Financial Management

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Financial Management

ORIGINAL ARTICLE OPEN ACCESS

Financial Statement Readability and Firm Debt Choice

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Received: 11 May 2024 | **Revised:** 23 July 2025 | **Accepted:** 25 July 2025

Funding: Hamdi Ben-Nasr acknowledges financial support from Qatar University through the internal grant "IRCC-2024-005".

Keywords: bank loans | information asymmetry | monitoring | public debt | readability

ABSTRACT

Examining more than 16,000 firm-year observations in the United States, we provide novel evidence showing that higher financial statement readability leads to a decrease in information asymmetry and the need for external monitoring, thereby reducing the reliance on bank debt relative to public debt. Our channel tests show that information asymmetry, as measured by the bid–ask spread, partially mediates the relationship between readability and the bank debt ratio. Furthermore, cross-sectional tests demonstrate that information environment quality and financial constraints exacerbate the negative effect of readability on the bank debt ratio. Our results remain robust to a battery of additional tests. The study provides valuable insights for investors, firms, and regulators to improve transparency and market efficiency.

JEL Classification: G18, G21, G32

1 | Introduction

It is widely agreed that the asymmetry of information in equity markets adversely affects resource allocation (Akerlof 1978; Spence 1978, 2002; Stiglitz 2002). This broad body of literature suggests that more transparent and informative disclosures reduce information asymmetry and enhance a firm's credibility with investors. This, in turn, can lead to higher liquidity levels (Kim and Verrecchia 1994; Welker 1995), lower monitoring costs (Leuz and Verrecchia 2000), and lower cost of capital (Armstrong et al. 2011; Lambert et al. 2012). Corporate disclosures can, of course, be either mandatory or voluntary. The former type comprises financial statements, footnotes, management discussions, and so forth, whereas the latter may include conference calls, press briefings, and information on corporate websites. Among all these, 10-K reports remain one of the most popular and effective disclosure channels. In addition to financial statements and other quantitative information, the textual component represents about 80% of 10-K reports (Li 2010; Lo et al. 2017). This highlights the importance of improving narrative quality in 10-K reports to alleviate information asymmetry.

Not surprisingly, in this context, policymakers and regulators have consistently encouraged firms to enhance the readability of their financial disclosures. For instance, in 1998, the US Securities and Exchange Commission (SEC) issued *A Plain English Handbook: How to Create Clear SEC Disclosure Documents*, which outlines guidelines for firms to follow when preparing and presenting their 10-K reports. The primary purpose is to standardize financial information and produce highly readable and concise reports that serve as a relevant basis for end-users to build upon their investment decisions and valuation strategies. In 2008, the SEC adopted a similar rule for mutual funds.

Our study contributes to the growing literature examining the impact of disclosure readability on corporate decisions

and outcomes. More precisely, we propose to investigate the relationship between readability and firm debt choice and find new evidence showing that higher readability leads to a decrease in information asymmetry and the need for external monitoring. Prior research has demonstrated that information asymmetry is a key factor in determining corporate debt options, and disclosure readability affects a firm's information environment. Therefore, readability may represent an information-based channel that affects firm debt choices, which, we argue, has theoretical support in corporate finance literature. For example, public debt is more sensitive to the information environment than bank loans (Berlin and Loeys 1988; Boyd and Prescott 1986; Chemmanur and Fulghieri 1994; Denis and Mihov 2003; Diamond 1984, 1991; Fama 1985; Hoshi et al. 1993; Nakamura 1991). Thus, in the presence of high information asymmetry, firms tend to substitute issuing bonds with bank loans. In other words, costly disclosures endanger firms' competitive positioning, resulting in more defensive strategies and secrecy (Verrecchia and Weber 2006; Bagnoli and Watts 2010). Therefore, firms tend to raise external funds from banks rather than bond markets (e.g., Blackwell and Kidwell 1988; Boot 2000; Fama 1985; Nakamura 1991; Almazan and Suarez 2003; Diamond 1984, 1991; Hoshi et al. 1993; Houston and James 1996).

Building on the theoretical basis outlined above and explained in greater detail below, we hypothesize and then show that superior (inferior) readability comes with less (more) reliance on bank debt. We use the Bog index as the primary measure of readability (Bonsall and Miller 2017; Hasan 2020; Rjiba et al. 2021) and subsequently employ alternative textual measures for robustness. By examining a sample of 16,532 firm-year observations of US firms from 2001 to 2018, we show a significant negative relationship between readability and bank debt ratio. Specifically, a one-standard-deviation increase in readability leads to a 1.15-point decrease in a firm's bank debt ratio. This finding remains robust to the use of alternative readability measures and different regression specifications that control for firm-level structural complexity. We also show that readability leads to less bank debt issuance. Additionally, we show that firms subject to the Plain English Mandate's requirement to enhance the clarity of filings are less likely to borrow in the syndicated loan market. Furthermore, we show that banks extract concessions from firms with low annual report readability. Indeed, we show that low (high) readability is associated with a high (low) cost of bank loans. To provide support for the information asymmetry channel, we perform a two-way mediation test. In the first step, we regress our liquidity proxy (i.e., minus the logarithm of the bid–ask spread) on readability and our controls. We show that readability is positively associated with stock liquidity. In the second stage, we regress the bank debt ratio on liquidity, readability, and controls. We report a negative coefficient for our liquidity proxy, suggesting that firms with low information asymmetry are less likely to rely on bank debt. We find that introducing liquidity reduces the coefficient of readability, suggesting that stock liquidity partially mediates the relationship between readability and bank debt ratio. Our results also show that textual length and sentiment affect debt choice.

