

Business Education of CEO-CFO and Annual Report Readability

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Abstract: Financial report readability captures the transparency and effectiveness of information communicated by firms' executives. It's interesting to investigate whether business knowledge, cognitive preferences, and professional ethics taught by a business education will shape the CEO/CFO's thinking in determining words, languages, paragraphs, and contents presented in financial reports when the self-interested CEO/CFO tends to influence the interpretation of financial information users. Using a sample of S&P 1500 CEOs and CFOs, we find that the CEO (CFO) with a business degree is associated with better (worse) readability of annual reports and the positive (negative) relation is strengthened (moderated) by internal corporate governance and external analyst following. Furthermore, we explore the interaction between CEO's and CFO's education background and provide additional evidence for the conflict of interest between CEOs and CFOs on financial reporting strategies. Our findings suggest business education, although has no direct impact on financial reporting quality, is beneficial to CEOs for strengthening their monitoring role in firm's financial reporting activities. Also, we consider that the ethical topics in business education can enhance financial executives' awareness to conduct practice under the ethical codes. Our study has implications for academic literature, business education, industry practitioners, and standards setting.

Keywords: Readability of 10-Ks; Business education; Executives' educational background; Financial reporting; Corporate governance

JEL Classification: A20, M41, M51, M54

1. Introduction

Prior studies suggest both firm-level factors (e.g., Li and Zhang, 2015) and managerial-level factors (e.g., Asay *et al.*, 2018; Hasan, 2018; Xu *et al.*, 2018), such as executive pay incentives and career concerns, affect financial report readability. The objective of this study is to explore whether a specific demographic factor, the education of CEOs and CFOs, may influence executives in charge of firms' financial reporting activities, because education trainings shape their thinking and cognitive values when deciding the use of language in financial disclosure.

Academic research has inconclusive and controversial arguments on the relation between education of executives and firm performance. One stream of research suggests that education is not an appropriate proxy for managerial capability although education, as a costly signal, is used to guide employers' decision-making during recruitment (Spence 1973; Bhagat *et al.*, 2010). Another stream of research agrees that education represents individuals' knowledge and skill base, and the personal choices on education at least partially reflect individuals' values and cognitive preferences (Hambrick and Mason, 1984). Accordingly, it's interesting to investigate whether managers with a business education background may behave differently from other managers with non-business education background in determining the readability of financial reporting.

Readability is a critical measure to assess the transparency of qualitative information. Lower readability often associated with complex, lengthy, or verbose expressions, making it hard for readers to extract information in financial documents (Bloomfield, 2002). Due to the substantial litigation risk derived from law reinforcement on financial reporting (e.g., the SOX), recently, there is a trend of shifting from traditional earnings manipulations to lowering the financial reporting readability for underperformed executives.

Our expectations are supported by recent empirical findings. For instance, Beber and Fabbri (2012) find that CEOs holding an MBA degree show large differences in behaviors, compared to CEOs without an MBA degree but with solid financial training, suggesting that CEOs holding an MBA degree behave differently due to their cognitive preferences, not their capability in finance. Emsley *et al.* (2006) argue that executives' cognitive preferences can be reflected in their unique ways to structure and process information. We expect that CEOs and CFOs with business education background may influence the annual report readability in a different way compared to their colleagues without business degrees, not only because they have formal training in business, but also because cognitive preferences are associated with their decisions of attending business schools.

Using the educational background data of S&P 1500 CEOs and CFOs between 1994 and 2015, we find that the CEO (CFO) with a business degree is associated with better (worse) readability of annual reports. This suggests that different roles and responsibilities in CEO/CFO rather than an educational degree itself may explain various degrees of readability in financial reporting chosen by executives. Moreover, we find that in deciding the readability of annual reports CEO and CFO may have a conflict of interest. On one hand, the pressure from a CEO with a business degree can mitigate the lower readability of annual report derived from a CFO with a business degree. On the other hand, the positive relation between the CEO with a business degree and annual reports' readability is moderated (1) by the CFO with a business degree or (2) if the CEO is promoted from a CFO role. Additional tests suggest both internal monitoring, such as corporate governance, and external monitoring, such as financial analysts following, may strengthen (moderate) the positive (negative) relation between the CEO (CFO) with a business degree and annual reports' readability. Finally, we find different types of educational degrees may have different effects on top executives' financial reporting decisions. Our results are robust after several sensitivity tests.

This study contributes to the current literature of readability in several ways. First, we identify a new managerial-level influencing factor, educational background of executives. Because demographic features can be viewed as imperfect proxies for cognitive preferences and an individual's beliefs and value system are usually developed at a person's younger age, relatively stable throughout lifetime (Hambrick and Mason, 1984), education may be one of the most appropriate demographic factors to capture managerial cognitive preferences. Second, this study enriches the literature by distinguish the influence of CEO business education from the influence of CFO business education. We provide new evidence that CEO (CFO) education in business is positively (negatively) related to annual report readability. Additional evidence suggests that during the interaction between CEO and CFO, CEO takes a more influential role on controlling the transparency of qualitative information in financial disclosures. Such evidence also contributes to the debate of CEO/CFO influencing power on financial reporting behaviors (e.g., Jiang *et al.*, 2010). Third, our findings have implications to regulators and educators. The SEC continuously adopts new rules (e.g., Rule 13a-20) to make financial reports more readable. Our evidence indicates that due to the conflict of interest, CFOs with certain cognitive preferences have incentives to tune down the readability. Therefore, it is necessary to implement more regulations to increase managerial obligations and limit their use of language in financial reporting. In addition, our findings shed light, from the education perspective, on the importance of strengthening ethical codes, since our tests suggest ethical topics in business education will help students to establish the correct cognitive preferences, guiding them to make corporate decisions with integrity in the future.

The rest of this paper proceeds as follows. Section 2 and Section 3 review the relevant literature and develop the hypotheses, respectively. Section 4 describes the methodology design. Section 5 summarizes the sample data. Section 6 and Section 7 present the main empirical results and additional analyses. Section 8 concludes the article.

