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The influence of business strategy on annual report readability

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ABSTRACT

Concerns about the complexity of firm disclosures have prompted regulators to initiate projects to improve the readability of annual reports. We investigate business strategy as a determinant of annual report readability. As business strategy fundamentally determines a firm's product and market domain, technology, and organizational structure, it influences a firm's operating complexity, environmental uncertainty and information asymmetry. Consequently, business strategy frames the level, wording, and complexity of disclosures. We capture a firm's business strategy based on the Miles and Snow (1978) strategic typology and measure 10-K readability with Li's (2008) Fog index. We find that firms pursuing an innovation-oriented prospector strategy have less readable 10-Ks relative to firms pursuing an efficiency-oriented defender strategy. We also find that prospectors display more negative and uncertainty tones while defenders exhibit more litigious tone in their 10-Ks. Our study provides useful insights to policy makers as it suggests that efforts to improve annual report readability may be limited for some firms given that business strategy is a fundamental determinant of readability and pronouncements accommodating different strategic orientations are not feasible.

1. Introduction

As the scope of reporting requirements has widened to a broader narrative including corporate governance, sustainability and responsibility, remuneration, enhanced disclosure regimes and long form audit reports, the complexity and materiality of information in annual reports is being questioned. This has prompted the international financial reporting community to initiate projects on streamlining annual reports to improve their readability. Responses in the US include the Securities and Exchange Commission (SEC)'s 1998 Plain English Mandate (SEC Rule 421 (d)) and the Financial Accounting Standards Board (FASB)'s ongoing Disclosure Framework project, initiated in 2009, with the objective of making financial statement disclosures more effective, coordinated and less redundant. Disclosure reform is also on the agenda of the International Accounting Standards Board (IASB) and the UK Financial Reporting Council (FRC).[1] Form 10-Ks report accounting numbers prepared in accordance with accounting standards, as well as unstructured textual narratives disclosing accounting policies and describing business operations and financial performance. When preparing annual reports, including the financial reports and accompanying notes, and the management discussion and analysis (MD &A) sections, managers have discretion over the content emphasized, and the language and writing style used in their narratives (Henry and Leone, 2016; Loughran and McDonald, 2014). Li (2010) argues that unstructured textual narratives in annual reports

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[1] Better Communication in Financial Reporting is a key pillar of the IASB's work agenda for 2017-2021. In March 2017, the IASB issued Discussion Paper DP/2017/1 Disclosure Initiative – Principles of Disclosure.

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exhibit irregularities, ambiguities, and managerial opportunism. Form 10-K volume of pages and footnote disclosures has also increased, up 16 percent and 28 percent respectively over the six-year period 2004–2010, with evidence of disclosure repetition and redundancy (Iannoconi and Sinnett, 2011). Investors rely on information in 10-Ks to infer trading and pricing decisions (Cazier and Pfeiffer, 2016; Griffin, 2003; Huddart et al., 2007) and complex disclosures, including less readable annual reports, can impair users' ability to process information, and hence affect their judgment and decision making (Li, 2008; Miller, 2010; You and Zhang, 2009). Consequently, policy makers and various capital market participants are increasingly concerned about the readability of 10-Ks that underpins the understandability and decision usefulness of information contained therein.

Such concern has spawned research on the association between readability and individual firm characteristics synonymous with operating complexity and uncertainty.[2] In this study, we investigate whether business strategy explains 10-K readability. By fundamentally influencing a firm's operating complexity and environmental uncertainty (Bentley et al., 2013; Hambrick, 1983a; Higgins et al., 2015; Miles and Snow, 1978), business strategy warrants attention in explaining 10-K readability as it is a comprehensive measure that captures firm-level complexity not necessarily captured by individual firm characteristics. As Bentley et al. (2013) suggest, business strategy is a broad underlying measure that "captures a construct that is greater than the sum of its parts" (p.805).

Specifically, we explore the 10-K readability of innovation-oriented prospector firms and efficiency-oriented defender firms. Pursuing innovation increases firms' exposure to operating complexity and environmental uncertainty due to the risky nature of research and development (R&D), and unpredictable and constantly changing consumer choices (Miles and Snow, 1978; Naiker et al., 2008), which can increase disclosure complexity and incentives to obfuscate information. Conversely, firms pursuing a more stable cost-efficient strategy relying less on innovation, are less exposed to operating complexity, environmental uncertainty, and costly failure, resulting in less complex disclosures and lower incentives to obfuscate information. Our proposition is that prospectors have less readable 10-Ks relative to defenders.

With the accounting standard setting community focused on improving the readability of financial reports, our study is motivated by considering the influence of strategy on communication and how this may restrict the success of reporting reforms to a subset of firms. White (2013), former SEC Chair, notes the importance of broadening considerations of disclosure complexity as accounting standards and volume of mandated disclosures may not be the sole contributing factor. Zahra et al. (2005) and Bentley et al. (2013) highlight the importance of establishing direct antecedents of financial reporting outcomes rather than merely identifying their perfunctory indicators. Bentley et al. (2013) associate prospectors with financial reporting irregularities, and Bentley Goode et al. (2018) relate prospectors to a richer external information environment. Our study complements these studies by investigating whether business strategy influences the readability and tone of 10-K information.

We classify a firm's strategic orientation using Miles and Snow (1978, 2003) typology and following the methodology of Bentley et al. (2013) which relies on a collective of firm characteristics: research intensity, marketing and advertising efforts, historical growth, operational efficiency, capital intensity, and organizational stability. We obtain the Fog index, a proxy for 10-K readability, from Feng Li's website.[3] Using 24,817 firm-year observations spanning 1994–2011, we find that prospectors have less readable 10-Ks relative to defenders. Investigating if business strategy influences disclosure sentiment or tone using Loughran-McDonald sentiment measures, we find that prospectors display greater negative and uncertainty tones while defenders use more litigious tone in their 10-Ks. Greater use of negative and uncertainty tones in the 10-Ks can explain the lower readability of prospectors' 10-Ks. Our results are robust to using alternative measures of readability including the Kincaid and Flesch indexes. We do not, however, find an association between business strategy and 10-K length, suggesting that linguistic index and length capture different facets of reporting and disclosure complexity. Further, we show that in both sub-samples of good and poor performing firms, prospectors have less readable 10-Ks relative to defenders, suggesting that business strategy plays a more fundamental role than earnings performance in explaining 10-K readability.

Our study offers insights for policy makers seeking to enhance the readability and reduce the complexity of annual reports. Christopher Cox (2007), former SEC Chair, suggests the use of the Fog index to measure compliance with the SEC's plain English initiatives.[4] Our study suggests that policy makers' efforts to improve and assess annual report readability may be limited to influencing a subset of firms with a strategic orientation not requiring, or incentivizing, complex communications.

Our study also contributes to the readability and business strategy literatures. We document that business strategy is associated with annual report readability, controlling for individual firm complexity variables. Cazier and Pfeiffer (2016) show a firm's operating complexity, disclosure redundancy, and residual disclosure (i.e. 10-K length unexplained by a firm's operating complexity or redundancy) as determinants of 10-K length. However, amongst the firm characteristics examined, Cazier and Pfeiffer (2016) find that R&D does not explain variation in 10-K length. We show that while business strategy (including R&D) is not associated with 10-K length, it is associated with 10-K readability. Our study also provides a plausible explanation to Bentley Goode et al.'s (2018) finding that prospectors (defenders) have higher (lower) analyst following since lower (greater) 10-K readability can increase (reduce) the demand for analyst services. Our findings also imply that strategy should be controlled for in future studies to mitigate the concern of omitted correlated variables (Li, 2010, p. 158).

The remainder of this paper proceeds as follows. Section 2 reviews the literature on annual report readability and business strategy, and formulates the hypothesis to be tested. Section 3 presents the research design. Section 4 reports sample selection,

[2] Such individual firm characteristics include firm size, market to book ratio, R&D, age, and geographic and operating segments (Cazier and Pfeiffer, 2016; Kumar, 2014; Laksamana et al., 2012; Li, 2008; Lo et al. 2017).

[3] The data for 10-K readability are made available by Feng Li at http://webuser.bus.umich.edu/feng/.

[4] The UK FRC also encourages the use of plain English to enhance financial information understandability (Financial Reporting Council, 2011).

descriptive statistics and the main results. Sections 5 and 6 present robustness and additional analyses, respectively. Section 7 concludes the study.

2. Literature review and hypothesis development

In the fields of communication, psychology, and education, readability is defined as the ease of understanding a message attributable to the style of writing (Barnett and Leoffler, 1979). Corporate disclosures, including those within the annual report, contain significant unstructured textual information (Li, 2010). Prior studies suggest that investors find the annual report difficult to read (Bartlett and Chandler, 1997; Courtis, 1982; Hynes and Bexley, 2004; Lee and Tweedie, 1975). Davis and Tama-Sweet (2012) claim that managers have discretion over the degree of detail (or content), as well as the words used to describe a particular data item or event, in narrative disclosures. Beattie (2014) provides an extensive review on accounting narratives. Although narrative disclosures can improve transparency and meet stakeholders' information needs, there are concerns that narrative disclosures may lose utility or obfuscate issues with writing styles that confuse, distract or perplex readers (Courtis, 2004; Rutherford, 2003; SEC, 1998).

According to comprehension theory, readability affects individuals' understanding of the disclosures and, subsequently, their judgments (Kintsch and Van Dijk, 1978; Masson and Waldron, 1994). Rennekamp (2012) and Shah and Oppenheimer (2007) claim that processing fluency, reflective of individuals' concern about the ease of processing information, determines their reliance on the disclosure. As per the incomplete revelation hypothesis, investors react less timely and completely to information that is more difficult to process (Bloomfield, 2002; Grossman and Stiglitz, 1980). Complex information requires investors to exert more cognitive efforts. This reduces their understanding and ability to evaluate the firm's prospects based on the information, and can impair their decision making (Lee, 2012).