Additionally, we examine how the relationship between a firm's readability and its debt structure may vary in a cross-section of firms. We explore the moderating role of the information environment. We use credit rating, institutional ownership, and product market competition as proxies for the information environment. We find that the negative relationship between readability and bank debt ratio is stronger in firms with a weaker information environment. We also find that the negative relationship between readability and bank debt is stronger in financially constrained firms. Our models use firm size, Hadlock and Pierce's (2010) index, Kaplan and Zingales's (1997) index, and Whited and Wu's (2006) index as proxies for financial constraints.

This article is, on the one hand, grounded in the literature examining corporate disclosures from a narrative perspective. In recent years, the availability of quantitative and readability measures such as the Flesch–Kincaid index, the Gunning–Fog index, and the Bog index has stimulated considerable research interest. Several studies examined the determinants of annual report readability in this context. For instance, Li (2008) shows that the annual reports of low-performing firms are more difficult to read and analyze, whereas firms with persistent earnings are more likely to produce high-quality annual reports. Other studies show that the variation in readability could be attributed to (i) earnings management practices (Lo et al. 2017); (ii) the level of managerial ability (Hasan 2020); and (iii) the extent of the use of option-based CEO compensation (Wruck and Wu 2021), employment quality (Tan et al. 2023), board independence (Rahman and Kabir 2023), CEO succession (Oradi et al. 2024), litigation risk (Humphery-Jenner et al. 2024), and customer concentration (Ullah et al. 2025).

Other studies investigate the effects of readability on information asymmetry, hence on firms, investors, and analysts. They argue that lower (higher) readability leads to more (less) severe information asymmetry, resulting in deteriorating (enhancing) the firms' financial performance, the quality of investors' decisions, and analysts' forecasts. For instance, Hwang and Kim (2017) show that firms with poor readable narrative disclosure are more likely to trade at significant discounts compared to their intrinsic values. Loughran and McDonald (2014) show that low-readable 10-K filings are positively and significantly associated with return volatility. Ertugrul et al. (2017) find that firms with annual reports that suffer from low readability are subject to stricter terms of bank loan contracts and are more likely to face stock price crash risk. In addition, Bonsall and Miller (2017) show that lower readability is negatively associated with a firm's debt rating, resulting in a higher cost of debt. Gao et al. (2023) show that borrowers whose writing is more readable are more likely to secure credit from peer-to-peer lenders. Biddle et al. (2009) document a positive relationship between improved readability and investment efficiency.[1]

Our article makes at least two main contributions to corporate finance and disclosure literature. First, it adds novel findings to the literature on readability (e.g., Biddle et al. 2009; Loughran and McDonald 2014; Ertugrul et al. 2017; Bonsall and Miller 2017; Hwang and Kim 2017; Rjiba et al. 2021) by highlighting the impact of readability on debt composition. That is to say, by showing, for the first time in this literature, that superior (inferior) readability leads to less (more) reliance on bank debt. Second, it contributes to the strand of literature on debt choice (e.g., Lin et al. 2013; Boubaker et al. 2017, 2018; Bharath and Hertzel 2019; Ben-Nasr 2019; Li et al. 2019, 2025; Chen et al. 2020; Cline et al. 2020; Ben-Nasr et al. 2021; Baker et al. 2024; Kabir et al. 2024; Ge et al. 2024)

by focusing on the role played by disclosure readability in debt choice. Our study shows that information asymmetry (proxied by analyst coverage, the probability of informed trading, credit rating, institutional ownership, and product market competition) strengthens the negative relationship between readability and bank debt, and this negative relationship is stronger in financially constrained firms.

Third, we add to the literature that used firm-level variables related to information asymmetry to explain debt choice. However, this literature is mixed. On the one hand, firms with high information asymmetry are less likely to issue public debt, which is highly sensitive to information asymmetry (Diamond 1984, 1991). Consistent with this view, Houston and James (1996) show that firms with high growth opportunities, which suffer from severe agency and information asymmetry problems, tend to rely on bank debt rather than on public debt. Krishnaswami et al. (1999) report a positive relation between residual volatility and bank debt ratio. Denis and Mihov (2003) show that firms with less tangible assets (i.e., high information asymmetry) are more likely to rely on bank debt. Li et al. (2019) show that an increase in information asymmetry resulting from exogenous shocks in the United States that affect analyst coverage is positively related to the bank debt ratio. Ge et al. (2024) show that the improvement in the information environment due to the implementation of IFRS 9 is negatively related to the bank debt ratio. However, Lin (2016) shows a positive relationship between tangibility as measured by collateral value and the bank debt ratio, suggesting that high information asymmetry leads to a high degree of reliance on bank debt. Hadlock and James (2002) report a positive relationship between market-to-book and bank debt ratios, also suggesting that high information asymmetry leads firms to rely more on bank debt. To reconcile mixed findings in the literature, we utilize textual analytics to proxy for information asymmetry, acknowledging that the proxies used in prior studies may be imprecise and contribute to inconsistent results.