2. Literature Review

2.1 Readability of form 10-K reports

Form 10-K contains essential information regarding firm performance, financial position, cash flows, and corporate governance. The readability of 10-K is an important quality element, when evaluating how effectively firms communicate their financial information to investors and creditors. In recent years, researchers have begun to put more emphasis on the determinants and market consequences of financial reporting readability. The determinants of low readability include poor financial performance (Dempsey *et al.*, 2012; Li, 2008), pressure to meet or beat the earnings benchmark (Lo *et al.*, 2017), and lower managerial ability in transforming resources to revenues (Hasan, 2018). Potential consequences include stock price delay (You and Zhang, 2009; Callen *et al.*, 2013), less individual investment (Lee, 2012), reduction of investor trading (Miller, 2010; Loughran and McDonald, 2011), less favorable ratings (Callen *et al.* 2013), analyst under-performance (Lehavy *et al.*, 2011), increase of voluntary disclosure (Guay *et al.*, 2016), lower bond ratings (Lawrence, 2013) and increase of borrowing cost (Ertugrul *et al.*, 2017; Bonsall and Miller, 2017), etc..

2.2 CEO/CFO business education background and corporate outcomes

Academia has a long history in arguing the potential effect of education on business outcomes (Spence, 1973; Hambrick and Mason, 1984). Based on the framework of capability argument, an elite education training (Gomulya and Boeker, 2014), an MBA degree, or a CPA certification (Aier

et al., 2005) can significantly highlight the quality of a CEO/CFO. Moreover, Troy *et al.* (2011) and Bamber *et al.* (2010) suggest that business education including MBA degree may reduce managers' personal rationalization of unethical or illegal behaviors and increase the accuracy of management earnings forecast. However, education trainings may shape the thinking of different persons in different ways and thus lead to different financial consequences. For example, Vafeas (2009) suggests that market reacts more positively to the appointment of a corporate controller holding an accounting degree but Hu *et al.* (2017) find that CEOs holding an accounting degree are associated with the lower level of conservatism.

Bhagat *et al.* (2010) document some other interesting findings that educational background has no impact on CEO termination, but the education levels between outgoing CEOs and incoming CEOs are positively correlated and the incoming CEOs with MBA degree bring a short-term increase in operating performance. Berger *et al.* (2014) provide evidence that the portfolio risk of financial institutions decreases when board composition changes associated with more directors holding the Ph.D. degrees. Beber and Fabbri (2012) focus on firm's foreign currency derivative holdings and find that CEOs holding MBA degrees and with younger ages and less working experience tend to have more speculation behaviors. In conclusion, all the above literature suggests that executives' education background can influence their corporate policies and strategies.

3. Theoretical Development

Based on the assumption of bounded rationality, the literature in judgment and decision making provides consistent evidence that individual characteristics play a role in decision outcomes (Bonner, 2008). The upper echelon theory developed by Hambrick and Mason (1984) suggests that top managers' individual characteristics affect how they assess or interpret their situations and therefore impact their decisions. Many studies have found evidence consistent with this theory (e.g., Liu and Yermack, 2012; Malmendier and Tate 2009; Bamber *et al.*, 2010; Yang, 2012; Dyreng *et al.*, 2010).

Business education provides top executives the professional financial reporting knowledge and train them with business ethics and professional skills for communication of financial information. When the top executives have no business school training, those promoted from sales or production positions might exert more of their limited energy on the non-financial aspects of the firms but emphasize less on the accuracy of financial data instead of the readability of financial reporting. They are more inclined to rely on the financial experts in financial reporting. Therefore, we can expect a positive relation between CEO/CFO education background and 10-K readability. On the other hand, CEOs and CFOs with business education background might have more interest in influencing the annual report readability seeking the most benefits from the firm within their incumbency (Jensen and Meckling, 1976). Emsley *et al.* (2006) argue that executives' cognitive preferences can be reflected in their unique ways to structure and process information. Therefore, they are more likely to reduce the readability of 10-K when they are exposed to the opportunity to extract more personal gain from the firm.

Based on the above competing arguments, we develop the following non-directional hypothesis:

H1: CEO/CFO education background is associated with the readability of 10-K.

What we are more interested in is one step further to investigate whether the CEO' business background can serve as a constraint when the CFO is going down the opposite path of the CEO's

will. In theory, the CEO is the most powerful officer in the executive team. The CEO sets a tone of how financial reporting should be processed and has every reason to ensure his/her expectation on financial reporting be met by the CFO, especially after the Sarbanes-Oxley Act Section 302 taking effect. Bishop *et al.* (2017) finds that CEOs have a significant influence on CFOs' financial reporting judgements. Shi *et al.* (2019) also finds that when CFOs have strong intention to ingratiate themselves with CEOs, they have more CEO-CFO "language style matching". When the CFO is motivated to conduct obfuscation of financial reporting, the business education background of the CEO might play as a constraint to mitigate the CFO's motivation. The business education, especially master level and PhD level, is a costly investment by the CEO, in terms of both time and money, which manifests the CEO's dedication to master business-related knowledge. When the CFO manages to obfuscate the financial reporting, the CEO with a business education background is more likely to detect the CFO's intention and command the adjustment of readability improvement, compared to the CEO without any business education background. We, therefore, develop the following hypothesis in its alternative form:

H2: *Ceteris paribus*, the CEO's business education background has more influence on the readability of annual report than the CFO's business education background.

4. Methodology Design

4.1 Readability of annual reports

In this study, we implement two methods to measure the readability of annual reports¹. First, Bonsall *et al.* (2017) develop a new measure of readability, Bog Index, based on plain English attributes of 10-K filings recommended by the SEC². This measure is advantageous by combining multifaceted measures of readability and is validated by using a series of controlled experiments and an archival-based regulatory intervention. Following Hasan (2018), we use Bog Index developed by Bonsall *et al.* (2017) to inversely measure the readability of annual reports. A higher value of Bog Index indicates a lower degree of readability. Following Loughran and McDonald (2014), we also use two proxies --- 10-K document file size and word count --- to measure readability³, due to their simplicity, smaller measure errors, and easier replication. A larger file size (FileSize) or a larger number of words (NWords) indicates a lower degree of readability.