The Fog (Gunning-Fog) index is a proxy for annual report readability used by prior studies (Biddle et al., 2009; Lawrence, 2013; Lehavy et al., 2011; Li, 2008; Miller, 2010). The Fog index is inversely associated with annual report readability. Extant studies have documented the capital market effects of annual report readability suggesting that less readable reports (including 10-Ks): discourage and impede informed securities trading by small investors (Hirshleifer and Teoh, 2003; Lawrence, 2013; Miller, 2010); exacerbate market under-reaction (You and Zhang, 2009); prolong the price discovery process and lengthen post-filing drifts (Lee, 2012); indirectly reduce investors' perceptions of management credibility (Rennekamp, 2012); and induce more analyst following but result in greater analyst forecast dispersion and error (Lehavy et al., 2011; Loughran and McDonald, 2011).

Extant studies have also explored the determinants of 10-K readability. Li (2008) associates lower earnings with less readable 10-Ks, with attribution to the management obfuscation hypothesis which posits that managers may use vague and complex language to downplay adverse information and avoid negative market reactions (Courtis, 1998; Dempsey et al., 2012). Bloomfield (2008) notes alternative explanations to Li's (2008) findings. For instance, according to the attribution theory in psychology, investors expect firms to explain bad news and this is more complicated to convey. Kumar (2014) investigates the effect of culture on annual report readability. He finds that US-listed Asian firms whose domestic culture is more secretive (i.e. preference for confidentiality and the restriction of disclosure) exhibit less readable annual reports, whereas those with higher ownership dispersion provide more readable annual reports to mitigate increased conflicts of interest between owners under such an ownership structure. Laksamana et al. (2012) show that over-compensated top management has less readable Compensation Discussion and Analysis (CD&A) due to obscuring compensation practices that are disconnected with economic determinants of pay. Lo et al. (2017) show that firms that have managed earnings to outperform the previous year's earnings tend to obfuscate bad performance and earning management, rendering the MD&A section of 10-Ks more difficult to read. Cazier and Pfeiffer (2016) find 10-K length is associated with some individual firm characteristics synonymous with operating complexities (e.g., acquisition incidences, capital leases, return volatility, number of operating segments, leverage, size, free cash flow and special items) but not others (e.g., R&D, intangibles, operating leases, number of geographic segments).

We expand the literature exploring the determinants of annual report readability by proposing that business strategy is an underlying factor of 10-K readability capturing complexity and uncertainty not captured by individual firm characteristics. Business strategy, determined at a very early stage of a firm's life cycle, requires long-term resource commitments, and thus it directs how firms achieve, maintain or enhance their performance (Bentley et al., 2013; Burgelman, 2002; Snow and Hambrick, 1980; Zajac and Shortell, 1989). To maintain competitiveness, firms align their respective strategies with different patterns of product and market domain, technology, and organizational structure and process (Miles and Snow, 1978, 1984, 1986, 2003; Miles et al., 1978; Milgrom and Roberts, 1995; Navissi et al., 2017). As such, business strategy fundamentally influences a firm's operating complexity and environmental uncertainty (Bentley et al., 2013; Hambrick, 1983a; Higgins et al., 2015; Miles and Snow, 1978), which can frame the level, wording, and complexity of disclosures to stakeholders in documents such as the 10-K.

We compare 10-K readability for the contrasting innovation-oriented prospector and efficiency-oriented defender strategies. Prospectors aggressively change their technologies to explore and launch new products and market opportunities. Prior literature suggests that market uncertainty, technological uncertainty, and intensity of competition determine environmental uncertainty (Jaworski and Kohli, 1993; Kohli and Jaworski, 1990). Environmental uncertainty refers to the degree of change that influences a firm's organizational design and operations, which is driven by unpredictable and constantly changing actions of customers, suppliers, competitors and regulatory groups (Child, 1972; Dess and Beard, 1984; Ghosh and Olsen, 2009). Unique, unstructured, and experimental R&D activities lead to rapid technological changes (Clark, 1985; Ecker et al., 2013; Hill et al., 2000; Kohli and Jaworski, 1990; Saviotti, 1998). Further, fierce competition and unpredictable consumer choices make it difficult to predict the outcome for highly idiosyncratic products in volatile, constantly changing environments (Song and Montoya-Weiss, 2001; Su et al., 2010). As such, prospectors are exposed to complexity and environmental uncertainty (DeSarbo et al., 2005; Ittner et al., 1997; Ittner and

Larcker, 2001; Kotha and Nair, 1995; Williamson, 1979). Li (2008) argues that operating complexity and environmental uncertainty reduce 10-K readability.

Since environmental uncertainty induces firm performance variability (Cheng and Kesner, 1997), it accentuates information asymmetry between the firm and external stakeholders (Ghosh and Olsen, 2009), reduces the clarity of information disclosed by managers (Leifer and Mills, 1996), and complicates managerial assumptions in financial reporting (Barth et al., 2001; Bentley et al., 2013). This triggers more complex disclosures for prospectors. For instance, Dedman et al. (2009) posit that innovative firms have incentives to provide more disclosures on their R&D but acknowledge that these disclosures contain scientific complexity and technical words that make the communication of these activities difficult. In addition, since innovative activities are prone to costly failure (Huang et al., 2008; Saleh and Wang, 1993), according to attribution theory in psychology (Bloomfield, 2008) prospectors are expected to accompany any bad news associated with failures with more exhausting explanations.[5] Thus, *a priori*, prospectors' disclosures are more complex, technical, and contain more uncertain words that reduce 10-K readability.

Bentley (2012) and Bentley et al. (2013) suggest that prospectors exhibit greater incentives (e.g., rapid and sporadic growth, greater need for external financing, and poorer financial performance), opportunities (e.g., lack of monitoring, internal control deficiencies, less stable and more complex organizational structure), and rationalizations (e.g., individualistic and egoism based ethical climate and culture) to misreport, relative to defenders. Recent studies associate prospectors with greater financial reporting irregularities and higher audit fees (Bentley et al., 2013), aggressive tax avoidance (Higgins et al., 2015), weaker internal control over financial reporting (ICFR) (Bentley-Goode et al., 2017) and, consequently, greater likelihood of receiving a material weakness opinion (Chen et al., 2017), and value-decreasing overinvestment (Navissi et al., 2017). Lo et al. (2017) associate obfuscation of earnings management with less readable annual reports. Thus, prospectors are also likely to obfuscate unfavourable information with vague, perplexing, and complex words or sentence structure in annual reports and this impression management reduces 10-K readability.

In contrast, defenders seek to offer cost-efficient and high-quality products to customers in market niches, with limited focus on R &D, thereby reducing operating complexity and environmental uncertainty (Miles and Snow, 1978, 2003; Naiker et al., 2008). To achieve this, they continuously enhance the efficiency of technologies and facilitate stringent monitoring and control with a centralized organizational structure (Ittner and Larcker, 1997; Thomas and Ramaswamy, 1996). Consequently, defenders grant less discretion to managers and employees, whom are subject to task programmability and strict monitoring and control, which can curb opportunism and information asymmetry (Bentley et al., 2013; Ittner et al., 1997; Naiker et al., 2008).

Some studies suggest that managers engage in strategic reporting to protect against proprietary costs from competition (Bagnoli and Watts, 2010; Ellis et al., 2012). Competitors can deduce the cost function, and hence the organization and production process, of a leader from financial information such as performance and cost measures (Sadka, 2004), allowing them to subsequently formulate their competitive strategies (Beatty et al., 2013). To withstand or discourage competition for their price sensitive products (Hambrick, 1983b; Tansey et al., 2014), defenders may be incentivized to engage in strategic reporting by omitting disclosures (i.e. less voluntary disclosures), or comply with the mandatory disclosure requirements, but with an attempt to diffuse information (Wagenhofer, 1990). For example, defenders can make the disclosures vague or proactively discuss bad news and downplay good news in their 10-Ks. Wagenhofer (1990) proposes that disclosures of unfavourable information can deter opponents, and Dhaliwal et al. (2014) document that managers battle the high threat of new entrants by reporting losses more quickly than gains. This, in turn, can add noise to defenders' 10-Ks and render their 10-Ks less readable. Alternatively, due to their aversion to risk (Navissi et al., 2017), defenders may disclose surplus information to ensure compliance with mandatory reporting requirements, and disclose more bad news over good news to manage financial statement users' perceptions, with such profuse disclosures adding noise to defenders' 10-Ks. In relation to proprietary costs, Seavey et al. (2017), however, suggest that such costs are higher for prospectors. This drives strategic reporting with the consequence being the production of less comparable reports. On balance, we expect defenders to have less complex disclosures and lower incentives to obfuscate information, with a corresponding more readable 10-K, than prospectors. Formally stated, the hypothesis to be tested is:

Prospectors have less readable 10-Ks relative to defenders.

3. Research design

We employ regression Model 1 to test the association between business strategy and annual report readability.

$$\begin{aligned} FOG_{it} = {} & \beta_0 + \beta_1\, BOS_{it} + \beta_2\, LAGFOG_{it} + \beta_3\, ABDA_{it} + \beta_4\, REAM_{it} + \beta_5\, EARN_{it} + \beta_6\, SIZE_{it} + \beta_7\, MTB_{it} + \beta_8\, AGE_{it} + \beta_9\, SIAT_{it} \\ & + \beta_{10} RETVOL_{it} + \beta_{11}\, EVOL_{it} + \beta_{12}\, NBSEG_{it} + \beta_{13}\, NGSEG_{it} + \beta_{14}\, NITEMS_{it} + \beta_{15}\, SEO_{it} + \beta_{16}\, MA_{it} + \beta_{17}\, DLW_{it} \\ & + INDUSTRY\ \ FIXED\ \ EFFECTS + YEAR\ \ FIXED\ \ EFFECTS + \varepsilon_{it} \end{aligned} \quad \text{(Model 1)}$$

3.1. Dependent variable

FOG, our dependent variable, is a proxy for 10-K readability obtained from Feng Li's website. Li (2008) estimates *FOG* as (words-per-sentence + percent-of-complex-words) $*$ 0.4 where words with three syllables or more are deemed as complex words. A higher

[5] For instance, managers may attribute unsuccessful investments to bad luck, such as external events, which entail additional length and complicated sentences to tie poor performance to those events (Miller and Ross, 1975).