Our article also differs from prior studies on textual analytics and capital structure. For instance, Bonsall et al. (2017) focus exclusively on bond debt (i.e., ratings and costs), whereas we examine the bank debt ratio, the decision to borrow in the syndicated loan market, and the cost of bank loans. This contribution is important because bank debt has unique characteristics. Indeed, banks are less sensitive to information asymmetry than public lenders (Diamond 1984, 1991), can monitor firms (Lin et al. 2013), and have the flexibility to renegotiate loan terms (Chemmanur and Fulghieri 1994). Chakraborty et al. (2022) show that financial statements' length and complexity are positively related to the degree of reliance on bank debt. We contribute to this article by incorporating additional aspects of textual analytics, namely, readability and sentiment. We also add to this article by using the 1998 Plain English Mandate as an exogenous shock. We redefine our DID analysis to consider the change in firms' readability around the introduction of the Plain English Mandate in 1998, in line with the methodology adopted by Bonsall and Miller (2017). Our results show that treated firms that were subject to the Plain English Mandate's requirement of enhancing the clarity of filings experienced a significant reduction in bank loan issuance. Additionally, we add to this article by performing a two-way mediation analysis, which shows that information asymmetry, as measured by bid–ask spread, is the channel through which annual report readability affects the bank debt ratio.

The remainder of the article is structured as follows. In Section 2, the background literature and primary hypotheses are summarized, whereas Section 3 describes the data, samples, variables, and research design. In Sections 4 and 5, we present the significant regression results, discuss robustness tests, and report the results for cross-sectional regressions. Section 6 concludes the article.

2 | Theoretical Background and Hypotheses

Two lines of research intersect in this study—the firm debt choice policy and the economic implications of firm disclosures, particularly with respect to the readability of annual reports. Below, we develop the theoretical basis for our study along these two lines.

2.1 | Debt Choice

Existing literature identifies the informational channel as one of the most critical determinants of firms' debt choices. Indeed, both theoretical and empirical studies show that firms' financing through public debt is more sensitive to information asymmetry than their financing through bank debt. From this perspective, we can discern three main types of information-based models: information production, proprietary information, and monitoring.

According to prior literature, issuing public debt is more expensive than obtaining bank loans in the context of information-production models because SEC rules require additional and costly disclosures to approve any public debt issue (Blackwell and Kidwell 1988; Fama 1985; Hadlock and James 2002; Nakamura 1991). Banks can access the firm's data and information at a lower cost (Berlin and Loeys 1988; Boyd and Prescott 1986). Additionally, banks would be more able to assess the firm's claims (Hadlock and James 2002). In support of these theoretical predictions, empirical evidence shows that public debt is positively correlated with firm size (Denis and Mihov 2003; Houston and James 1996; Johnson 1997; Krishnaswami et al. 1999). Large firms have undeniably more resources than small firms to cover the substantial costs associated with the documentation required by the SEC.

Firms are required to protect sensitive and strategic information from competitors who might steal it and negatively affect their competitive position (Campbell 1979). Thus, firms with valuable proprietary information are likely to rely more on bank financing (Campbell 1979; Yosha 1995). Nevertheless, the empirical evidence remains mixed and inconclusive. For example, some studies have documented a positive stock price reaction to a new bank debt agreement. This finding suggests that firms hold valuable private information (Billett et al. 1995; Lummer and McConnell 1989; Preece and Mullineaux 1994). However, other studies do not depict any abnormal yields following the issuance of a new bank loan (Best and Zhang 1993) or any adverse stock price reaction following the announcement of a non-bank debt (James 1987; Mikkelson and Partch 1986).

Moral hazard models state that banks are more effective monitors than bondholders. Indeed, bondholders are subject to the problem of free riding and are less able to monitor resources. Conversely, banks concentrate debt ownership in the hands of one party, which has greater resources and easier access to private information (Petersen and Rajan 1995). Consequently, bank monitoring helps mitigate moral hazard issues by discouraging managers from engaging in practices that could harm shareholders and creditors (Chemmanur and Fulghieri 1994; Fama 1985; Lin et al. 2013; Rajan 1992).

2.2 | Narrative Disclosure Readability

The firm's disclosures serve as an essential communication tool between managers and external stakeholders. Traditionally, researchers have focused more on the numerical data disclosed by the firm. The textual disclosure did not receive an equally important consideration due to the difficulty of quantifying and measuring such a narrative component. As a result of the development of new software and linguistic techniques, the field of research around this vital topic has expanded significantly in recent years. The emergence of big data analytics has enabled the measurement of the quality of textual disclosures for extensive data samples. As a result, numerous studies have sprung up to examine the determinants of the readability of narrative disclosures and analyze the economic implications for different market players.

Bloomfield (2002) made a turning point in the research stream that has examined disclosure readability. By introducing the concept of the "Incomplete revelation hypothesis" (IRH), Bloomfield (2002) argues that firm managers tend to bury bad news in footnotes or poorly readable documents to manipulate the stock price and make the information processing convoluted for investors. Li (2008) brings empirical evidence that corroborates this hypothesis. To conceal unfavorable information and mislead outside stakeholders, managers at low-profit firms produce less readable disclosures. Conversely, firms with the most persistent positive earnings tend to disclose the highest readable annual reports. Lo et al. (2017) show that earnings management increases the complexity of annual reports. In the same quest to identify the determinants of the readability of narrative disclosures, Hasan (2020) argues that the best managers ensure superior performance for their companies, making them more likely to implement highly readable disclosures. First, because of their desire to reflect transparency and avoid the harmful effects of information asymmetry. Second, to highlight their accomplishments and main contributions toward the value creation of their firms. The empirical evidence supports these arguments and points out that better managerial ability is significantly and positively associated with improved readability of narrative disclosures in 10-K reports. Wruck and Wu (2021) report a negative relationship between CEO equity incentives and annual report readability, supporting that options increase the incentive to misreport financial statements (Armstrong et al. 2011). Tan et al. (2023) show that high employment quality is positively associated with annual report readability. Rahman and Kabir (2023) show that board independence is positively related to annual report readability. Oradi et al. (2024) show that the presence of insider CEOs is positively related to the readability of annual reports. Humphery-Jenner et al. (2024) report a negative relation between annual report readability and litigation risk. Ullah et al. (2025) show that customer concentration leads to less readable annual reports.