4.2 CEO and CFO business education background

The educational data is combined from multiple sources. EXECUCOMP database provides executives' basic information, including their names, IDs and company affiliations, which are later matched to educational data from Marquis Who's Who on the Web, Zoominfo.com, and Capital IQ. Missing values from the databases are completed by general online searches. Binary variables

¹ Although the Fog Index suggested by Li (2008) is one of the pioneering measures of readability used in accounting and finance research, both Bonsall *et al.* (2017) and Loughran and McDonald (2014) suggest that the complex words component of Fog index is poorly specified in financial applications. Hence, this paper does not use the Fog Index to capture the readability of annual reports.

² We thank Brain P. Miller for making the data of Bog Index publicly available online.

³ We thank Bill McDonald for making the data publicly available online.

“CEO_Bdegree” and “CFO_Bdegree” are coded into indicating at least one business degree from the bachelor, master, or PhD studies.⁴

4.3 Other control variables

Following prior research (Lo *et al.* 2017; Hasan 2018; Xu *et al.*, 2018), we control the complexity of accounting system and other firm specific characteristics that are associated with annual reports’ readability. We implement the performance-adjusted discretionary accruals developed by Kothari *et al.* (2005) to inversely measure the earnings quality of financial reporting (ABS_DC). To capture the volatility of accounting performance and market performance, we respectively use the standard deviations of quarterly earnings before extraordinary items in previous three years and the standard deviations of monthly stock returns in prior year as the measurement of earnings volatility (Earn_Volatility) and return volatility (Ret_Volatility). We use the natural log of the number of years since the firm was first covered by the CRSP database to measure the firm age (LogAge). We expect that a higher level of absolute value of discretionary accruals, more volatile earnings and returns, and a young firm age are associated with a lower degree of readability in annual reports.

Moreover, to measure the complexity of accounting system in a firm, we use NO_GeoSeg to measure the number of geographic segments, NO_BusSeg to measure the number of business segments, SI to measure the special items in COMPUSTAT scaled by total assets, MA to measure whether the sample firm has either a merger or acquisition, CT to measure whether the sample firm has foreign exchange income, ComplexACCT to measure whether the sample firm has either marketable securities adjustments or pension liability adjustments, and LogNonmiss to measure the number of non-missing items in COMPUSTAT. We expect that a more complex accounting system is associated with a lower degree of readability in financial reporting.

Finally, we also control firm characteristics, including SIZE measured as the natural log of total assets, book-to-market ratio (BM), firm’s return on assets (ROA), and a dummy variable, Delaware, coded as 1 if the sample firm is incorporated in the state of Delaware. We develop the following OLS regression to test the relation between CEO/CFO’s education background and the readability of annual reports:

$$\begin{aligned}
 \text{Readability} = & \beta_0 + \beta_1 \text{Education} + \beta_2 \text{ABSDC} + \beta_3 \text{LogAge} + \beta_4 \text{RetVolatility} \\
 & + \beta_5 \text{EarnVolatility} + \beta_6 \text{NOGeoseg} + \beta_7 \text{NOBusseg} + \\
 & \beta_8 \text{SIZE} + \beta_9 \text{BM} + \beta_{10} \text{ROA} + \beta_{11} \text{SI} + \beta_{12} \text{MA} + \beta_{13} \text{CT} \\
 & + \beta_{14} \text{ComplexACCT} + \beta_{15} \text{LogNonmiss} + \beta_{16} \text{Delaware} \\
 & + \beta_{17} \text{Time} + \beta_{18} \text{Industry} + \varepsilon_1
 \end{aligned} \tag{1}$$

⁴ At the bachelor level, a business degree indicates the executive has at least one undergraduate major in accounting, finance, business administration, management, management information system, marketing, and operation management, etc.. Economics related majors and certain interdisciplinary majors (such as industrial management) are not counted as business degrees. At the master level, a business degree indicates the executive has at least one graduate major in either MBA or one of the areas mentioned above. At the PhD level, a business degree indicates a PhD major in areas mentioned above. The authors manually code these variables to avoid measurement errors.

where Readability refers alternatively to the Bog Index developed by Bonsall *et al.* (2017), and Nwords and FileIndex developed by Loughran and McDonald (2014). Education refers alternatively to the CEO/CFO with at least one business degree (CEO_Bdegree or CFO_Bdegree). All the variables in the Equation 1, except for dummy variables, are Winsorized at top and bottom 1 percent level. We conduct standardized regressions using Equation (1) to directly interpret the relative importance of each variable. Following previous papers, we control fixed time effect and fixed industry effect for all our OLS regressions, and we cluster the coefficients' standard errors of multivariate regressions at both firm-level and year-level.

5. Sample and Data Collection

We receptively collect the firm-level fundamental variables from COMPUSTAT database, market variables from the CRSP database, financial analysts following from the I/B/E/S database, and executive variables from COMPUSTAT EXECUCOMP. The data of CEO and CFO education background are manually obtained from multiple data sources. Our main sample year range is between 1994 and 2015. The sample sizes vary when we respectively the CEO and CFO education background and use different measurements to capture the readability of 10-Ks. Table 1 illustrates the descriptive results for our sample between 1994 and 2014 and the results are consistent with prior research such as Hasan (2018), Xu *et al.* (2018), and Lo *et al.* (2017).

Table 1. Descriptive statistics

Variables	Mean	Median	25th Pctl	75th pctl
BogIndex	83.4980	84	79	89
NWords	10.5693	10.5750	10.2232	10.9362
FileSize	12.6769	12.6762	12.3355	13.0349
CEO_Bdegree	0.3174	0	0	1
CFO_Bdegree	0.3431	0	0	1
ABS_DA	0.0981	0.0589	0.0257	0.1202
LogAge	2.9998	3.0445	2.4849	3.6636
Ret_Volatility	0.1192	0.1001	0.0710	0.1447
Earn_Volatility	0.0224	0.0104	0.0055	0.0225
NO_Geoseg	7.0630	5	3	10
NO_Busseg	5.9737	3	3	9
SIZE	7.2825	7.1819	6.1596	8.3417
BM	0.4827	0.4328	0.2652	0.6464
ROA	0.0324	0.0487	0.0155	0.0875
SI	-0.0183	-0.0014	-0.0133	0
MA	0.5186	1	0	1
CT	0.2946	0	0	1
ComplexACCT	0.5517	1	0	1
LogNonmiss	5.8524	5.8833	5.7333	5.9661
Delaware	0.6095	1	0	1

This table illustrates the descriptive statistics of sample variables.

