(−0.235)	(−0.979)	(−1.018)	(−6.744)	(−6.733)	(−6.397)
Ret_Vol	0.079**	0.288***	0.080**	0.011	0.010	0.006
	(2.291)	(2.773)	(2.551)	(0.989)	(0.913)	(0.770)
Earn_Vol	1.626***	2.563	1.692***	0.381**	0.398**	0.267***
	(2.835)	(1.526)	(3.148)	(2.418)	(2.492)	(2.596)
Ln_NBSeg	0.120	0.783***	0.159*	0.111***	0.106***	0.047***
	(1.329)	(2.963)	(1.914)	(4.883)	(4.636)	(3.225)
Ln_NGSeg	−0.129	−0.286	−0.079	0.067***	0.067***	0.045***
	(−1.478)	(−1.156)	(−0.992)	(2.729)	(2.746)	(2.829)
Ln_Nitem	−1.840**	−4.071	−1.597*	1.488***	1.488***	0.845***
	(−2.018)	(−1.498)	(−1.944)	(5.465)	(5.454)	(4.578)
MA	−0.087	0.100	−0.079	0.022	0.019	0.019*
	(−1.461)	(0.585)	(−1.477)	(1.278)	(1.117)	(1.670)
DLW	0.074	0.228	0.090	0.064**	0.064**	0.037**
	(0.769)	(0.822)	(1.040)	(2.402)	(2.392)	(2.085)
SEO	0.082	0.145	0.049	0.019	0.020	0.009

(*continued on next page*)

Table 5 (*continued*)

Panel B: TMT age and MD&A section readability						
Variables	(1)	(2)	(3)	(4)	(5)	(6)
	FOG	FLESCH_A	KINCAID	LENGTH	WORDS	DIMENSION
	(0.760)	(0.421)	(0.492)	(0.537)	(0.574)	(0.390)
Year and industry fixed effects included						
Observations	11,452	11,452	11,452	11,452	11,452	11,452
Adjusted R^2	0.115	0.145	0.117	0.491	0.489	0.476

*,**,*** indicate significance (two-tailed) at 0.10, 0.05, and 0.01 levels, respectively. Standard errors are robust to heteroscedasticity and clustering by firm. T-statistics are presented in parentheses below the coefficients.

mandatory financial reports are incomprehensible to investors, they fail in their purpose of providing information to empower investors. Of even greater concern is the fact that firms may attempt to obfuscate poor performance with incomprehensible language in mandatory financial reports. In light of this, the SEC launched the 'Plain English initiative' that encourages firms to write financial reports that eschew complicated jargon (SEC, 1998). However, given the continuing complaints in the financial press (Bricker & Smith, 2017; Lipin & Rosman, 2016), this initiative has a long way to go.

Noting these concerns, accounting and finance research has borrowed techniques from computational linguistics to objectively assess the readability of financial reports (e.g. Lehavy et al., 2011; Li, 2008; Lo et al., 2017; Loughran & McDonald, 2014). Using these objective measures of readability, researchers show that less readable financial reports are used to communicate losses (Li, 2008), that earnings management is linked to less readable reports (Lo et al., 2017), and that less readable reports lead to more information asymmetry and lower information efficiency (Lee, 2012). Furthermore, research has shown that less readable reports are linked to subsequent frauds (Blanco & Dhole, 2017). These findings build up pressure on firms to find ways to improve the readability of their financial reports. Therefore, searching for factors that improve the readability of financial reports is a pertinent area of academic research.

There has been growing interest in the impact of executive age on various aspects of firm performance and attributes. Management literature, specifically the upper echelons theory, has highlighted the impact of the TMT on corporate outcomes. In evaluating this theory, researchers (Carpenter et al., 2004) find that the TMT's cognition, values, and perception impact the organization, but also admit difficulties in measuring these traits. Executive age is a good proxy for these traits, is easy to observe and verify, and is reported to the public in the firm's 10-K. With increasing attention on the diversity of the workforce and with age being a distinct dimension of diversity (Kunze et al., 2011), there is considerable interest in how executive age affects firm outcomes (Huang et al., 2012; Wang et al., 2016). Sociology research and business research have shown that individuals become more ethical and capable as they grow older (Blonigen, 2010; Huang et al., 2012; Mudrack, 1989; Wimalasiri, 2001). We therefore argue that the complexity of financial reports, whether ontological or opportunistic in origin, will be alleviated as the executive ages. Thus, we predict that financial reports will become more readable for firms with older executives.

We test our hypothesis by computing the readability scores for the 10-K report as well as the MD&A. We use six readability measures taken from prior literature. We separately evaluate the age of the CEO, the average age of the TMT, as well as the age of the CFO against each of

Table 6
CFO age and readability.