From an economic perspective, some studies have explored the implications of readability for firms and markets. Biddle et al. (2009) report evidence suggesting that better readability enhances managers' monitoring by shareholders, thereby improving investment decisions. Loughran and McDonald (2014) show that better readability decreases stock price volatility, which increases firm value. In the same vein, Hwang and Kim (2017) show that firms with lower readability in their narrative disclosures have lower firm value, suggesting that investors penalize firms with less readable annual reports. Rjiba et al. (2021) show that annual report complexity increases the firm's cost of equity. Other studies focused on the impact of readability on the firm's debt. In this regard, Ertugrul et al. (2017) provide empirical evidence that banks tend to monitor firms with lower readability disclosures more strictly by imposing more stringent loan terms. They also show that annual report complexity increases stock price crash risk. Similarly, Bonsall and Miller (2017) find that financial disclosures that are difficult to decipher decrease bonds' rating, hence increasing the cost of borrowing.

In addition to its implications at the firm's level, readability also affects the decisions and behaviors of numerous market players. For instance, empirical evidence points out that less readable annual reports negatively and significantly impact the quality of analysts' reviews. The intuition behind this is that analysts need more time to analyze less readable annual reports, increasing access costs and resulting in earnings forecast errors that sharply differ between analysts and lead to higher forecast dispersion (Lehavy et al. 2011; Loughran and McDonald 2014). Other studies have found that readability affects investors' behaviors and decisions in various ways. In this regard, You and Zhang (2009) showed that investors' underreaction to the firm's disclosures is more pronounced for less readable 10-K reports. Lawrence (2013) pointed out that long-term investors, particularly buy-and-hold investors, are more likely to invest in more transparent firms that offer readable and concise reports. Boubaker et al. (2019) provide evidence that lower readability leads to lower stock liquidity as investors become less willing to read and analyze long 10-K reports. In other words, the ambiguity and complexity of the financial reports increase the informational risk and act as a barrier to investment and trading.

The overall findings from these studies suggest that readability significantly influences the firms' informational environment. Indeed, enhanced readability lowers information processing costs for external stakeholders, which in turn reduces moral hazard concerns by preventing managers from engaging in opportunistic activities. We assume that the readability of the firm's 10-K reports is highly influenced by the firm's funding options, whether public or private, due to information asymmetries. We present our hypotheses, supported by relevant theories and evidenced by previous empirical studies, in the following sections.

2.3 | Hypothesis Development

We use information asymmetry as a mediating channel through which the readability is likely to influence the firm's debt

choice. The channel is twofold: (i) reducing the information processing cost and (ii) deterring managers from the obfuscation of bad news. Following prior research, lower readability has been demonstrated to hinder external stakeholders' efforts to analyze the firm's disclosures and properly extract relevant information. For instance, some studies claim that lower readability is mainly related to a psychological factor. Indeed, many investors prefer less lengthy and less expensive information processing due to their inability and unwillingness to go over lengthy and complicated reports. This latter factor is tied up to investors' reluctance to initiate stock trading of firms with less readable 10-K reports (Boubaker et al. 2019; Lawrence 2013; Miller 2010).

In parallel, prominent market players such as investment bankers, financial analysts, market screeners, professional experts, and auditors show less appetite to tackle low-quality financial reports with fewer narrative disclosures. The ambiguity and complexity of these disclosures make it more challenging for various market players to fairly assess firms' value. Empirical evidence corroborates these claims and documents that firms disclosing less readable 10-K reports are more likely to experience analyst errors, dispersion, and disagreement between rating agencies (Bonsall and Miller 2017; Lehavy et al. 2011; Loughran and McDonald 2014). In the same context, the pecking order theory states that, traditionally, external stakeholders doubt the quality of firms that choose to raise funds on the financial markets (Myers and Majluf 1984). Consequently, firms with less readable narrative disclosures worry that ambiguity will aggravate these suspicions. Therefore, we expect firms disclosing less readable reports to avoid issuing bonds and forgo capital providers' penalties. Yet, instead, such firms are inclined to rely on less information-sensitive debt instruments, that is, bank loans.

On the other hand, the IRH (Bloomfield 2002) states that critical information extracted from firms' disclosures is not fully reflected in market prices. In turn, this could encourage managers to bury bad news in less readable reports to boost the stock price or delay the discovery of adverse information by external stakeholders. Thus, less readable disclosures could be a synonym for a more significant moral hazard; hence, greater distrust vis-à-vis the management of the firm. The management obfuscation hypothesis is substantiated by empirical evidence showing that firms with less readable textual disclosures display higher volatility returns (Loughran and McDonald 2014), a greater risk of stock price crash, and more restrictive lending conditions (Ertugrul et al. 2017).