(lower) value of *FOG* suggests that the annual report is less (more) readable since it requires more (less) years of formal education for a reader of average intelligence to read the text once and understand the context.[6]

3.2. Test variable

We follow Bentley et al. (2013) and Higgins et al. (2015) to operationalize business strategy (*BOS*), our test variable, based on the Miles and Snow (1978) strategic typology. *BOS* is a discrete score ranging from 6 to 30, constructed as the sum of quintile ranks of six variables per SIC 2-digit industry and year. The six variables are research intensity, marketing and advertising efforts, historical growth, operational efficiency, capital intensity, and organizational stability. Following Bentley et al. (2013) and Ittner et al. (1997), all variables are computed using a rolling prior five-year period over 1989–2011 for 1994–2011 business strategy scores. Existing literature shows that firms commit their resources and attempt to maintain their strategic positions over a long-term period to gain competitive advantage (Miles and Snow, 1978, 2003). Therefore, using a longer rolling period to compute the variables can minimize the random influence of external events on each variable computed to more accurately capture business strategy (Thomas and Ramaswamy, 1996; Zajac and Shortell, 1989).

Research intensity (*RDS5*), the ratio of R&D expenditures to sales, captures a firm's tendency to search for new products and markets (Naiker et al., 2008). Prospectors increase R&D intensity to maintain their reputations as innovative leaders in the market (Hambrick et al., 1983; Ittner and Larcker, 1997). In contrast, defenders have limited focus on R&D since they emphasize continuous improvement of existing products with standardized inputs (Smith et al., 1989). Therefore, prospectors (defenders) display a higher (lower) value in *RDS5*.

Marketing and advertising efforts (*SGA5*), the ratio of selling, general and administrative expenses (SG&A) to sales, reflect a firm's focus on exploiting and marketing new products (Bentley et al., 2013).[7] To introduce customers to new differentiated products, prospectors heavily rely on marketing and advertising (Ittner et al., 1997; Levy, 1989). In contrast, regular customers are already familiar about defenders' well-established cost-efficient products, therefore defenders rely less on marketing and advertising (Kotha and Nair, 1995; McDaniel and Kolari, 1987). Prospectors (defenders) exhibit a higher (lower) value of *SGA5*.

The third variable included is historical growth or investment opportunities (*REV5*), measured as one-year percentage change in total sales (Bentley et al., 2013). Prospectors tend to experience high growth rates by market expansion via regularly pioneering new products. In contrast, defenders stick to the existing stable market domain and achieve growth through market penetration (Said et al., 2003; Shortell and Zajac, 1990). Smith et al. (1989) juxtapose that the growth pattern of defenders is stable, while that of prospectors is spurt. Consequently, prospectors (defenders) are more likely to have a higher (lower) value of *REV5*.

Operational efficiency (*EMPS5*), the number of employees to sales, indicates a firm's ability to produce products and services efficiently (Higgins et al., 2015). Highly standardized business operations and clearly stipulated procedures enable employees in defenders to generate a higher level of sales, relative to the same number of employees in prospectors who engage in innovative activities characterized with uncertainty and loosely defined procedures that can lead to wasteful activities (Ittner et al., 1997; Naiker et al., 2008). Thus, it is expected that prospectors (defenders) have a higher (lower) *EMPS5* ratio.

The fifth variable is capital intensity (*CAP5*), reflecting a firm's technological efficiency and measured as net property, plant, and equipment to total assets (Bentley et al., 2013). Defenders are more automated and capital intensive to achieve inputs minimization and outputs maximization, that ultimately leads to economies of scale (Langerak et al., 1999; McDaniel and Kolari, 1987). In contrast, prospectors, which continuously explore new market opportunities, are less automated and capital-intensive, pay less attention to technology improvement, and are more flexible and regularly replace their technologies (Hambrick, 1983a; Segev, 1989). Therefore, a higher (lower) *CAP5* for defenders (prospectors) is expected.

Finally, organizational stability (*TEMP5*) is measured as the standard deviation of the total number of employees (Bentley et al., 2013). Employees in prospectors have shorter tenure as they move across firms based on the availability of projects, and also because they possess general skills that afford them mobility between firms. Further, senior management in prospectors can be hired externally (Thomas and Ramaswamy, 1996). Conversely, employees in defenders do not generally possess a wide range of skills allowing them to move across firms and they receive familiarisation training on the firm's business operations, rendering them more 'sticky' to the firm (Naiker et al., 2008). Further, senior management is usually promoted within defenders as intimate knowledge of the firm and its production capacity is necessary (Navissi et al., 2017; Thomas and Ramaswamy, 1996).

The six strategy variables are quintile ranked per year and two-digit SIC industry to acknowledge the co-existence of different strategies in the same industry, and to control for potential year-industry effects so that less biased quintiles can be constructed. *RDS5*, *SGA5*, *REV5*, *EMPS5*, and *TEMP5* are ranked in an ascending manner, while *CAP5* is ranked in a descending manner, with the intention that a higher (lower) value of these variables reflects prospector (defender) characteristics. The quintile-ranked scores of

[6] Loughran and McDonald (2014) suggest file size as a superior 10-K readability proxy than the Fog index. They claim that the Fog index is poorly specified in financial applications because it deems many multisyllabic yet well understood business texts (e.g., company) complex. Whilst Bonsall et al. (2017) acknowledge the shortcomings of the Fog index, they also question the validity of file size as a proxy for readability. Specifically, they show that file size is subject to measurement error because it does not rely on actual language used in the document, and time-series and cross-sectional variations in file size are mainly driven by the inclusion of content unrelated to the underlying text in the 10-K (e.g., HTML, XML, pdf and jpeg file attachments). With the limitations of both file size and the Fog index, Bonsall et al. (2017) propose an alternative measure based on plain English attributes. We employ three alternative proxies for 10-K readability in our robustness analysis, namely the Kincaid index, the Flesch index, and annual report length. We source these alternative measures from Li's website.

[7] Pantzalis and Park (2009) note that less than 20 percent of firms in Compustat report their advertising expenditures. Thus, we utilize SG&A to capture firm-level marketing and advertising activities, which is in line with Bentley et al. (2013). Our results (untabulated) remain qualitatively and quantitatively similar with the use of advertising expenditure, recognizing that this specification results in a much smaller sample.

these six variables are summed every year, ranging from 6 to 30, to indicate a firm's business strategy: defender (*DEF*: 6–12); analyzer (*AN*: 13–23); and prospector (*PRO*: 24–30). We expect a positive coefficient on *BOS* to show that prospector-oriented firms have less readable 10-Ks (i.e. higher *FOG*). We also replace *BOS* with separate dichotomous variables for defender (*DEF*) and prospector (*PRO*) firms, and expect a negative (positive) coefficient on *DEF* (*PRO*), suggesting that defenders (prospectors) display more (less) readable 10-Ks.

3.3. Control variables

Following previous readability studies (e.g. Cazier and Pfeiffer, 2016; Laksamana et al., 2012; Li, 2008; Lo et al., 2017), we control for the following determinants of annual report readability. *LAG_FOG*, measured as one-year lagged *FOG*, controls for persistence in readability (Lo et al., 2017). Controlling for the lagged dependent variable can also attenuate the concern of reverse causality (Chen et al., 2011; Klein, 1998). We expect *LAG_FOG* to be positively associated with *FOG*. Lo et al. (2017) associate earnings management with 10-K readability. We control for both accruals and real earnings management since Cohen et al. (2008) document increasing (decreasing) levels of real (accruals) earnings management after the passage of the Sarbanes-Oxley Act in 2002. Accruals earnings management is proxied by the absolute value of Modified Jones (1991) discretionary accruals (*ABDA*), as per Dechow et al. (1995) and Cohen et al. (2008). Real earnings management is proxied by *REAM* which is the sum of the standardized three real earnings management measures, namely abnormal cash flows from operations (*RCFO*), abnormal production costs (*RPROD*), and abnormal discretionary expense (*RDISX*), as per Cohen et al. (2008), Park (2017), and Roychowdhury (2006). We expect these variables to be positively associated with *FOG*.

EARN is calculated as operating earnings scaled by book value of assets. We expect a negative coefficient on *EARN* since firms with poorer performance have more perplexing disclosures to explain the bad news and/or greater incentives to obfuscate information (Bloomfield, 2008), resulting in less readable 10-Ks (i.e. higher *FOG*). *SIZE*, measured as the logarithm of the market value of equity at the end of the fiscal year, reflects the complexity of a firm's operating and business environment. *MTB*, measured as the market value of equity plus the book value of liabilities divided by the book value of assets at the end of the fiscal year, captures a firm's growth potential and, hence, complex and uncertain business models.[8] Positive coefficients are expected on *SIZE* and *MTB* since larger firms and high growth firms are expected to produce less readable 10-Ks. *AGE* is calculated as the logarithm of the number of years since a firm first appears in CRSP monthly stock return files. We predict a negative coefficient on *AGE* because older firms characterized with less information uncertainty and greater investor familiarity with their business models produce less complex and, hence, more readable 10-Ks. *SIAT*, measured as special items scaled by book value of assets, is expected to have a negative coefficient since firms with more negative special items exhibit more complex 10-Ks.

Business and operating environment volatility is captured with *RETVOL,* the standard deviation of monthly stock returns in the last year, and *EVOL*, the standard deviation of operating earnings in the last five fiscal years. Both measures are expected to yield positive coefficients, as more volatile environments lead to less readable 10-Ks. We control for, and expect positive coefficients on, *NBSEG* (i.e. the logarithm of the number of business segments from the Compustat segment file plus 1) and *NGSEG* (i.e. the logarithm of the number of geographic segments from the Compustat segment file plus 1), as more business and geographic segments reflect greater complexity of operations and, hence, less readable 10-Ks. We further include financial complexity proxied by *NITEMS*, measured as the logarithm of the number of non-missing items on Compustat. We predict a positive coefficient on *NITEMS* since financially complex firms disclose more and have less readable 10-Ks. Firms with seasoned equity offerings and merger and acquisitions tend to have more detailed disclosures that can result in less readable 10-Ks, thus we include and expect positive coefficients on *SEO*, a dichotomous variable that equals 1 if a firm has a seasoned equity offering during the year and 0 otherwise, and *MA*, a dichotomous variable that equals 1 if a firm has a merger and acquisition during the year and 0 otherwise. Firms that are incorporated in Delaware are subject to different corporate laws and, thus, exhibit different levels of readability (Daines, 2001). This is controlled for with a dichotomous variable (*DLW*) being 1 if a company is incorporated in Delaware and 0 otherwise. Finally, we control for industry and year fixed effects, and cluster standard errors at the firm level (Cameron and Miller, 2015; Petersen, 2009).