The starting point of our sample selection process is the 145,392 firm-year observations between 1994 and 2015 from COMPUSTAT database which offers public companies' fundamental financial data. Then we merge the COMPUSTAT raw data with financial market data from CRSP database, and our sample size is reduced to 99,006. Next, we obtain the personal information of CEO/CFO from EXECUCOMP database and our sample size is significantly reduced to 18,679 after the merger. Furthermore, we remove observations with missing values in other control variables and our sample size is reduced to 15,226. Finally, we merge the sample with hand-collected education data for 2,414 CEOs and 1,995 CFOs in S&P 1500 companies. Our final sample size varies when using different proxies to measure the financial reporting readability and using either CEO or CFO education as the independent variable.

6. Empirical Results

Table 2 discusses the relation between CEO/CFO education background and readability of 10-Ks. Panel A shows that the CEO's business degree is significantly and negatively associated with annual reports' readability proxied by Bog Index (Coefficient = -0.0240, P-value= 0.0012). We also find the CEO's business degree is negatively associated with file size of annual reports and the relation is significant at 10 percent level (Coefficient = -0.0158, P-value = 0.0844), and we don't find a significant relation between CEO's business degree and the number of words contained in annual reports (Coefficient = -0.0131, P-value = 0.1508). Our results suggest that CEOs with at least one business degree may be associated with better readability in their annual reports. In Panel B, we find that CFO's business degree is significantly and positively associated with all three measures of the readability of annual reports (Bog Index: Coefficient = 0.0540, P-value < 0.0001; NWords: Coefficient = 0.0490, P-value < 0.0001; FileSize: Coefficient = 0.0486, P-value < 0.0001). In conclusion, the business degrees of either CEO or CFO have different effects on annual reports' readability. CFOs with at least one business degree is associated with a lower degree of readability but CEOs with at least one business degree will not be with a lower degree of readability in their annual reports. The different associations between the CEO/CFO's education background and annual reports' readability suggest that different roles and responsibilities in CEO/CFO rather than an educational degree itself may explain various degrees of readability in financial reporting chosen by executives. Compared to a non-business degree education, the education experience from a business degree provides the CEO/CFO with more knowledge, concepts, and techniques that can be implemented for accounting treatments and financial reporting strategies.

Table 2. The relation between CEO/CFO business education and readability of 10-Ks

Variables	Dependent = Bog Index		Dependent = NWords		Dependent = FileSize	
	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value
CEO_BDegree	-0.0240	0.0012	-0.0131	0.1508	-0.0158	0.0844
ABS_DC	-0.0018	0.8142	0.0157	0.0844	0.0115	0.1847
LogAge	-0.1002	<.0001	-0.0514	<.0001	-0.0499	<.0001
Ret_Volatility	0.1015	<.0001	0.1163	<.0001	0.1087	<.0001
Earn_Volatility	-0.0185	0.0327	0.0365	0.0014	0.0346	0.0013
NO_Geoseg	0.0321	0.0002	0.0143	0.1577	0.0123	0.2039
NO_Busseg	0.0454	<.0001	0.0749	<.0001	0.0798	<.0001

SIZE	0.0713	<.0001	0.2813	<.0001	0.2825	<.0001
BM	0.0319	0.0001	0.0070	0.4988	0.0047	0.6246
ROA	-0.0628	<.0001	-0.0772	<.0001	-0.0745	<.0001
SI	-0.0100	0.3293	0.0015	0.8977	0.0018	0.8692
MA	0.0547	<.0001	0.0312	0.0013	0.0308	0.0013
CT	-0.0226	0.0034	0.0365	<.0001	0.0394	<.0001
ComplexACCT	0.0628	<.0001	-0.0064	0.5536	-0.0034	0.7338
LogNonmiss	0.0314	0.2147	0.0743	0.0182	0.0703	0.0349
Delaware	0.0219	0.0042	0.0658	<.0001	0.0679	<.0001
F-statistics (P-Value)	87.86 (<0.0001)		35.11 (<0.0001)		36.04 (<0.0001)	
Adjusted R ²	0.4387		0.2956		0.2741	
Sample Size	11,217		9,335		9,335	

Panel B: The relation between CFO's business degree and readability of 10-Ks

Variables	Dependent = Bog Index		Dependent = NWords		Dependent = FileSize	
	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value
CFO_BDegree	0.0540	<.0001	0.0490	<.0001	0.0486	<.0001
ABS_DC	0.0077	0.4868	0.0075	0.4809	0.0064	0.5469
LogAge	-0.0724	<.0001	-0.0842	<.0001	-0.0744	<.0001
Ret_Volatility	0.0750	<.0001	0.1039	<.0001	0.1032	<.0001
Earn_Volatility	0.0191	0.0628	0.0513	0.0005	0.0513	0.0006
NO_Geoseg	0.0076	0.5828	-0.0013	0.9236	0.0022	0.8713
NO_Busseg	0.0789	<.0001	0.0934	<.0001	0.0992	<.0001
SIZE	0.0670	<.0001	0.3260	<.0001	0.3432	<.0001
BM	-0.0151	0.2697	-0.0464	0.0002	-0.0466	0.0001
ROA	-0.0786	<.0001	-0.0979	<.0001	-0.0992	<.0001
SI	0.0232	0.1216	0.0585	<.0001	0.0584	<.0001
MA	0.0897	<.0001	0.0411	0.0007	0.0444	0.0003
CT	0.0245	0.0422	0.0437	0.0007	0.0435	0.0007
ComplexACCT	0.0299	0.0172	0.0078	0.5499	0.0091	0.483
LogNonmiss	0.0805	0.0042	0.1642	<.0001	0.1654	<.0001
Delaware	0.0038	0.7371	0.0558	<.0001	0.0601	<.0001
F-statistics (P-Value)	55.65 (<0.0001)		32.19 (<0.0001)		33.12 (<0.0001)	
Adjusted R ²	0.4142		0.3680		0.3768	
Sample Size	8,021		7,833		7,833	

This table illustrates the relation between CEO/CFO education background and the readability of 10-Ks. We respectively use Bog Index developed by Bonsall and Miller (2017) and Bonsall *et al.* (2017) and NWords and FileSize measured by Loughran and McDonald (2014) to proxy the readability of 10-Ks. In Panel A (B), we test the relation between CEO's (CFO's) business education and readability of 10-Ks.