In addition, previous work has shown that firms' disclosures are a crucial instrument for shareholders to monitor the firm's management (Bushman and Smith 2001; Lambert 2001). In this regard, less readability implores a hostile environment toward the provider of disclosures (Alter and Oppenheimer 2008; McGlone and Tofighbakhsh 2000), increasing the need for closer monitoring of the firm's management. The existing literature has long highlighted the ability of banks to provide better monitoring than bondholders. Indeed, banks possess more substantial resources, have privileged access to private information, and hold a higher concentration of debt ownership. Such traits spare them from the free-rider problem that often disadvantages bondholders (Chemmanur and Fulghieri 1994; Fama 1985; Lin et al. 2013; Rajan 1992). Given all the arguments above, we expect firms with less readable disclosures to rely more on bank loans to ensure more effective monitoring and deter managers from engaging in fraudulent practices.

Given the considerations mentioned above, we state the following hypothesis.

H 1. *Lower readability increases reliance on bank debt relative to public debt.*

3 | Key Variables and Data

This section describes the main variables in our analysis, debt structure, readability, and control variables, along with their respective descriptive statistics.

3.1 | Debt Structure

We follow prior studies on debt choices to model our analysis. In addition, we collect data related to debt structuring from the S&P Capital (IQ) database, which provides detailed data for over 60,000 global companies with historical data going back to 2001. The bank (public) debt ratio is calculated as bank (public) debt over total debt. Bank debt is defined as the sum of term loans and revolving credit. Public debt is defined as the sum of subordinated bonds and notes, as well as senior bonds and notes. Total debt is defined as the sum of all types of debts, including commercial paper, revolving credit, term loans, subordinated bonds and notes, senior bonds and notes, capital leases, and other debt. We collect data on bank debt issuance and spread from DealScan.

3.2 | Annual Report Readability

We follow recent studies (Bonsall et al. 2017; Bonsall and Miller 2017; Ertugrul et al. 2017; Rjiba et al. 2021) and use the Bog index as a primary measure of firms' narrative disclosures.[2] Due to its construction methodology, the Bog index offers a multidimensional measure of readability that captures a significant part of the plain English attributes of disclosure (e.g., sentence length, passive verbs, wordiness, and word difficulty).[3] Indeed, it includes three distinct components: Sentence Bog, Word Bog, and Pep. The first two components assess a document's reading difficulty, whereas the third encapsulates factors that facilitate reading. The calculation details of the Bog index are as follows:

$$\text{Bog index} = \text{Sentence Bog} + \text{Word Bog} - \text{Pep} \tag{1}$$

where

$$\text{Sentence Bog} = \frac{(\text{average sentence length})^2}{\text{long sentence limit}} \tag{2}$$

$$\text{Word Bog} = \frac{(\text{style problems} + \text{heavy words} + \text{abbreviations} + \text{specialist}) \times 250}{\text{number of words}} \tag{3}$$

$$\text{Pep} = \frac{(\text{names} + \text{interest words} + \text{conversational}) \times 25}{\text{number of words}} + \text{sentence variety} \quad (4)$$

$$\text{Sentence variety} = \frac{\text{standard deviation of sentence length} \times 10}{\text{average sentence length}} \quad (5)$$

A higher score for the Bog index thus indicates less readable annual reports. To ease the interpretation of our findings, we multiply the Bog index by (−1). A higher score of the resulting index (readability) is assigned to firms with more readable annual reports. We also use the range standardization of the reciprocal of the Bog index (Readability_s) as an alternative measure of annual report readability.[4] A high score for Readability_s indicates better annual report readability.

Although early studies (Biddle et al. 2009; Lawrence 2013; Lehavy et al. 2011; F. Li 2008) that tackled the readability of financial disclosures have massively opted for the Gunning–Fog index as the primary measure, Loughran and McDonald (2014) investigated its relevance regarding the complexity of words and their relative measure based on syllable count.[5] However, such a measure would probably mislead the assessment of the readability of firm disclosures. As an example, complex terms such as corporation, investment, and management are commonly used in a company's disclosure and are quite familiar to the average investor. Bonsall et al. (2017) point out that the Bog index's greatest contribution compared to other traditional measures of readability lies in its second component, Word Bog. In fact, the Bog index shares more criteria with the SEC than its predecessors when measuring readability.[6]

3.3 | Control Variables

On the basis of prior research (Boubaker et al. 2017, 2018; Denis and Mihov 2003; Houston and James 1996; Lin et al. 2013), we control for a wide range of firm characteristics that determine debt choices following previous studies. First, we control for the natural logarithm of total assets (size). Because large firms benefit from lower information-producing costs than small firms (Blackwell and Kidwell 1988; Houston and James 1996), they are more likely to use public debt. Then, we control for the ratio of total liabilities to total assets (leverage). The expected effect of leverage on debt choices is mixed. On the one hand, highly leveraged firms that may be considered poor-quality firms may exhibit lower demand for bank-monitored debt (Diamond 1991). On the other hand, leverage may act as a disciplinary device, implying more reliance on public debt. We also include the ratio of net property, plant, and equipment to total assets (tangibility). Tangible assets serve as collateral for debt, which means a better credit quality. In this respect, Denis and Mihov (2003) provide empirical evidence suggesting that firms with more tangible assets are more likely to rely on public debt. Additionally, we control for the firm's return on assets (profitability). Denis and Mihov (2003) find that more profitable firms enjoy a better reputation in the credit markets and are more likely to issue public debt. Diamond's (1991) model predicts that successful firms with more investment opportunities rely less on bank-monitored debt. We propose including the sum of the market value of equity plus the book value of debt divided by total assets (Tobin) as a proxy for the firm's growth opportunities. Finally, we control for Altman's (1968) z-score (z-score) as a measure of the firm's likelihood of bankruptcy. Prior literature reports mixed results regarding the impact of the firm's z-score on debt choices. On the one hand, Denis and Mihov (2003) find that firms with a higher bankruptcy risk need bank monitoring and, hence, are likely to have a higher bank debt ratio. On the other hand, other studies argue that these firms are more inclined to substitute banks' loans with public debt to avoid banks' strict monitoring (Roberts and Sufi 2009; Sufi 2009). Variable definitions are provided in Appendix A.