4. Sample selection, descriptive statistics, and main results

Table 1 presents our sample selection procedure. We begin with 219,904 firm-years with Compustat data between 1989 and 2011 after removing firm-years with zero or negative sales and assets, and missing historical SIC. Firm-year removals are: 50,462 firm-years operating in the Utilities and Financial industries (SIC codes 49, 60–69) since they are highly regulated and subject to different accounting rules; and 107,346 firm-years with insufficient five-year rolling data to compute all six business strategy component variables. This yields 62,096 firm-years with available business strategy scores between 1994 and 2011.[9] A merge with 10-K *FOG* data obtained from Feng Li's website results in 38,514 firm-years. Finally, after merging with other determinants of 10-K readability estimated using Compustat and CRSP data, 24,817 firm-years remain in our sample. The sample comprises 1941 defender firm-years (eight percent), 1216 prospector firm-years (five percent), and 21,660 analyzer firm-years (87 percent). The domination of analyzer firm-year observations is consistent with prior studies, including Bentley et al. (2013), Higgins et al. (2015), and Navissi et al. (2017),

[8] Concerned that *MTB* is highly correlated with *REV5,* as they both capture growth potential, *MTB* is excluded from the regression in a robustness test (untabulated) with quantitatively and qualitatively similar results found.

[9] Our sample ends in 2011 because Feng Li provides *FOG* data up to 2011.

Table 1
Sample selection.

Firms-years with Compustat data between 1989 and 2011 (after eliminating firm-years with zero or negative sales and assets, and missing historical SIC)	219,904
Less firm-years operating in the Utilities and Financial industries (SIC codes 49, 60–69)	(50,462)
Less firm-years with insufficient five year rolling data to compute all six business strategy component variables	(107,346)
Firm-years with available business strategy scores between 1994 and 2011	62,096
Firm-years after merging with available FOG data from Feng Li's website	38,514
Firm-years after merging with control variables for 10-K readability	24,817
Comprising	
Defender firm years	1941
Prospector firm years	1216
Analyzer firm years	21,660

as many firms pursue a hybrid business strategy.

The industry distribution (untabulated) is similar to Bentley et al. (2013) and supports Miles and Snow (1978, 2003) that three types of viable business strategies co-exist in different industries. The manufacturing sector is the largest industry segment represented in the full sample (60 percent), as well as in the sub-samples of prospectors (64 percent), defenders (74 percent) and analyzers (59 percent).

The descriptive statistics for the main variables are reported in Table 2 Panel A. Similar to Bentley et al. (2013), *BOS* has a mean (median) of 17.86 (18.00) with a standard deviation of 3.59. The statistics for *FOG* and other control variables resemble those reported by Li (2008) and Lo et al. (2017). For instance, the mean (median) *FOG* is 19.46 (19.27). The statistics for *ABDA* and *REAM* (including its three main components, namely *RCFO*, *RPROD*, and *RDISX*) are similar to those reported by Cohen et al. (2008).

We perform univariate analysis to provide preliminary insights on the association between *FOG* and *BOS*. As reported in Table 2 Panel B, the mean of *FOG* increases monotonically across *BOS* quartiles, suggesting that firms more closely resembling a prospector strategy exhibit less readable 10-Ks. The difference in mean *FOG* between the highest and lowest *BOS* quartiles is 0.166, significant at the one percent level (*t*-statistic = 5.47). Similarly, Table 2 Panel C shows that mean *FOG* increases progressively in the defender, analyzer and prospector sub-samples when firms are categorized based on their strategic type. The difference in mean *FOG* between prospector and defender sub-samples is 0.437, and is significant at the one percent level (*t*-statistic = 7.02).

We present the Pearson (upper diagonal) and Spearman (lower diagonal) correlations in Table 3. *FOG* and *BOS* are positively correlated. Further, *BOS* is correlated with earnings management proxies (*ABDA* and *REAM*) and many of the complexity variables previously included in readability studies. The highest variance inflation factor of 2.44, pertinent to *SIZE,* is less than the threshold of 10 thereby mitigating multicollinearity concerns among independent variables (Kennedy, 1992).

Table 4 reports the main regression results. In column (1), the coefficient on *BOS* is positive (0.016) and significant at the one percent level (*t*-statistic = 3.64). This suggests that firms with a higher business strategy score, resembling a prospector strategy, have less readable 10-Ks. In column (2), *BOS* is replaced with separate dichotomous variables for defender (*DEF*) and prospector (*PRO*) firms. We find significantly negative (positive) coefficients on *DEF* (*PRO*), suggesting that defenders (prospectors) are associated with more (less) readable 10-Ks. An *F*-test of the equality of the *DEF* and *PRO* coefficients rejects the null hypothesis that these coefficients are equal (Higgins et al., 2015). Finally, column (3) reports the results after restricting the sample to only prospector and defender firm-year observations. The coefficient on *PRO* is positive (0.324) and significant (*t*-statistic = 3.35) at the one percent level, consistent with our hypothesis that prospectors are associated with less readable 10-Ks relative to defenders. Among the control variables, *LAG_FOG* is significantly and positively associated with *FOG* as per Lo et al. (2017), while *EARN* and *NGSEG* are significantly and negatively associated with *FOG* as per Li (2008). Other variables including *ABDA*, *REAM*, *AGE*, *RETVOL*, *SEO*, and *DLW* are not significantly associated with *FOG* on a consistent basis. This suggests that business strategy as an *ex ante* determinant of a firm's operating environment, complexity, and financial reporting outcome is value adding in understanding 10-K readability over and above standalone variables used to compute business strategy (e.g., growth opportunities) and *ex post* financial reporting outcome variables such as earnings management.

5. Additional analysis

5.1. Disclosure sentiment

Extant studies have examined the impact of disclosure tone on firm outcomes. For example, Kothari et al. (2009) find that negativity in management's disclosures is related to greater stock return volatility of a firm. Loughran and McDonald (2013) show that initial public offerings with more uncertain text demonstrate greater first-day returns, absolute offer price revisions, and subsequent volatility. Ertugrul et al. (2017) find that firms with less readable 10-Ks and more ambiguous or uncertain tones experience higher costs of external financing and display more managerial information hoarding that results in greater stock price crash risk. However, these studies rarely examine the determinants of disclosure tones. We examine whether business strategy influences the lexical properties or disclosure tone of 10-Ks using three Loughran-McDonald sentiment measures obtained from WRDS SEC Filings Queries (Loughran and McDonald, 2011). First, litigious tone (*LIT*) refers to the Loughran-McDonald litigious word proportion within

Table 2
Descriptive statistics and univariate analysis.

Variable	Mean	Q1	Median	Q3	Std dev.
Panel A: Descriptive statistics for dependent, test and control variables					
FOG	19.458	18.451	19.273	20.242	1.692
BOS	17.858	15.000	18.000	20.000	3.589
ABDA	0.069	0.019	0.044	0.085	0.087
REAM	0.063	−0.027	0.037	0.135	0.192
RCFO	0.016	−0.035	0.023	0.078	0.124
RPROD	−0.038	−0.148	−0.039	0.067	0.220
RDISX	0.085	−0.058	0.040	0.198	0.286
EARN	0.055	0.025	0.079	0.129	0.177
SIZE	5.886	4.361	5.898	7.273	2.119
MTB	1.865	1.091	1.446	2.094	1.516
AGE (raw)	18.716	9.000	15.000	28.000	12.062
SI (raw)	−40.688	−6.800	0.000	0.000	489.276
RETVOL	0.143	0.085	0.121	0.175	0.092
EVOL	0.048	0.015	0.028	0.054	0.067
NBSEG (raw)	5.368	2.000	3.000	9.000	4.589
NGSEG (raw)	6.503	3.000	4.000	9.000	5.219
NITEMS (raw)	270.576	235.000	267.000	306.000	40.045
SEO	0.261				0.439
MA	0.406				0.491
DLW	0.584				0.493

	BOS quartiles					
	1	2	3	4	4-1Vv	*t*-statistic
Panel B: Mean of FOG within each business strategy score quartile						
Mean of FOG	19.372	19.433	19.507	19.538	0.166	5.47***
N	6245	7484	5129	5959		

	Business strategy				
	Defender	Analyzer	Prospector	Prospector-defender	*t*-statistic
Panel C: Mean of FOG within each business strategy type					
Mean of FOG	19.279	19.460	19.716	0.437	7.02***
N	1941	21,660	1216		

FOG represents the Fog index of the entire annual report developed by Feng Li. A higher FOG indicates that the annual report is less readable. BOS is Bentley et al. (2013) business strategy score ranging from 6 to 30, constructed as the sum of quintile ranks of the following six variables per SIC 2-digit industry and year, where RDS5, SGA5, REV5, EMPS5, and TEMP5 are ranked in an ascending manner, while CAP5 is ranked in a descending manner, so that a higher (lower) value of these variables reflects prospector (defender) characteristics. The range of scores for each type of business strategy is as follows: defender (6-12); analyzer (13-23); prospector (24-30). The six variables used to compute BOS include: (1) research intensity (RDS5) which is the ratio of research and development expenditures to sales computed over a rolling prior five-year average; (2) marketing and advertising efforts (SGA5) which is the ratio of selling, general and administrative expenses to sales computed over a rolling prior five-year average; (3) historical growth or investment opportunities (REV5) which is one-year percentage change in total sales computed over a rolling prior five-year average; (4) operational efficiency (EMPS5) which is the number of employees to sales computed over a rolling prior five-year average; (5) capital intensity or technological efficiency (CAP5) measured as net property, plant, and equipment to total assets computed over a rolling prior five-year average; and (6) organizational stability (TEMP5) which is the standard deviation of the total number of employees computed over a rolling prior five-year period. ABDA refers to the absolute value of Modified Jones (1991) discretionary accruals (*ABDA*) per Dechow et al. (1995). REAM is the sum of the standardized three real earnings management measures, namely abnormal cash flows from operations (RCFO), abnormal production costs (RPROD), and abnormal discretionary expense (RDISX), as in Cohen et al. (2008), Park (2017), and Roychowdhury (2006). EARN is operating earnings scaled by book value of assets. SIZE is the logarithm of market value of equity. MTB is the market value of equity plus book value of liability divided by the book value of total assets. AGE is the logarithm number of years since a firm shows up in CRSP monthly stock return files. SIAT is special items (SI) scaled by book value of assets. RETVOL is the standard deviation of the monthly stock returns in the last year. EVOL is the standard deviation of the operating earnings in the last five fiscal years. NBSEG is the logarithm of the number of business segments plus 1. NGSEG is the logarithm of the number of geographic segments plus 1. NITEMS is the logarithm of the number of non-missing items on Compustat. SEO is a dichotomous variable that equals 1 if a firm has seasoned equity offering during the year and 0 otherwise. MA is a dichotomous variable that equals 1 if a firm has merger and acquisition during the year and 0 otherwise. DLW is a dichotomous variable that equals 1 if a company is incorporated in Delaware and 0 otherwise. ***, **, and * indicate significance at 0.01, 0.05, and 0.10 level (two-tailed test), respectively.