To better interpret the interaction between CEO and CFO and their effect on annual reports' readability, we investigate whether CEO and CFO in the same company tend to coordinate or hamper in their financial reporting strategies. Four panels of Table 3 are available consecutively.

Table 3. The interaction between CEO/CFO business education and its relation to readability of 10-Ks

Panel A: The interaction between CEO and CFO business education						
Variables	Dependent = Bog Index		Dependent = NWords		Dependent = FileSize	
	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value
CEO_Bdegree	-0.1978	<.0001	-0.1310	0.0008	-0.1412	0.0007
CFO_Bdegree	0.0410	0.0691	0.0005	0.0981	0.0012	0.0967
CEO_Bdegree*	0.1475	0.0011	0.1648	0.0001	0.1746	0.0003
CFO_Bdegree						
ABS_DC	-0.0144	0.4402	-0.0047	0.7889	-0.0355	0.6838
LogAge	-0.0820	0.0003	-0.0633	0.0084	-0.0532	0.0157
Ret_Volatility	0.0795	0.0003	0.0807	0.0005	0.6325	0.003
Earn_Volatility	-0.0048	0.7603	0.0904	<.0001	1.3421	<.0001
NO_Geoseg	0.0686	0.0016	0.0028	0.8775	0.0003	0.8539
NO_Busseg	-0.0127	0.5572	0.0675	0.0007	0.0083	0.0007
SIZE	0.0602	0.0107	0.3498	<.0001	0.1287	<.0001
BM	-0.0324	0.1584	-0.0536	0.0002	-0.0546	0.0017
ROA	-0.1170	<.0001	-0.0689	0.0052	-0.3682	0.0064
SI	0.0416	0.0521	0.0348	0.0831	0.3119	0.0929
MA	0.0151	0.4591	0.0403	0.0381	0.0438	0.0548
CT	0.0049	0.7982	0.0353	0.0638	0.0381	0.1008
ComplexACCT	0.0550	0.007	-0.0044	0.8344	-0.0060	0.8227
LogNonmiss	0.1367	0.0128	0.1391	0.0044	0.7429	0.013
Delaware	-0.0037	0.8489	0.0494	0.0086	0.0578	0.0141
F-statistics	76.80		36.60		40.87	
(P-Value)	(<0.0001)		(<0.0001)		(<0.0001)	
Adjusted R ²	0.4774		0.3895		0.4001	
Sample Size	2,474		2,324		2,324	

Panel A illustrates that under the pressure from the CEO with a business degree, the CFO with a business degree is weakly correlated with a lower degree of readability and the relation is significant at only 10% level (Bog Index: Coefficient = 0.0410, P-value = 0.0691; NWords: Coefficient = 0.0005, P-value = 0.0981; FileSize: Coefficient = 0.0012, P-value = 0.0967). Moreover, we find that the CEO with a business degree tends to override the influence from its CFO with a business degree and is associated with a higher degree of readability in its financial reporting (Bog Index: Coefficient = -0.1987, P-value < 0.0001; NWords: Coefficient = -0.1310, P-value = 0.0008; FileSize: Coefficient = -0.1412, P-value = 0.0007). Standardized regressions allow us to compare the importance of each variable, and we find that the CEO's education background plays a more important role in determining the readability of annual reports compared to the CFO's education background. Finally, we find that CEO and CFO may mutually intervene in the financial reporting, since the relation between the CEO with a business degree and annual reports' readability

is moderated by the CFO with a business degree (Bog Index: Coefficient = 0.1475, P-value = 0.0011; NWords: Coefficient = 0.1648, P-value < 0.0001; FileSize: Coefficient = 0.1746, P-value = 0.0003).

We conduct additional analyses in Panel B and Panel C to investigate the relation between CFO's education background and the annual reports' readability under the pressure of CEO. In Panel B, we find that when the CEO has at least one business degree, the CFO with a business degree is correlated with a higher degree of annual reports' readability but the relations are significant at only ten percent level. In Panel C, in contrast, we find that the negative relation between the CFO with a business degree and its annual reports' readability is more pronounced when the CEO does not have any business degree.

Table 3. The interaction between CEO/CFO business education and its relation to readability of 10-Ks

Panel B: The relation between CFO business education and readability when CEO has a business degree

Variables	Dependent = Bog Index		Dependent = NWords		Dependent = FileSize	
	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value
CFO_Bdegree	0.0489	0.0830	0.0144	0.0633	0.0165	0.0585
ABS_DC	0.0029	0.9090	-0.0319	0.1910	-0.0271	0.2706
LogAge	-0.0610	0.0367	-0.0514	0.1312	-0.0523	0.1321
Ret_Volatility	0.0481	0.1080	0.1007	0.0159	0.1045	0.0125
Earn_Volatility	-0.0006	0.9781	0.0820	0.0043	0.0842	0.0025
NO_Geoseg	0.0280	0.3043	-0.0705	0.0146	-0.0736	0.0113
NO_Busseg	-0.0842	0.0048	0.1171	0.0016	0.1019	0.0064
SIZE	0.0255	0.4608	0.3713	<.0001	0.3536	<.0001
BM	0.0175	0.5580	-0.0552	0.0383	-0.0614	0.0204
ROA	-0.0051	0.8704	-0.0831	0.0286	-0.0793	0.0384
SI	-0.0382	0.1902	0.0367	0.2545	0.0346	0.2834
MA	0.0745	0.0033	0.0171	0.5675	0.0122	0.6828
CT	0.0115	0.6576	0.0339	0.2385	0.0380	0.1856
ComplexACCT	0.0778	0.0052	0.0194	0.5982	0.0144	0.6963
LogNonmiss	0.1137	0.1363	0.2875	0.0006	0.2867	0.0006
Delaware	-0.0486	0.0965	0.0788	0.0138	0.0739	0.0219
F-statistics	73.03		19.22		19.80	
(P-Value)	<0.0001		<0.0001		<0.0001	
Adjusted R ²	0.5258		0.4271		0.4173	
Sample Size	1,147		1,084		1,084	