3.4 | Data and Summary Statistics

Our sample spans the period from 2001 to 2018. We begin in 2001 because it is the year Capital IQ data became available.[7] We collect data on control variables from Compustat. In line with previous studies, we exclude firms belonging to the financial and utility sectors. Similarly, to mitigate the influence of outliers, we winsorize all continuous variables at the 1% and 99% levels. We also exclude observations with missing data on debt structure, readability, or control variables. Finally, we exclude firms with singleton observations to avoid overestimating the statistical significance (Correia 2015). The final sample consists of 16,134 firm-year observations representing 2337 unique firms.

Table 1 presents descriptive statistics of the key variables in our regression models. Notably, we find that firms tend to rely more on public debt than on banks' loans. Indeed, the public debt represents 50.14% of the firm's total debt compared to only 39.37% of banks' loans. Furthermore, the average readability score is higher than −85 (i.e., a Bog index of +85), which falls within the same range as previous studies (Bonsall and Miller 2017; Hasan 2020; Rjiba et al. 2021). According to StyleWriter, the Bog index for government and business disclosures typically ranges between 60 and 100, placing the average readability of our sample in line with the values announced by StyleWriter. To put this in perspective, the Bog index can vary from 0 to over 1000, and interpretations of readability are as follows: 0–20 = excellent; 21–40 = good; 41–70 = average; 71–100 = poor; 101–130 = bad; 131–1000 = dreadful; and 100+ = gobbledygook.

4 | Main Analysis: Readability and Debt Choice

4.1 | Model Specification

To investigate the effect of readability on the firm's debt choice, we estimate the following model:

$$y_{it} = a_0 + \beta_1 \text{Readability}_{it} + \sum \gamma_k' X_{kit} + \text{Industry dummies} + \text{Year dummies} + \varepsilon_{it} \quad (6)$$

where y_{it} is the ratio of bank debt to total debt (Bankratio). As described earlier, we measure readability using the Bog index

TABLE 1 | Descriptive statistics.

	N	Mean	Standard deviation	Minimum	Maximum	5th percentile	First quartile	Median	Third quartile	95th percentile
Dependent variables										
Bankratio (%)	16,134	39.481	44.412	0	100	0	0	10.885	100	100
Publicratio (%)	16,134	49.731	44.860	0	100	0	0	58.006	99.030	100
Test variables										
Readability	16,134	−85.256	7	−103	−68	−97	−90	−85	−80	−74
Control variables										
Total assets in $ (millions)	16,134	5450.882	15,471.253	9.122	112,733	20.862	137.140	681.365	2979.056	28,373
Leverage	16,134	22.269	17.476	0.014	79.454	0.314	8.286	19.847	32.073	56.297
Tangibility	16,134	53.499	41.308	2.454	200.990	7.253	21.892	41.498	76.015	133.312
Profitability	16,134	−1.735	19.901	−102.641	23.392	−42.977	−2.042	3.806	7.556	14.727
Tobin	16,134	1.978	1.265	0.602	7.885	0.836	1.196	1.588	2.289	4.602
z-score	16,134	0.775	3.588	−19.366	4.964	−6.018	0.666	1.648	2.436	3.654

Note: This table reports the descriptive statistics for the variables used in our main tests. The final sample comprises 16,532 firm-year observations representing 2337 unique firms over the 2001–2018 period, with non-missing values for all control variables, for our analyses of the impact of 10-K reports readability on the firm's debt choice. All variables are defined in Appendix A. Bankratio and Publicratio are multiplied by 100 to ease interpretation.

TABLE 2 | The impact of readability on debt choice.

	Readability				Readability_s			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Readability measure	−0.140***	−0.154***	−0.232***	−0.262***	−0.026***	−0.029***	−0.034***	−0.038***
	(2.716)	(2.777)	(−4.594)	(−4.868)	(3.269)	(3.395)	(−4.333)	(−4.531)
Size	−9.990***	−9.969***	−9.201***	−9.182***	−0.481***	−0.482***	−0.444***	−0.443***
	(−68.716)	(−64.093)	(−62.400)	(−58.153)	(−68.575)	(−63.921)	(−62.313)	(−58.030)
Leverage	−0.003	−0.029	−0.004	−0.025	−0.001	−0.011	−0.001	−0.011
	(−0.133)	(−1.473)	(−0.181)	(−1.270)	(−0.152)	(−1.479)	(−0.168)	(−1.263)
Tangibility	0.004	−0.001	0.014*	0.008	0.003	−0.002	0.013*	0.006
	(0.515)	(−0.128)	(1.756)	(0.706)	(0.374)	(−0.189)	(1.678)	(0.648)
Profitability	0.092***	0.082***	0.105***	0.095***	0.041***	0.037***	0.047***	0.043***
	(3.267)	(2.901)	(3.669)	(3.279)	(3.288)	(2.917)	(3.673)	(3.287)
Tobin	−2.359***	−2.201***	−2.439***	−2.228***	−0.067***	−0.063***	−0.069***	−0.063***
	(−8.463)	(−7.551)	(−8.651)	(−7.566)	(−8.491)	(−7.582)	(−8.592)	(−7.534)
z-score	2.087***	2.083***	1.975***	1.933***	0.167***	0.167***	0.158***	0.154***
	(13.404)	(12.970)	(12.445)	(11.782)	(13.312)	(12.893)	(12.345)	(11.679)
Constant	82.528***	80.287***	119.674***	121.308***	0	0	0	0
	(18.467)	(16.835)	(26.044)	(24.502)	(0)	(0)	(0)	(0)
Observations	16,134	16,134	16,134	16,134	16,134	16,134	16,134	16,134
Adj R^2	0.172	0.183	0.209	0.220	0.172	0.183	0.209	0.220
Year-fixed effects	No	No	Yes	Yes	No	No	Yes	Yes
Industry-fixed effects	No	Yes	No	Yes	No	Yes	No	Yes