10-Ks, and is measured as the number of Loughran-McDonald Financial-Litigious words in the document divided by the total number of words in the document that occur in the master dictionary. Litigious tone includes words such as *claimant*, *testimony*, *regulation* and *tort*, reflecting a propensity for legal contests or a litigious environment. Second, negative tone (*NEG*) refers to the Loughran-McDonald negative word proportion within 10-Ks, and is measured as the number of Loughran-McDonald Financial-Negative words in the document divided by the total number of words in the document that occur in the master dictionary. Negative tone

Table 3
Correlations and variance inflation factors.

Variable	FOG	BOS	ABDA	REAM	EARN	SIZE	MTB	AGE	SIAT	RETVOL	EVOL	NBSEG	NGSEG	NITEMS	SEO	MA	DLW	VIF
FOG		**0.046**	**0.026**	**0.037**	**−0.048**	0.022	0.017	**−0.034**	**−0.026**	**0.027**	**0.031**	**0.032**	0.014	**0.167**	**0.042**	**0.026**	**0.055**	
		< .0001	*< .0001*	*< .0001*	*< .0001*	*0.000*	*0.005*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*0.022*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	
BOS	**0.065**		**0.088**	**0.153**	**−0.072**	**0.176**	**0.238**	**−0.091**	**−0.040**	**0.105**	**0.127**	**−0.033**	**0.119**	**0.027**	**0.180**	**0.142**	**0.047**	1.17
	< .0001		*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	
ABDA	**0.044**	**0.054**		**0.152**	**−0.309**	**−0.201**	**0.110**	**−0.144**	**−0.089**	**0.282**	**0.286**	**−0.082**	**−0.034**	**−0.053**	**−0.032**	**−0.049**	**0.031**	1.22
	< .0001	*< .0001*		*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	
REAM	**0.061**	**0.181**	**0.092**		**−0.173**	−0.010	**0.138**	**−0.101**	0.007	**0.110**	**0.173**	**−0.049**	**0.051**	**0.047**	**0.055**	**0.028**	**0.054**	1.09
	< .0001	*< .0001*	*< .0001*		*< .0001*	*0.107*	*< .0001*	*< .0001*	*0.225*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	
EARN	**−0.092**	0.001	**−0.167**	**−0.166**		**0.357**	**0.057**	**0.140**	0.001	**−0.341**	**−0.492**	**0.048**	−0.000	0.000	**0.111**	**0.120**	**−0.047**	1.55
	< .0001	*0.847*	*< .0001*	*< .0001*		*< .0001*	*< .0001*	*< .0001*	*0.809*	*< .0001*	*< .0001*	*< .0001*	*0.922*	*0.950*	*< .0001*	*< .0001*	*< .0001*	
SIZE	0.006	**0.175**	**−0.232**	−0.020	**0.442**		**0.302**	**0.263**	**−0.124**	**−0.351**	**−0.264**	**0.248**	**0.252**	**0.281**	**0.566**	**0.291**	**0.079**	2.44
	0.343	*< .0001*	*< .0001*	*0.001*	*< .0001*		*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	
MTB	**0.031**	**0.277**	0.002	**0.122**	**0.442**	**0.479**		**−0.092**	0.002	**0.051**	**0.192**	**−0.075**	**0.047**	−0.008	**0.217**	−0.012	**0.050**	1.34
	< .0001	*< .0001*	*0.701*	*< .0001*	*< .0001*	*< .0001*		*< .0001*	*0.647*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*0.159*	*< .0001*	*0.055*	*< .0001*	
AGE	**−0.047**	**−0.088**	**−0.139**	**−0.118**	**0.150**	**0.207**	**−0.055**		**−0.058**	**−0.254**	**−0.205**	**0.241**	**0.109**	**0.163**	**0.100**	**0.080**	**−0.146**	1.23
	< .0001	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*		*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	
SIAT	**−0.053**	**−0.083**	**−0.040**	−0.008	**0.082**	**−0.204**	**0.031**	**−0.039**		0.015	0.015	**−0.078**	**−0.032**	**−0.062**	**−0.079**	**−0.038**	−0.015	1.04
	< .0001	*< .0001*	*< .0001*	*0.185*	*< .0001*	*< .0001*	*< .0001*	*< .0001*		*0.017*	*0.014*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*0.013*	
RETVOL	**0.066**	**0.138**	**0.276**	**0.118**	**−0.348**	**−0.377**	**−0.094**	**−0.300**	**−0.029**		**0.362**	**−0.065**	0.016	**−0.076**	**−0.107**	**−0.147**	**0.051**	1.38
	< .0001	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*		*< .0001*	*< .0001*	*0.009*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	
EVOL	**0.045**	**0.109**	**0.249**	**0.144**	**−0.273**	**−0.338**	**0.073**	**−0.240**	**0.075**	**0.434**		**−0.126**	**−0.028**	**−0.072**	**−0.070**	**−0.140**	**0.069**	1.55
	< .0001	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*		*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	
NBSEG	**0.031**	**−0.033**	**−0.084**	**−0.043**	−0.022	**0.210**	**−0.059**	**0.176**	**−0.135**	**−0.040**	**−0.169**		**0.359**	**0.300**	**0.127**	**0.195**	0.006	1.30
	< .0001	*< .0001*	*< .0001*	*< .0001*	*0.000*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*		*< .0001*	*< .0001*	*< .0001*	*< .0001*	*0.286*	
NGSEG	**0.038**	**0.121**	**−0.045**	**0.076**	**−0.041**	**0.270**	**0.092**	**0.081**	**−0.183**	**0.034**	**−0.047**	**0.490**		**0.431**	**0.180**	**0.133**	**0.044**	1.37
	< .0001	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*		*< .0001*	*< .0001*	*< .0001*	*< .0001*	
NITEMS	**0.182**	0.019	**−0.066**	**0.060**	**−0.029**	**0.296**	**0.072**	**0.143**	**−0.213**	**−0.069**	**−0.124**	**0.381**	**0.513**		**0.184**	**0.105**	**0.070**	1.33
	< .0001	*0.001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*		*< .0001*	*< .0001*	*< .0001*	
SEO	**0.047**	**0.182**	**−0.062**	**0.057**	**0.184**	**0.568**	**0.314**	**0.072**	**−0.155**	**−0.145**	**−0.125**	**0.116**	**0.195**	**0.188**		**0.169**	**0.091**	1.53
	< .0001	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*		*< .0001*	*< .0001*	
MA	**0.029**	**0.138**	**−0.078**	0.023	**0.127**	**0.298**	**0.067**	**0.060**	**−0.140**	**−0.156**	**−0.198**	**0.186**	**0.153**	**0.106**	**0.169**		0.017	1.15
	< .0001	*< .0001*	*< .0001*	*0.000*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*		*0.006*	
DLW	**0.066**	**0.048**	0.012	**0.063**	**−0.048**	**0.083**	**0.052**	**−0.154**	**−0.057**	**0.065**	**0.067**	0.005	**0.051**	**0.071**	**0.091**	0.017		1.05
	< .0001	*< .0001*	*0.049*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*< .0001*	*0.403*	*< .0001*	*< .0001*	*< .0001*	*0.006*		

Pearson (Spearman) correlations are reported in the upper (lower) diagonal. The *p*-values are italicized. Correlations with *p*-value less than 0.0001 are in bold face. The last column reports variance inflation factors. See Table 2 for variable definitions.

Table 4
Regressions of FOG on business strategy and control variables.

		Full sample		PRO and DEF only
	Exp sign	(1)	(2)	(3)
Intercept	?	18.310	18.507	14.920
		(11.28)***	(11.35)***	(3.99)***
BOS	+	0.016		
		(3.64)***		
DEF	−		−0.125	
			(−2.37)**	
PRO	+		0.186	0.324
			(3.13)***	(3.35)***
LAG_FOG	+	0.178	0.178	0.151
		(17.13)***	(17.16)***	(7.22)***
ABDA	+	0.048	0.043	0.472
		(0.35)	(0.32)	(1.73)*
REAM	+	0.015	0.025	−0.252
		(0.22)	(0.38)	(−1.92)*
EARN	−	−0.243	−0.242	−0.283
		(−2.97)***	(−2.97)***	(−1.71)*
SIZE	+	0.010	0.012	0.039
		(0.89)	(1.07)	(1.35)
MTB	+	0.001	0.003	−0.000
		(0.18)	(0.38)	(−0.02)
AGE	−	−0.051	−0.052	−0.049
		(−1.99)**	(−2.03)**	(−0.74)
SIAT	−	0.012	0.013	0.150
		(0.36)	(0.39)	(1.24)
RETVOL	+	0.327	0.357	0.486
		(2.26)**	(2.46)**	(1.26)
EVOL	+	−0.020	0.012	−0.415
		(−0.10)	(0.06)	(−0.99)
NBSEG	+	0.022	0.016	−0.103
		(0.41)	(0.30)	(−0.72)
NGSEG	+	−0.288	−0.276	−0.287
		(−5.01)***	(−4.82)***	(−1.93)*
NITEMS	+	−0.894	−0.873	0.866
		(−1.40)	(−1.37)	(0.58)
SEO	+	0.059	0.062	−0.035
		(1.63)*	(1.70)*	(−0.34)
MA	+	0.013	0.018	0.081
		(0.49)	(0.65)	(1.05)
DLW	+/−	0.094	0.094	0.075
		(2.81)***	(2.79)***	(0.89)
PRO = DEF *F*-statistic			13.23	
(*p*-value)			(0.000)***	
Adj. *R*-square		11.98%	11.98%	11.28%
N		24,817	24,817	3157

DEF is equal to 1 for defenders, and 0 otherwise. PRO is equal to 1 for prospectors, and 0 otherwise. LAG_FOG is FOG lagged at *t-1*. See Table 2 for other variable definitions. Reported results include industry and year fixed effects in regressions, with robust standard errors clustered by firm. The *t*-statistics are in parentheses. ***, **, and * indicate significance at 0.01, 0.05, and 0.10 level (two-tailed test), respectively.

incorporates words such as *loss*, *losses*, *adverse* and *failure*, which indicate pessimism. Third, uncertainty tone (*UNC*) refers to the Loughran-McDonald uncertainty word proportion within 10-Ks, which is the number of Loughran-McDonald Financial-Uncertainty words in the document divided by the total number of words in the document that occur in the master dictionary. Uncertainty tone comprises words such as *approximate*, *contingency*, *depend*, *fluctuate* and *variability*, which signify imprecision.