Table 3. The interaction between CEO/CFO business education and its relation to readability of 10-Ks

Panel C: The relation between CFO business education and readability when CEO does not have a business degree

Variables	Dependent = Bog Index		Dependent = NWords		Dependent = FileSize	
	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value
CFO_Bdegree	0.1168	<.0001	0.1002	0.0004	0.0994	0.0004

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ABS_DC	0.0022	0.9330	0.0417	0.0902	0.0393	0.1085
LogAge	-0.1128	0.0006	-0.1113	0.0030	-0.1145	0.0022
Ret_Volatility	0.1274	<.0001	0.0676	0.0334	0.0667	0.0345
Earn_Volatility	-0.0123	0.6230	0.0901	0.0007	0.0949	0.0004
NO_Geoseg	0.0486	0.1555	0.0507	0.1134	0.0512	0.1075
NO_Busseg	0.0070	0.8244	0.0588	0.0527	0.0649	0.0313
SIZE	0.1413	<.0001	0.3495	<.0001	0.3853	<.0001
BM	-0.0504	0.0050	-0.0476	0.0688	-0.0490	0.0685
ROA	-0.2414	<.0001	-0.1055	0.0066	-0.1073	0.0048
SI	0.1417	<.0001	0.0938	0.0015	0.0940	0.0013
MA	-0.0375	0.1851	0.0755	0.0159	0.0711	0.0236
CT	-0.0338	0.2028	0.0203	0.5330	0.0231	0.4777
ComplexACCT	0.0485	0.0924	-0.0440	0.2184	-0.0505	0.1531
LogNonmiss	0.1035	0.1899	0.0230	0.7343	0.0252	0.7091
Delaware	-0.0012	0.9614	0.0130	0.6808	0.0152	0.6322
F-statistics	545.87		39.86		45.83	
(P-Value)	(<0.0001)		(<0.0001)		(<0.0001)	
Adjusted R ²	0.5708		0.4730		0.4800	
Sample Size	1,327		1,240		1,240	

Finally, in Panel D, we test the relation between the CEO education background and annual reports' readability if the CEO is promoted from the CFO position in the same company. Our results suggest the positive relation between the CEO with a business degree and annual reports' readability is moderated if the CEO is promoted from the CFO role. In conclusion, we find additional evidence to support that an educational degree itself will not lead to an intentional degree of readability but the CEO's (CFO's) responsibilities will encourage the CEO (CFO) to implement business knowledge learned from previous business education to increase (decrease) the readability of annual reports. Moreover, there is a conflict of interest between CEO and CFO in their financial reporting strategies.

Table 3. The interaction between CEO/CFO business education and its relation to readability of 10-Ks

Panel D: The relation between CEO business education and readability if the CEO is promoted from the CFO role

Variables	Dependent = Bog Index		Dependent = NWords		Dependent = FileSize	
	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value
CEO_Bdegree	-0.0226	0.0024	-0.0134	0.0146	-0.0161	0.0082
CEO_Bdegree*						
Promoted_from_CFO	0.0016	0.0242	0.0082	0.0908	0.0084	0.0636
ABS_DC	-0.0018	0.8174	0.0159	0.0822	0.0116	0.1800
LogAge	-0.0998	<.0001	-0.0513	<.0001	-0.0499	<.0001
Ret_Volatility	0.1015	<.0001	0.1163	<.0001	0.1087	<.0001
Earn_Volatility	-0.0184	0.0331	0.0363	0.0015	0.0344	0.0013

NO_Geoseg	0.0322	0.0002	0.0146	0.1506	0.0126	0.1947
NO_Busseg	0.0455	<.0001	0.0745	<.0001	0.0795	<.0001
SIZE	0.0711	<.0001	0.2812	<.0001	0.2824	<.0001
BM	0.0320	0.0001	0.0071	0.4910	0.0049	0.6155
ROA	-0.0627	<.0001	-0.0771	<.0001	-0.0744	<.0001
SI	-0.0102	0.3239	0.0012	0.9174	0.0015	0.8907
MA	0.0548	<.0001	0.0314	0.0013	0.0309	0.0013
CT	-0.0227	0.0033	0.0364	<.0001	0.0394	<.0001
ComplexACCT	0.0629	<.0001	-0.0058	0.5878	-0.0029	0.7724
LogNonmiss	0.0311	0.2199	0.0752	0.0168	0.0712	0.0327
Delaware	0.0222	0.0037	0.0662	<.0001	0.0682	<.0001
F-statistics	112.79		45.15		46.65	
(P-Value)	(<0.0001)		(<0.0001)		(<0.0001)	
Adjusted R ²	0.4512		0.3049		0.2980	
Sample Size	11,217		9,335		9,335	

These four panels of Table 3 illustrate the interaction between CEO/CFO business education and its relation to readability of 10-Ks. In Panel A, we test the interaction between CEO and CFO business education and their association with readability of 10-Ks. In Panel B, we test the relation between CFO business education and readability of 10-Ks when CEO has a business degree. In Panel C, we test the relation between CFO business education and readability of 10-Ks when CEO doesn't have any business degree. In Panel D, we test the relation between CEO business education and readability of 10-Ks if the CEO is promoted from the CFO role.

Finally, we conduct robustness tests after controlling CEO/CFOs' age, gender, and tenure⁵ and implementing the propensity score matching method to construct the OLS regression sample. Untabulated results⁶ suggest the consistent conclusions.