Note: This table presents the regression results for the impact of 10-K reports' readability on a firm's debt choice. The dependent variable is the proportion of bank debt to total debt. We use Readability for Columns (1)–(4) and Readability_s for Columns (5)–(8) as the firm's readability measures. Year- and industry-fixed effects are first added separately, then jointly, to the regression in Columns (2)–(4), respectively. Sample period: 2001–2018. Beneath each coefficient estimate, the robust *t*-statistic, clustered at the firm and year levels, is reported. Definitions and data sources for the variables are provided in Appendix A.
***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

multiplied by −1. Indeed, the higher the Bog index, the less readable the document is. Thus, multiplication by −1 allows a positive association between our measure and the readability of 10-K reports. X_{kit} are $(K \times 1)$ vectors of firm-level controls at time t. We estimate Equation (6) using ordinary least squares (OLS). We compute robust standard errors using a double cluster at the firm and year levels. We also include industry- and year-fixed effects to control for industry- or time-specific shocks to firm debt choice.[8]

4.2 | Main Results

Table 2 portrays the regression results for the relationship between the readability of narrative disclosures in 10-K reports and the bank debt ratio (Bankratio). We use (−1) × Bog index as the leading explanatory variable through Columns (1)–(4) and the range standardization of the reciprocal of the Bog index for Columns (5)–(8). The coefficient of readability is found to be negative and significant at the 1% significance level, implying that the more (less) readable the firm's 10-K report, the less (more) the reliance on the bank debt. The coefficient remains negative and statistically significant after including the industry- and year-fixed effects separately and jointly. The relationship between the readability of the firm's narrative disclosures and the proportion of bank debt is economically meaningful. For instance, results reported in Column (4) show that a one standard deviation increase in readability is associated with a 4.35%, that is, $(6.539 \times 0.262/0.394)$, decrease in bank debt ratio.

We re-run the regression with the public debt ratio (Publicratio) as the dependent variable. Table A1 displays the regression results. The coefficient of readability is now significantly positive at the 1% level, suggesting that firms disclosing better readable reports are more likely to substitute away from bank debt for public debt. These results lend further support to our main hypothesis, stating that better readability is synonymous with lower information asymmetries, hence with greater reliance on public debt financing. The results support our main hypothesis that better readability leads to lower levels of information asymmetry and, therefore, a greater reliance on public debt financing.

As for the control variables, the coefficient estimates are generally consistent with the findings of prior studies. For instance, smaller firms with lower Tobin's *Q* ratios are likely to rely more on bank debt (Boubaker et al. 2018; Denis and Mihov 2003; Hadlock and James 2002; Nakamura 1991). Regression results also document a

positive association between the firm's profitability and the ratio of bank debt to total debt (Hoshi et al. 1993). They also show that firms with a higher z-score, that is, a higher probability of bankruptcy, are more likely to substitute public debts with bank debts (Denis and Mihov 2003).

4.3 | The Decision to Borrow in the Syndicated Loan Market

We examine the effect of readability on the firms' decision to borrow in the syndicated lending market. We use DealScan to collect data on firm borrowing in the syndicated lending market. We merge DealScan with Compustat using the link provided by Professor Michael Robert.[9] Then, we merge the DealScan data with the Bog index and control variable data. We regress a dummy variable equal to one if the firm issues a bank loan (Bank Loan Dummy) and zero otherwise (i.e., the firm has a deal amount in DealScan) on Readability and control variables while controlling for firm- and year-fixed effects. The results reported in Column (1) of Table 3 show that the coefficient for Readability is negative and statistically significant at the 1% level, suggesting that higher readability comes with less bank loan issuance.

To better identify the causal impact of readability on bank debt issuance, we use the 1998 Plain English Mandate as a plausibly exogenous shock. We define our DID analysis to consider the change in firms' readability around the introduction of the Plain English Mandate in 1998, in line with the methodology adopted by Bonsall and Miller (2017). We construct a binary variable POST_PE, which takes a value of 1 for the post-Mandate period (1999 and 2000) and a value of 0 for the pre-Mandate period (1996 and 1997). The treatment group is defined using the binary variable PROSP, which takes a value of 1 if a firm filed a prospectus during either 1999 or 2000, and 0 otherwise. Treatment and control groups are matched on covariates in the model using an entropy-balancing approach to mitigate the confounding effects of these variables. We regress Bank Loan Dummy on POST_PE, PROSP, and POST_PE × PROSP, as well as our control variables. The results reported in Column (2) of Table 3 present a negative and statistically significant coefficient for POST_PE × PROSP. This indicates that treated firms, which were subject to the Plain English Mandate's requirement of enhancing the clarity of filings, experienced a significant reduction in bank loans.