To examine the association between disclosure tone and business strategy, we separately regress each measure of tone (*LIT*, *NEG*, and *UNC*) on three distinct test variable specifications: (1) *BOS*; (2) *PRO* (*DEF*), which is a dichotomous variable that equals 1 for prospectors (defenders) and 0 otherwise; and (3) *PRO*, which is a dichotomous variable that equals 1 for prospectors and 0 otherwise, after limiting the sample to prospectors and defenders only. We employ a similar set of controls to those used in Model 1.[10]

The results for this analysis are reported in Table 5. With regard to *LIT*, column (1) of Table 5 reports a negative coefficient on *BOS* (-0.012) that is significant at the one percent level (*t*-statistic = −5.07). Upon replacing *BOS* with the separate dichotomous variables *DEF* and *PRO*, column (2) shows a significant positive (negative) coefficient on *DEF* (*PRO*) at the five (ten) percent level, indicating

[10] Although we do not control for lagged disclosure tones in this analysis, consistent results (untabulated) are observed after further controlling for lagged disclosure tones in the model.

Table 5
Regressions of disclosure sentiment on business strategy and control variables.

	Full sample						PRO and DEF only		
	DV = *LIT*		DV = *NEG*		DV = *UNC*		DV = *LIT*	DV = *NEG*	DV = *UNC*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Intercept	−0.168	−0.273	−2.541	−2.479	1.382	1.420	1.453	−3.685	−0.985
	(−0.19)	(−0.31)	(−4.35)***	(−4.24)***	(3.70)***	(3.78)***	(0.75)	(−2.72)***	(−1.12)
BOS	−0.012		0.010		0.010				
	(−5.07)***		(5.99)***		(9.05)***				
DEF		0.069		−0.048		−0.035			
		(2.35)**		(−2.58)***		(−2.57)***			
PRO		−0.042		0.085		0.070	−0.130	0.164	0.123
		(−1.62)*		(3.62)***		(4.23)***	(−3.18)***	(4.97)***	(5.57)***
ABDA	−0.002	−0.008	−0.043	−0.043	0.002	0.004	−0.147	−0.084	−0.045
	(−0.04)	(−0.12)	(−0.86)	(−0.88)	(0.06)	(0.12)	(−1.15)	(−0.83)	(−0.58)
REAM	−0.028	−0.040	0.103	0.112	0.029	0.041	−0.012	0.057	−0.003
	(−0.92)	(−1.33)	(4.61)***	(4.98)***	(2.15)**	(2.92)***	(−0.18)	(1.23)	(−0.10)
EARN	−0.054	−0.041	−0.222	−0.226	−0.047	−0.053	−0.087	−0.079	−0.026
	(-1.55)	(−1.20)	(−4.81)***	(−4.87)***	(−2.25)**	(−2.55)***	(−1.15)	(−1.28)	(−0.59)
SIZE	0.037	0.035	0.019	0.021	0.008	0.009	0.018	0.001	0.004
	(5.72)***	(5.42)***	(4.16)***	(4.49)***	(2.67)***	(3.21)***	(1.19)	(0.13)	(0.57)
MTB	−0.028	−0.025	−0.027	−0.025	0.000	0.002	−0.015	−0.016	0.005
	(−5.66)***	(−6.22)***	(−6.34)***	(−5.98)***	(0.00)	(0.87)	(−1.96)**	(−2.38)**	(0.91)
AGE	0.140	0.142	−0.021	−0.022	−0.089	−0.089	0.135	−0.015	−0.064
	(9.72)***	(9.86)***	(−2.10)**	(−2.17)**	(−12.74)***	(−12.65)***	(4.13)***	(−0.72)	(−4.03)***
SIAT	−0.054	−0.055	−0.078	−0.077	−0.005	−0.003	−0.004	0.005	−0.009
	(−1.65)*	(−1.59)	(−2.27)**	(−2.33)**	(−0.50)	(−0.46)	(−0.09)	(0.14)	(−0.32)
RETVOL	−0.055	−0.083	0.677	0.700	0.157	0.183	−0.197	0.641	0.203
	(−0.81)	(−1.22)	(12.03)***	(12.44)***	(4.15)***	(4.79)***	(−1.19)	(5.19)***	(2.30)**
EVOL	0.007	−0.029	0.482	0.507	0.095	0.123	−0.065	0.369	0.095
	(0.07)	(−0.31)	(5.34)***	(5.60)***	(1.90)*	(2.45)**	(−0.33)	(2.09)**	(0.85)
NBSEG	0.082	0.088	0.005	0.000	−0.111	−0.117	0.038	−0.031	−0.105
	(2.88)***	(3.11)***	(0.25)	(0.00)	(−7.80)***	(−8.20)***	(0.60)	(−0.64)	(−2.75)***
NGSEG	−0.074	−0.086	0.066	0.077	0.046	0.058	−0.026	0.127	0.066
	(−2.49)**	(−2.90)***	(2.83)***	(3.28)***	(2.89)***	(3.68)***	(−0.40)	(2.65)***	(1.79)*
NITEMS	0.238	0.209	1.547	1.583	0.083	0.129	−0.441	1.964	0.992
	(0.68)	(0.60)	(6.57)***	(6.71)***	(0.55)	(0.85)	(−0.57)	(3.61)***	(2.82)***
SEO	0.015	0.012	0.037	0.040	0.018	0.022	0.026	0.013	−0.003
	(0.85)	(0.61)	(2.98)***	(3.20)***	(2.33)**	(2.75)***	(0.67)	(0.49)	(−0.17)
MA	0.001	−0.006	−0.040	−0.035	0.001	0.007	0.018	−0.017	0.006
	(0.05)	(−0.41)	(−3.99)***	(−3.50)***	(0.21)	(1.20)	(0.54)	(−0.71)	(0.38)
DLW	0.037	0.037	0.056	0.058	0.025	0.025	0.114	0.076	0.030
	(1.91)*	(1.91)*	(4.30)***	(4.25)***	(2.77)***	(2.69)***	(2.57)***	(2.68)***	(1.28)
PRO = DEF									
F-statistic		9.89		25.32		42.22			
(*p*-value)		(0.000)***		(0.000)***		(0.000)***			
Adj. *R*-square	9.62%	9.36%	30.68%	30.45%	47.36%	46.70%	9.55%	33.02%	4.44%
N	18,105	18,105	18,105	18,105	18,105	18,105	2312	2312	2312

LIT refers to the Loughran-McDonald litigious word proportion in the 10-K filings, which is the number of Loughran-McDonald Financial-Litigious words in the document divided by the total number of words in the document that occur in the master dictionary. NEG refers to the Loughran-McDonald negative word proportion in the 10-K filings, which is the number of Loughran-McDonald Financial-Negative words in the document divided by the total number of words in the document that occur in the master dictionary. UNC refers to the Loughran-McDonald uncertainty word proportion in the 10-K filings, which is the number of Loughran-McDonald Financial-Uncertainty words in the document divided by the total number of words in the document that occur in the master dictionary. See Tables 2 and 4 for other variable definitions. Reported results include industry and year fixed effects in regressions, with robust standard errors clustered by firm. The *t*-statistics are in parentheses. ***, **, and * indicate significance at 0.01, 0.05, and 0.10 level (two-tailed test), respectively.

that defenders (prospectors) have more (less) litigious tone in their 10-Ks than their non-counterparts. Upon excluding analyzers, column (7) reports a negative coefficient on *PRO* (−0.130) that is significant at the one percent level (*t*-statistic = −3.18). Overall, our findings suggest that defenders incorporate more litigious tone in their 10-Ks than prospectors. A plausible explanation for this is that given the risk averse nature of defenders they tend to comply more with regulation to avoid reputation costs (Higgins et al., 2015), and risk averse firms tend to employ more litigious tones to inform the market of the firm's legal environment so as to mitigate litigation risks (Martikainen et al., 2016; Rogers et al., 2011).

With regard to *NEG*, column (3) reports a significant positive coefficient on *BOS* (0.010, *t*-statistic = 5.99), while column (4) shows a significant negative (positive) coefficient on *DEF* (*PRO*), with both *t*-statistics significant at the one percent level. When limiting the sample to prospectors and defenders only, column (8) reports a positive coefficient on *PRO* (0.164) that is significant at the one percent level (*t*-statistic = 4.97). Overall, these findings are consistent with prospectors including more negative tone in their

10-Ks than both analyzers and defenders. Finally, Table 5 indicates that prospectors tend to also include more uncertain tone in their 10-Ks than other firms, given the significant positive coefficient on *BOS* in column (5), the significant negative (positive) coefficient on *DEF* (*PRO*) in column (6), and the significant positive coefficient on *PRO* in column (9). Across model specifications, columns (2), (4) and (6) also report that, upon undertaking an *F*-test of coefficient equality, the *DEF* and *PRO* coefficients consistently are not equal. Collectively, the findings for *NEG* and *UNC* reflect prospectors' 10-Ks displaying more negative and uncertain tones, which is consistent with these firms operating in volatile and risky environments that can beget less readable 10-Ks stemming from complex explanations for uncertain or unsuccessful projects. The evidence bridges the insights provided by several prior studies, including Naiker et al. (2008), who show that prospectors have greater stock return volatility and uncertainty relative to defenders, while Kothari et al. (2009) associate negativity in management's disclosures with a firm's stock return volatility.