Panel A: CFO age and 10-K readability						
Variables	(1)	(2)	(3)	(4)	(5)	(6)
	FOG	FLESCH_A	KINCAID	LENGTH	WORDS	DIMENSION
CFO_AGE	−0.012***	−0.032***	−0.012***	−0.005***	−0.005***	−0.002***
	(−3.175)	(−2.725)	(−3.407)	(−4.107)	(−4.025)	(−2.842)
Control variables included						
Year and Industry fixed effects included						
Observations	9313	9313	9313	9313	9313	9313
Adjusted R^2	0.131	0.431	0.070	0.762	0.729	0.471

Panel B: CFO age and MD&A section readability						
Variables	(1)	(2)	(3)	(4)	(5)	(6)
	FOG	FLESCH_A	KINCAID	LENGTH	WORDS	DIMENSION
CFO_AGE	−0.021***	−0.068***	−0.019***	−0.003***	−0.003**	−0.003***
	(−3.616)	(−3.895)	(−3.539)	(−2.611)	(−2.529)	(−3.077)
Control variables included						
Year and industry fixed effects included						
Observations	7874	7874	7874	7874	7874	7874
Adjusted R^2	0.118	0.158	0.120	0.435	0.431	0.427

CFO_AGE is the age of CFO in current year. The significant drops in observations are due to missing CFO age information.
*,**,*** indicate significance (two-tailed) at 0.10, 0.05, and 0.01 levels, respectively. Standard errors are robust to heteroscedasticity and clustering by firm. T-statistics are presented in parentheses below the coefficients.

the six measures of readability. Therefore, with a 2 × 3 × 6 design, we conduct 36 independent tests on the impact of executive age on financial report readability. Our results show a positive link between executive age and financial report readability for all 36 tests. These results are robust to a battery of sensitivity analyses such as outlier removal, two-way clustering, and correcting for potential self-selection bias.

We make several contributions to the literature. First of all, from a financial reporting perspective, we show that the readability of a firm's financial reports will improve with the age of executives. Therefore, firms can make strategic recruitment choices to improve the readability of their financial reports. We contribute to the literature on the upper echelon theory with supportive evidence that executive age, which is a distinct trait of senior management, impacts corporate outcomes. Contributing to the growing literature on diversity in the workplace, we document the advantages of utilizing older executives. Given the persistence of age-based discrimination (Kunze et al., 2011; Lahey, 2008; Lipnic, 2018; Wanberg et al., 2016) and the inevitable aging of the US and indeed the global workforce (Walter & Scheibe, 2013), these results will be of interest to firms and their managers. Furthermore, our finding that hiring older executives may improve the readability of financial reports will be of interest to investors and regulators who are looking for ways to improve the readability of such reports.

Our study has some limitations that open up avenues for further research. First of all, our study is limited to the largest of the listed firms, specifically the S&P1500, with data available in Execucomp. Future research may extend our study to smaller listed firms when alternative data avenues become feasible. Second, it would be interesting to replicate this study internationally, in different cultural settings, to observe if similar results can be obtained. Third, although we have used six major readability proxies in this study, there are still more proxies to be evaluated. Fourth, we have not controlled for all factors that may affect our results. Factors such as ownership structure, governance structures of the firm, audit committee characteristics, and the level of financial expertise on the corporate board may impact financial report readability. The correlation of these variables with executive age may impact the relationship between executive age and readability. Finally, future research could evaluate if older executives are linked to better comprehension in other forms of corporate communication channels such as conference calls and shareholder meetings.

Declarations of interest

None.

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Appendix A. Variable definitions

Variable	Definition
Dependent variables	
FOG	FOG is Fog Index, a measure of the number of years of formal education a reader needs to understand a given text. FOG (10-K) and FOG (MD&A) are the Fog Index values based respectively on the entire 10-K report and MD&A section.
FLESCH_A	FLESCH is Flesch reading ease level based on a 100-point scale, which estimates ease of reading. FLESCH_A = −1 × FLESCH. This transformation makes FLESH_A an inverse readability measure. FLESCH_A (10-K) and FLESCH_A (MD&A) are the FLESCH_A values based respectively on the entire 10-K report and the MD&A section.
KINCAID	KINCAID is Flesch-Kincaid grade level score, a measure of the grade school level necessary for understanding a document. KINCAID (10-K) and KINCAID (MD&A) are the Flesch-Kincaid grade level scores based respectively on the entire 10-K report and the MD&A section.
LENGTH	LENGTH is the natural logarithm of the text length of a document. LENGTH (10-K) and LENGTH (MD&A) are the natural logarithm values of the text length of respectively the entire 10-K report and the MD&A section.
WORDS	WORDS is the natural logarithm of the number of words in a document. WORDS (10-K) and WORDS (MD&A) are the natural logarithm values of the number of words of respectively the entire 10-K report and the MD&A section.
DIMENSION	DIMENSION refers to the natural logarithm of the number of distinct words in a document. DIMENSION (10-K) and DIMENSION (MD&A) are the natural logarithm values of the number of distinct words in respectively the entire 10-K report and the MD&A section.

Variable	Definition
Variables of interest	
CEO_AGE	Age of CEO in the current year.
TMT_AGE	Average age of all executives in TMT. TMT is defined as the top five highest paid executives (Bebchuk, Cremers, & Peyer, 2011).
Control variables	
Earnings	Operating earnings scaled by book value of assets.
SIZE	Natural logarithm of market value of equity.
MTB	(Market value of equity + book value of liability)/book value of total assets.
CO_AGE	Number of years since a firm's first appearance in CRSP.
SI	Amount of special items divided by book value of assets.
Ret_Vol	Standard deviation of monthly stock returns in the prior year.
Earn_Vol	Standard deviation of operating earnings during the previous five years.
NBSeg	Number of business segments.
Ln_NBSeg	Natural logarithm of the number of business segments.
NGSeg	Number of geographic segments.

Ln_NGSeg	Natural logarithm of the number of geographic segments.
Nitem	Number of non-missing items in Compustat.
Ln_Nitem	Natural logarithm of the number of non-missing items in Compustat.
MA	Equals one if the firm engages in a merger or acquisition in the current year, else zero.
DLW	Equals one if firm is incorporated in Delaware, else zero.
SEO	Equals one if firm makes a seasoned equity offering according to SDC Platinum's record, else zero.

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