7. Additional Tests

In this section, we conduct additional tests to investigate the tension between CEO and CFO and how their educational backgrounds are associated with their annual reports' readability. Table 4 illustrates how internal and external oversight may influence the relation between CEO/CFO's education background and annual reports' readability. Four panels of Table 4 are available on the following pages. In Panel A and Panel B, we respectively examine whether the external monitoring, measured by the number of financial analysts following (No_Analyst) from the I/B/E/S database, tends to influence the relation between CEO/CFO's education background and annual reports' readability. We find that the financial analyst following will strengthen (moderate) the positive (negative) relation between CEO (CFO) with a business degree and annual reports' readability. In Panel C and Panel D, we respectively investigate whether the internal monitoring, measured by corporate governance performance scores (CGOV) from the KLD database, tends to influence the

⁵ We collect the data of CEO/CFOs' age, gender, and tenure from COMPUSTAT EXECUCOMP. Because of missing values in the database, the sample sizes of robustness tests are reduced significantly.

⁶ All the detailed tables of untabulated results in this paper are available when requesting.

relation between CEO/CFO's education background and annual reports' readability. Our results suggest that the corporate governance will strengthen (moderate) the positive (negative) relation between CEO (CFO) with a business degree and annual reports' readability. In conclusion, both internal and external oversight are effective methods to encourage the CEO and CFO to use knowledge learned from their previous education to improve the quality of financial reporting.

Table 4. The effect of financial analyst following and corporate governance

Panel A: The relation between CEO business education and readability conditional on financial analyst						
Variables	Dependent = Bog Index		Dependent = NWords		Dependent = FileSize	
	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value
CEO_Bdegree	-0.0146	0.0085	-0.0030	0.0078	-0.0027	0.0080
CEO_Bdegree*	-0.0166	0.0651	-0.0327	0.0018	-0.0265	0.0090
No_Analyst						
ABS_DC	-0.0014	0.8554	0.0164	0.0724	0.0121	0.1651
LogAge	-0.1007	<.0001	-0.0525	<.0001	-0.0508	<.0001
Ret_Volatility	0.1011	<.0001	0.1156	<.0001	0.1082	<.0001
Earn_Volatility	-0.0181	0.0343	0.0370	0.001	0.0350	0.001
NO_Geoseg	0.0328	0.0001	0.0161	0.1133	0.0138	0.1581
NO_Busseg	0.0441	<.0001	0.0722	<.0001	0.0776	<.0001
SIZE	0.0764	<.0001	0.2913	<.0001	0.2906	<.0001
BM	0.0318	0.0001	0.0067	0.5177	0.0045	0.643
ROA	-0.0618	<.0001	-0.0753	<.0001	-0.0730	<.0001
SI	-0.0106	0.3039	0.0004	0.9687	0.0009	0.9302
MA	0.0548	<.0001	0.0311	0.0014	0.0307	0.0014
CT	-0.0231	0.0029	0.0353	0.0001	0.0385	<.0001
ComplexACCT	0.0628	<.0001	-0.0060	0.5765	-0.0031	0.7564
LogNonmiss	0.0323	0.2025	0.0762	0.0154	0.0719	0.031
Delaware	0.0214	0.0051	0.0650	<.0001	0.0672	<.0001
F-statistics	115.90		45.89		47.43	
(P-Value)	(<.0001)		(<.0001)		(<.0001)	
Adjusted R ²	0.4388		0.2963		0.2745	
Sample Size	11,217		9,335		9,335	

In this section, we conduct additional tests to investigate whether the education experience from a specific degree tends to influence the CEO/CFO's choice in financial reporting strategies. Untabulated results suggest that, consistent with our main results, the CEO respectively with a business bachelor's degree/a business master degree/a business PhD degree is associated with better readability of annual reports compared to the CEO respectively with a non-business bachelor degree/a non-business master degree/a non-business PhD degree. In contrast, untabulated results suggest that CFO with either a business bachelor's degree or a business master degree is associated with a lower degree of annual reports' readability but CFO with a business PhD degree is associated with a higher degree of annual reports' readability. We believe one possible reason is that compared to the business bachelor/master degree which focuses on basic concepts and techniques the business

PhD education contains more reading assignments and seminar courses related to topics of agency theory, management effectiveness, sustainable development, corporate governance, business ethics, corporate social responsibility, business regulations, and accounting frauds.

Table 4. The effect of financial analyst following and corporate governance

Panel B: The relation between CFO business education and readability conditional on financial analyst						
Variables	Dependent = Bog Index		Dependent = NWords		Dependent = FileSize	
	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value
CFO_Bdegree	0.0700	<.0001	0.0666	<.0001	0.0672	<.0001
CFO_Bdegree*	-0.0436	<.0001	-0.0486	<.0001	-0.0513	<.0001
No_Analyst						
ABS_DC	0.0089	0.351	0.0086	0.3625	0.0076	0.4221
LogAge	-0.0746	<.0001	-0.0876	<.0001	-0.0779	<.0001
Ret_Volatility	0.0738	<.0001	0.1025	<.0001	0.1017	<.0001
Earn_Volatility	0.0194	0.0179	0.0514	<.0001	0.0514	<.0001
NO_Geoseg	0.0083	0.4716	-0.0008	0.939	0.0027	0.7922
NO_Busseg	0.0744	<.0001	0.0886	<.0001	0.0942	<.0001
SIZE	0.0809	<.0001	0.3415	<.0001	0.3596	<.0001
BM	-0.0146	0.1523	-0.0459	<.0001	-0.0460	<.0001
ROA	-0.0734	<.0001	-0.0926	<.0001	-0.0935	<.0001
SI	0.0204	0.1027	0.0559	<.0001	0.0557	<.0001
MA	0.0903	<.0001	0.0417	<.0001	0.0450	<.0001
CT	0.0239	0.0141	0.0430	<.0001	0.0428	<.0001
ComplexACCT	0.0303	0.0035	0.0080	0.4556	0.0093	0.3812
LogNonmiss	0.0813	0.0006	0.1644	<.0001	0.1657	<.0001
Delaware	0.0026	0.7797	0.0544	<.0001	0.0585	<.0001
F-statistics	75.82		51.11		54.73	
(P-Value)	(<0.0001)		(<0.0001)		(<0.0001)	
Adjusted R ²	0.4155		0.3697		0.3786	
Sample Size	8,021		7,833		7,833	