5.2. Alternative measures of 10-K readability

Following Li (2008), we adopt three alternative measures of annual report readability: (1) the Kincaid Index, also known as the -Flesh-Kincaid Grade Level (*KINCAID*), where a higher value of *KINCAID* indicates lower readability[11]; (2) the Flesch Reading Ease (*FLESCH*), where a higher value of *FLESCH* signifies greater readability[12]; and (3) the length of an annual report (*LENGTH*), which is estimated as the logarithm of the number of words in a 10-K, where a higher value of *LENGTH* reflects lower readability. These data are also obtained from Feng Li's website. The results for this analysis are reported in Table 6.

Column (1) shows a positive coefficient on *BOS* (0.021) using *KINCAID* as the alternative 10-K readability proxy, while column (3) shows a negative coefficient on *BOS* (−0.098) employing *FLESCH* as the alternative 10-K readability proxy, with both significant at the one percent level (*t*-statistics = 5.19 and -8.28, respectively). This is consistent with prospectors' 10-Ks containing more complex information relative to defenders and analyzers, which requires greater user sophistication to understand and interpret. In support, when using *KINCAID* to measure readability, column (2) shows a significant negative (positive) coefficient on *DEF* (*PRO*), with both *t*-statistics significant at the one percent level, while column (4) shows a significant positive (negative) coefficient on *DEF* (*PRO*) at the one percent level when using *FLESCH* as the dependent variable. An *F*-test of coefficient equality shows that the *DEF* and *PRO* coefficients are not equal, whether in the context of *KINCAID* (*F*-statistic = 17.80, *p*-value = 0.000) or *FLESCH* (*F*-statistic = 39.19, *p*-value = 0.000). Moreover, when limiting the sample to prospectors and defenders only, the significant positive association between *KINCAID* and *PRO* (0.383, *t*-statistic = 4.19) reported in column (7), and the significant negative association reported in column (8) between *FLESCH* and *PRO* (-1.501, *t*-statistic = -5.77), indicate prospectors have less readable 10-Ks than defenders. We do, however, fail to find consistent evidence that business strategy accounts for variation in 10-K length, which aligns with Cazier and Pfeiffer (2016) who fail to find an association between R&D expenditure, which is one aspect of business strategy, and 10-K length. This also highlights that *FOG*, *KINCAID*, and *FLESCH* capture different facets of readability from *LENGTH*.

5.3. Earnings performance

We examine whether the association between business strategy and 10-K readability is sensitive to firm performance, given Li (2008) finds that poorly performing firms have less readable annual reports. We re-estimate Model 1 based on two sub-samples of firms depending on whether their current period earnings (*EARN*) is above or below industry-year median *EARN* to examine whether our main findings hold across both sub-samples.

Results reported in Table 7 show a significant positive coefficient on *BOS*, whether *EARN* is above (0.016, *t*-statistic = 2.50) or below (0.017, *t*-statistic = 3.18) the industry-year median. Moreover, we continue to find a significant positive coefficient on *PRO* across both *EARN* sub-samples, and a significant negative coefficient on *DEF* for the sub-sample where *EARN* is below the industry-year median. *F*-tests indicate that the *DEF* and *PRO* coefficients are not equal for both the above (*F*-statistic = 4.16, *p*-value = 0.016) and below (*F*-statistic = 8.95, *p*-value = 0.000) industry-year median *EARN* sub-samples. When limiting the sample to defenders and prospectors, a significant positive coefficient on *PRO* is found for both the above (0.483, *t*-statistic = 3.22) and below (0.250, *t*-statistic = 2.17) *EARN* sub-samples. In sum, our main findings are not sensitive to firm performance suggesting that business strategy fundamentally determines *FOG* for both good and poor performing firms.[13]

6. Robustness tests

Potential endogeneity issues are addressed with the following tests.

[11] *KINCAID*, indicative of a document that is understandable by an average US grade level, is estimated as (11.8 ∗ number of syllables/number of words) + (0.39 ∗ number of words/number of sentences) - 15.59. For example, a score of 8.0 indicates a document that is understandable by an average eighth grader.

[12] *FLESCH* rates reading ease on a scale of 0–100, where a score of 0 (1 0 0) reflects the material hardest (easiest) to read, calculated as 206.835 ∗ (1.015 ∗ number of words/number of sentences) − (84.6 ∗ number of syllables/number of words).

[13] We also re-estimate this analysis within the sub-sample of firms with improved earnings performance from *t*-1 to *t*, and within the sub-sample of firms with deteriorated earnings performance from *t*-1 to *t*. We continue to observe that *BOS* significantly explains the variation in *FOG*, and prospectors have greater *FOG* relative to defenders, within each sub-sample of improved and deteriorated earnings performance.

Table 6
Regressions of alternative readability measures on business strategy and control variables.

	Full sample						PRO and DEF only		
	DV = *KINCAID*		DV = *FLESCH*		DV = *LENGTH*		DV = *KINCAID*	DV = *FLESCH*	DV = *LENGTH*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Intercept	14.035	14.221	16.365	15.202	5.603	5.555	8.368	31.720	5.129
	(9.24)***	(9.31)***	(4.01)***	(3.71)***	(8.93)***	(8.87)***	(2.39)**	(3.02)***	(3.75)***
BOS	0.021		−0.098		0.002				
	(5.19)***		(−8.28)***		(1.37)				
DEF		−0.131		0.697		0.021			
		(−2.64)***		(4.85)***		(1.06)			
PRO		0.219		−0.744		0.084	0.383	−1.501	0.044
		(3.83)***		(−4.58)***		(3.92)***	(4.19)***	(−5.77)***	(1.37)
LAG_READ	0.212	0.213	0.309	0.312	0.264	0.264	0.183	0.305	0.250
	(20.63)***	(20.68)***	(27.40)***	(27.56)***	(22.39)***	(22.36)***	(8.53)***	(11.29)***	(9.74)***
ABDA	0.042	0.040	0.694	0.682	0.200	0.196	0.469	−1.006	0.275
	(0.33)	(0.32)	(1.81)*	(1.78)*	(3.24)***	(3.17)***	(1.81)*	(−1.34)	(2.27)**
REAM	0.064	0.081	−0.019	−0.100	0.012	0.013	−0.287	0.525	−0.087
	(1.03)	(1.30)	(−0.10)	(−0.51)	(0.43)	(0.48)	(−2.37)**	(1.54)	(−1.34)
EARN	−0.312	−0.313	1.036	1.077	−0.339	−0.331	−0.426	1.135	−0.352
	(−3.88)***	(−3.90)***	(4.38)***	(4.54)***	(−8.33)***	(−8.23)***	(−2.88)***	(2.54)**	(−5.23)***
SIZE	0.043	0.046	−0.158	−0.173	0.089	0.089	0.070	−0.238	0.103
	(3.85)***	(4.12)***	(−5.17)***	(−5.63)***	(18.19)***	(18.27)***	(2.53)**	(−3.07)***	(9.11)***
MTB	−0.004	−0.001	0.004	−0.012	−0.040	−0.040	−0.008	0.042	−0.024
	(−0.54)	(−0.13)	(0.19)	(−0.50)	(−9.58)***	(−9.66)***	(−0.50)	(0.87)	(−3.74)***
AGE	−0.058	−0.059	0.117	0.127	−0.076	−0.074	−0.075	0.160	−0.061
	(−2.36)**	(−2.41)**	(1.72)*	(1.87)*	(−7.36)***	(−7.20)***	(−1.19)	(0.88)	(−2.37)**
SIAT	0.006	0.008	0.027	0.017	−0.047	−0.047	0.213	−0.697	0.122
	(0.19)	(0.25)	(0.22)	(0.14)	(−2.36)**	(−2.35)**	(1.99)*	(−2.06)**	(1.83)*
RETVOL	0.352	0.398	−0.859	−1.066	0.529	0.535	0.500	−1.654	0.694
	(2.57)***	(2.91)***	(−2.18)**	(−2.70)***	(7.65)***	(7.76)***	(1.36)	(−1.65)*	(4.34)***
EVOL	0.091	0.139	1.209	0.971	0.012	0.012	−0.542	2.548	0.025
	(0.46)	(0.71)	(1.94)*	(1.56)	(0.12)	(0.12)	(−1.30)	(2.10)**	(0.16)
NBSEG	0.022	0.012	−0.181	−0.137	0.113	0.112	−0.096	0.327	0.123
	(0.42)	(0.24)	(−1.26)	(−0.96)	(5.22)***	(5.17)***	(−0.69)	(0.84)	(2.36)**
NGSEG	−0.230	−0.210	0.255	0.170	0.039	0.044	−0.219	0.142	−0.001
	(−4.19)***	(−3.84)***	(1.67)*	(1.11)	(1.67)*	(1.86)*	(−1.57)	(0.36)	(−0.03)
NITEMS	−0.757	−0.705	0.454	0.295	0.369	0.401	1.911	−5.982	0.696
	(−1.26)	(−1.17)	(0.28)	(0.18)	(1.51)	(1.65)*	(1.36)	(−1.45)	(1.34)
SEO	0.059	0.064	0.023	−0.002	0.061	0.060	−0.033	0.297	0.054
	(1.68)*	(1.82)*	(0.24)	(−0.02)	(3.98)***	(3.97)***	(−0.33)	(1.08)	(1.53)
MA	0.007	0.015	−0.058	−0.097	0.038	0.039	0.060	−0.291	0.037
	(0.27)	(0.60)	(−0.79)	(−1.33)	(3.29)***	(3.42)***	(0.79)	(−1.39)	(1.29)
DLW	0.089	0.088	−0.181	−0.179	0.079	0.078	0.100	−0.130	0.128
	(2.79)***	(2.76)***	(−2.05)**	(−2.02)**	(5.85)***	(5.81)***	(1.25)	(−0.57)	(4.26)***
PRO = DEF									
F-statistic		17.80		39.19		7.56			
(*p*-value)		(0.000)***		(0.000)***		(0.000)***			
Adj. *R*-square	15.20%	15.14%	25.73%	25.56%	20.11%	20.14%	15.69%	27.04%	25.12%
N	24,817	24,817	24,817	24,817	24,817	24,817	3157	3157	3157

KINCAID refers to the Kincaid Index, which estimates the understandability of a 10-K by an average US grade level, and is measured as (11.8 * number of syllables/number of words) + (0.39 * number of words/number of sentences) − 15.59. FLESCH refers to the reading ease of a 10-K on a scale of 0-100, and is calculated as 206.835 * (1.015 * number of words/number of sentences) − (84.6 * number of syllables/number of words). LENGTH refers to the length of a 10-K, and is measured as the logarithm of the number of words in a 10-K. LAG_READ is KINCAID, FLESCH and LENGTH lagged at t-1 when KINCAID, FLESCH and LENGTH is used as the dependent variable, respectively. See Tables 2 and 4 for other variable definitions. Reported results include industry and year fixed effects in regressions, with robust standard errors clustered by firm. The *t*-statistics are in parentheses. ***, **, and * indicate significance at 0.01, 0.05, and 0.10 level (two-tailed test), respectively.

6.1. Lead-lag regression

In line with Fich and Shivdasani (2006), we adopt a lead-lag approach to mitigate the concern of reverse causality. To do this, each independent variable is lagged by one year. In untabulated findings, for the full sample the coefficient on *LAG_DEF* is negative (−0.126) and significant (*t*-statistic = −2.42) while the coefficient on *LAG_PRO* is positive (0.114) and significant (*t*-statistic = 1.85).[14] In addition, an *F*-test indicates that the coefficients on *LAG_DEF* and *LAG_PRO* are not equal (*F*-statistic = 7.22, *p*-

[14] Untabulated results are available upon request.

Table 7
Earnings performance, business strategy, and 10-K readability.

	Above industry-year earnings median			Below industry-year earnings median		
	Full sample		DEF and PRO only	Full sample		DEF and PRO only
	(1)	(2)	(3)	(1)	(2)	(3)
Intercept	20.669	21.023	24.397	14.778	15.023	5.081
	(9.03)***	(9.12)***	(4.10)***	(7.37)***	(7.44)***	(1.04)
BOS	0.016			0.017		
	(2.50)**			(3.18)***		
DEF		−0.121			−0.158	
		(−1.57)			(−2.47)**	
PRO		0.166	0.483		0.155	0.250
		(1.69)*	(3.22)***		(2.30)**	(2.17)**
LAG_FOG	0.192	0.192	0.168	0.160	0.160	0.141
	(11.72)***	(11.71)***	(5.32)***	(12.52)***	(12.53)***	(5.05)***
ABDA	0.644	0.648	0.430	−0.216	−0.221	0.368
	(2.61)***	(2.62)***	(0.59)	(−1.36)	(−1.39)	(1.22)
REAM	−0.046	−0.035	−0.463	0.016	0.026	−0.132
	(−0.49)	(−0.38)	(−2.29)**	(0.18)	(0.30)	(−0.70)
EARN	−1.159	−1.150	−1.211	−0.095	−0.096	−0.099
	(−3.86)***	(−3.80)***	(−1.32)	(−1.03)	(−1.05)	(−0.54)
SIZE	0.009	0.013	0.033	0.028	0.030	0.047
	(0.51)	(0.79)	(0.63)	(2.04)**	(2.17)**	(1.51)
MTB	0.025	0.027	−0.003	0.016	0.018	0.039
	(1.86)*	(1.94)*	(−0.10)	(1.57)	(1.71)*	(1.60)
AGE	−0.013	−0.014	−0.068	−0.075	−0.077	−0.022
	(−0.38)	(−0.42)	(−0.74)	(−2.25)**	(−2.33)**	(−0.28)
SIAT	0.085	0.088	−0.372	−0.051	−0.055	0.157
	(2.55)**	(2.62)***	(−0.36)	(−0.72)	(−0.78)	(1.30)
RETVOL	0.126	0.191	0.568	0.322	0.335	0.620
	(0.46)	(0.71)	(0.70)	(1.95)*	(2.04)**	(1.51)
EVOL	0.839	0.869	−0.857	−0.050	−0.006	−0.168
	(2.16)**	(2.23)**	(−0.97)	(−0.2)	(−0.03)	(−0.35)
NBSEG	0.000	−0.009	0.000	0.002	−0.003	−0.217
	(0.01)	(−0.12)	(0.00)	(0.04)	(−0.04)	(−1.31)
NGSEG	−0.304	−0.299	−0.487	−0.311	−0.300	−0.247
	(−3.90)***	(−3.84)***	(−2.16)**	(−4.27)***	(−4.15)***	(−1.44)
NITEMS	−2.034	−2.080	−2.587	0.727	0.738	4.540
	(−2.29)**	(−2.35)**	(−1.09)	(0.91)	(0.92)	(2.35)**
SEO	0.080	0.083	0.100	0.034	0.035	−0.145
	(1.65)*	(1.71)*	(0.59)	(0.66)	(0.69)	(−1.17)
MA	−0.008	−0.001	−0.154	0.036	0.039	0.216
	(−0.22)	(−0.03)	(−1.28)	(0.99)	(1.08)	(2.34)**
DLW	0.126	0.130	0.183	0.042	0.042	0.004
	(2.91)***	(2.99)***	(1.62)	(0.98)	(0.98)	(0.04)
PRO = DEF						
F-statistic		4.16			8.95	
(*p*-value)		(0.016)**			(0.000)***	
Adj. *R*-square	13.13%	13.13%	13.84%	10.95%	10.95%	11.09%
N	12,415	12,415	1196	12,402	12,402	1961

Firms are split into sub-samples depending on whether their current period earnings (*EARN*) is above or below industry-year median *EARN*. See Tables 2 and 4 for other variable definitions. Reported results include industry and year fixed effects in regressions, with robust standard errors clustered by firm. The *t*-statistics are in parentheses. ***, **, and * indicate significance at 0.01, 0.05, and 0.10 level (two-tailed test), respectively.

value = 0.000). Upon eliminating analyzers, there is a significant positive coefficient on *LAG_PRO* (0.193, *t*-statistic = 2.06), which indicates our main finding that prospectors have less readable 10-Ks than defenders is not attributable to reverse causality.

6.2. Firm age

Following Higgins et al. (2015), firm age analysis is conducted to discount the possibility that our results are driven by firm age. We do this by interacting a firm age indicator (*OLDER*) with *PRO* and *DEF* for the full sample, and with *PRO* when limiting the sample to prospectors and defenders only. *OLDER* equals 1 if the firm's age (*AGE*) is greater than the median industry-year age, and 0 otherwise. If age differences between prospectors and defenders are driving the main findings, each interaction term should be significant and the difference between the coefficients on *PRO* and *DEF* should be insignificant for the full sample analysis.

For the full sample of firm-years, our untabulated findings show the coefficients on both interaction terms (*DEF* * *OLDER* and *PRO* * *OLDER*) are insignificant, while the coefficient on *DEF* remains negative (−0.128) and significant (*t*-statistic = −1.86) and the

coefficient on *PRO* remains positive (0.185) and significant (*t*-statistic = 2.68). Moreover, an *F*-test of the equality of the *DEF* and *PRO* coefficients rejects the null hypothesis that these coefficients are equal (*F*-statistic = 8.48, *p*-value = 0.000). Upon excluding analyzers, there is an insignificant coefficient on *PRO* * *OLDER* and a significant positive coefficient on *PRO* (0.339, *t*-statistic = 3.32). Overall, the firm age analysis results are consistent with the main findings and suggests that business strategy and firm age are different constructs.

6.3. Firm size

To discount that firm size is driving our inferences, following Bentley et al. (2013) and Carson and Fargher (2007) we form size quintiles and expand the main model by interacting *PRO* and *DEF* with the size quintiles representing the smallest, median, and largest firms in the sample (i.e. $DEF * SIZEQ1$, $DEF * SIZEQ3$, $DEF * SIZEQ5$, $PRO * SIZEQ1$, $PRO * SIZEQ3$, $PRO * SIZEQ5$). To the extent a particular size group is driving the main findings, a significant coefficient on the respective interactive variable would result.

Untabulated results for the full sample show that all of the interactive variables have insignificant coefficients. Moreover, the results continue to show a significant negative coefficient on *DEF* (-0.133, *t*-statistic = -1.76) and a significant positive coefficient on *PRO* (0.174, *t*-statistic = 2.15), with an *F*-test indicating the *DEF* and *PRO* coefficients are not equal (*F*-statistic = 5.79, *p*-value = 0.000). After limiting the sample to prospectors and defenders, the interactive variables remain insignificant while *PRO* has a positive coefficient (0.322) significant at the one percent level (*t*-statistic = 3.04). In sum, these results indicate that firm size does not drive our main findings.

7. Conclusion

Our study investigates whether business strategy is associated with 10-K readability. Consistent with the hypothesis, we find that prospectors have less readable 10-Ks relative to defenders. The results are robust to several sensitivity and robustness checks. We also find that prospectors' 10-Ks display more negative and uncertain tones, while defenders' 10-Ks exhibit more litigious tone. Our study suggests that the influence of business strategy on a firm's operating complexity and environmental uncertainty (and, hence, managerial opportunism) frames the level, wording, and complexity of disclosures and eventually 10-K readability.

Policy makers, locally and globally, are addressing calls for more streamlined reports with sources of streamlining including a plain English approach, reconsideration of materiality, grouping and reordering of note disclosures, reconfiguration of accounting policy disclosures and reduced page length. Our study is insightful for informing these deliberations. It suggests that policy makers need to be cognizant of the influence of a firm's strategic orientation on shaping the complexity and narrative of its communications. The success of regulatory initiatives to improve and monitor the readability of annual reports will vary depending on firms' strategic orientation. By necessity, prospector-oriented firms will have more complex and technical disclosures and greater incentives to obfuscate unfavourable information. Regulatory pronouncements to improve readability are less likely to achieve the desired outcome for such firms. While our study has focused on the entire 10-K readability, future studies can consider investigating the impact of business strategy on the readability of a specific section in the 10-K, for instance, MD&A where managers exhibit greater discretion in disclosures.

Data availability

All data used in this study are publicly available from the sources identified in the paper.

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