Table 4. The effect of financial analyst following and corporate governance

Panel C: The relation between CEO business education and readability conditional on corporate governance						
Variables	Dependent = Bog Index		Dependent = NWords		Dependent = FileSize	
	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value
CEO_Bdegree	-0.0522	<.0001	-0.0391	0.0081	-0.0422	0.0042
CEO_Bdegree*CGOV	-0.0338	0.0115	-0.0455	0.0019	-0.0472	0.0013
ABS_DC	-0.0101	0.3733	0.0010	0.9372	-0.0012	0.9276
LogAge	-0.0701	<.0001	-0.0224	0.2088	-0.0165	0.3504
Ret_Volatility	0.0926	<.0001	0.1204	<.0001	0.1174	<.0001
Earn_Volatility	-0.0099	0.3384	0.0503	0.0027	0.0508	0.0027

NO_Geoseg	0.0312	0.019	0.0265	0.0768	0.0271	0.0719
NO_Busseg	0.0025	0.8581	0.0648	0.0002	0.0732	<.0001
SIZE	0.0808	<.0001	0.2729	<.0001	0.2953	<.0001
BM	0.0561	<.0001	0.0377	0.0031	0.0391	0.0025
ROA	-0.0682	0.004	-0.0563	0.0036	-0.0619	0.0023
SI	0.0077	0.6525	-0.0058	0.7281	-0.0047	0.7841
MA	0.0556	<.0001	0.0330	0.0328	0.0339	0.0266
CT	-0.0153	0.216	0.0480	0.0006	0.0463	0.001
ComplexACCT	0.0565	<.0001	-0.0073	0.6397	-0.0097	0.531
LogNonmiss	0.1047	0.0075	0.1280	0.0012	0.1297	0.0011
Delaware	0.0169	0.1641	0.0667	<.0001	0.0707	<.0001
F-statistics (P-Value)	56.90 (<0.0001)		101.28 (<0.0001)		131.60 (<0.0001)	
Adjusted R ²	0.4837		0.3207		0.3326	
Sample Size	5,746		5,238		5,238	

Table 4. The effect of financial analyst following and corporate governance

Panel D: The relation between CFO business education and readability conditional on corporate governance						
Variables	Dependent = Bog Index		Dependent = NWords		Dependent = FileSize	
	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value
CFO_Bdegree	0.0407	0.0025	0.0244	0.0316	0.0234	0.0399
CFO_Bdegree*CGOV	-0.0545	<.0001	-0.0694	<.0001	-0.0682	<.0001
ABS_DC	0.0126	0.309	0.0161	0.1193	0.0148	0.1528
LogAge	-0.0540	0.0003	-0.1083	<.0001	-0.0991	<.0001
Ret_Volatility	0.0551	0.0002	0.1114	<.0001	0.1092	<.0001
Earn_Volatility	0.0326	0.0055	0.0526	<.0001	0.0523	<.0001
NO_Geoseg	0.0257	0.0977	0.0143	0.2477	0.0167	0.1726
NO_Busseg	0.0519	0.0004	0.1103	<.0001	0.1168	<.0001
SIZE	0.0342	0.0261	0.3203	<.0001	0.3363	<.0001
BM	0.0067	0.5977	-0.0302	0.015	-0.0301	0.0159
ROA	-0.1000	<.0001	-0.1026	<.0001	-0.1024	<.0001
SI	0.0391	0.0283	0.0634	<.0001	0.0616	<.0001
MA	0.1098	<.0001	0.0488	<.0001	0.0536	<.0001
CT	0.0468	0.0009	0.0384	0.0016	0.0378	0.0018
ComplexACCT	0.0213	0.1458	0.0043	0.7216	0.0055	0.6503
LogNonmiss	0.0442	0.0955	0.1480	<.0001	0.1506	<.0001
Delaware	0.0201	0.1262	0.0521	<.0001	0.0565	<.0001
F-statistics (P-Value)	59.96 (<0.0001)		29.17 (<0.0001)		31.50 (<0.0001)	
Adjusted R ²	0.4164		0.3445		0.3568	
Sample Size	5,934		5,992		5,992	

These four panels of Table 4 illustrate how external monitoring measured by financial analyst following and internal monitoring measured by corporate governance performance tends to influence the relation between CEO/CFO business education and readability of 10-Ks. In Panel A (B), we test the relation between CFO (CEO) business education and readability of 10-Ks conditional on financial analyst following. In Panel C (D), we test the relation between CFO (CEO) business education and readability of 10-Ks conditional on corporate governance.

Taken together, our test results suggest that a) self-interested CFOs are inclined to employ their business skills and technology to strategically obfuscate the financial reporting in order to seek personal benefits from the company; b) external and internal monitoring, or ethics training from PhD study helps mitigate the negative effect of CFOs' business education on readability; c) business education is helpful for CEOs to understand and control firms' financial reporting strategies and ethical topics in business education will encourage executives to improve the quality of financial reporting, and it facilitates the goal conflict between CEO and CFO on financial reporting quality.

8. Conclusions

This study investigates how the CEO/CFO's education background is associated with the readability of financial annual reports. Different from prior studies which focus on the educational background of either CEO or CFO, we discuss the interaction between CEO's and CFO's education background and provide additional evidence for the conflict of interest between CEO and CFO in corporate governance. Specifically, we find that the CEO (CFO) with a business degree is associated with better (worse) readability of annual reports and the positive (negative) relation is strengthened (moderated) by internal corporate governance and external analyst following. Moreover, this study suggests business education is helpful for a CEO to oversee and control a firm's financial reporting. In addition, our work implies ethical topics in the business education may encourage practitioners to behave more ethically, although a business degree is not directly related to the quality of financial reporting. Our study also bears implications for academic literature, business education, industry practitioners, and standards setting. Future research may further investigate how to design executive contracts to mitigate a conflict of interest between CEO and CFO, and further explore how to improve course contents and course structures in the business education.

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