To verify the attributability of these findings to the Plain English Mandate, we construct a placebo event where the Mandate is assumed to take place three years prior to its actual occurrence (POST_PSEUDO). We regress Bank Loan Dummy on POST_PE, PROSP, and POST_PE × PROSP, as well as our control variables. The results reported in Column (3) of Table 3 show that the coefficient for POST_PE × PROSP is not significant, showing the validity of our DID setting.

In relation to our analysis in Table 3, we examine whether banks extract concessions when they lend to firms with low readability. To do so, we check whether low (high) readability is associated with a high (low) cost of bank loans. We collect data on the cost of bank loans calculated as the natural logarithm of all-in drawn spread from DealScan (Lnspread). We control for Loan maturity, which is the natural logarithm of months till maturity of the loan's tranche, and Loan amount, which is the natural logarithm of the tranche's amount, as well as the list of controls included in Equation (1). We also control for the firm-fixed, year-fixed, and loan tranche–fixed effects. The results of regressing Lnspread on Readability and our controls are reported in Table 4 and show that the coefficient for Readability loads negative and significant, suggesting that a high (low) readability is associated with a low (high) cost of bank loan, suggesting that banks extract concessions from firms with less readable annual reports.

4.4 | A Channel Test

We carefully examine the mechanism through which readability affects the bank debt ratio. We agree that higher readability leads to a decrease in information asymmetry and the need for external monitoring. To test this view, we regress Liquidity, calculated as minus the logarithm of Qspread (i.e., the difference between the ask and bid prices divided by the average of the ask and bid prices), on Readability and our control variables. The results reported in Column (2) of Table 5 show that the coefficient for Readability loads positive and significant at the 1% level, suggesting that higher readability increases stock liquidity, hence reducing information asymmetry. As for the second step, we regress the bank debt ratio on Liquidity, Readability, and controls. The results reported in Column (3) of Table 5 show that Liquidity loads negative and significant, suggesting that firms with high liquidity (i.e., less information asymmetry) are less likely to rely on bank debt. The coefficient for Readability is lower in Column (3) when compared to its coefficient in Column (1). The Sobel test is significant at the 1% level, suggesting that Liquidity partially mediates the relationship between Readability and bank debt ratio.

5 | Robustness Checks

5.1 | Alternative Measures of Readability

In addition to readability, we examine the effect of textual length on debt choice. Managers are more likely to bury adverse information in lengthy documents, which makes it more difficult for external stakeholders to detect. Practitioners, therefore, associate long disclosures with lower readability (Barker 2002), and the SEC continues to encourage firms to produce disclosures as short and concise as possible (U.S. Securities and Exchange Commission 1998). Thus, we measure the length of the text (Length) as the natural logarithm of the number of words in the document (Li 2008). We also consider the lexical variation (Lexical_var) as an additional measure of length (Vajjala and Meurers 2012). It is calculated as the natural logarithm of the number of unique words in a firm's narrative disclosure. We expect that the higher the lexical variation, the less readable the text becomes.

We further explore the effect of textual sentiment on debt choice. The use of negative and uncertain tone sentiment is associated with high information asymmetry. Rjiba et al. (2021) show that the adverse effects of low readability on the cost of equity are more pronounced in the presence of a larger negative tone. Ertugrul et al. (2017) show that an uncertain tone is associated with high information asymmetry, resulting in a higher cost of external financing and increased crash risk. We use the natural logarithm

TABLE 3 | Bank loan issuance.

	Issuance of bank debt and loan		A quasi-natural experiment	
	(1)		(2)	(3)
	Bank Loan Dummy		Bank Loan Dummy	Bank Loan Dummy
Readability	−0.005***	POST_PE	0.745	
	(−3.204)		(1.645)	
Size	0.206***	PROSP	0.361	0.277
	(33.583)		(0.956)	(1.192)
Leverage	0.566***	POST_PE × PROSP	−0.986**	
	(12.281)		(−2.173)	
Tangibility	0.011	POST_PSEUDO		0.005
	(0.193)			(0.015)
Profitability	0.486***	POST_PSEUDO × PROSP		0.432
		POST_PSEUDO × PROSP		
	(6.939)			0.005
Tobin	−0.040***	Size	0.203***	0.143***
	(−5.508)		(13.428)	(7.716)
z-score	−0.002	Leverage	0.701***	0.786***
	(−0.086)		(5.621)	(6.260)
Constant	−3.195***	Tangibility	−0.006	0.586***
	(−20.911)		(−0.035)	(3.664)
Observations	29,565	Profitability	0.500***	0.731***
R^2	0.276		(3.086)	(4.356)
Firm-fixed effects	Yes	Tobin	−0.025*	−0.024
Year-fixed effects	Yes		(−1.880)	(−1.341)
		z-score	−0.012	0.019**
			(−1.321)	(2.298)
		Constant	−2.092***	−2.400***
			(−5.446)	(−10.436)
		Observations	5292	5296
		R^2	0.246	0.288
		Industry-fixed effects	Yes	Yes

Note: This table presents the regression results for the impact of 10-K reports' readability on the likelihood of borrowing in the syndicated lending market. The dependent variable in this table is Bank Loan, a dummy variable equal to one if the firm issues a bank loan and zero otherwise (i.e., the firm has a deal amount in DealScan). We use readability for Column (1). Column (2) reports the results of our quasi-natural experiment. The Plain English Mandate in 1998 is used as the exogenous shock to readability. We construct a binary variable POST_PE, which takes a value of 1 for the post-Mandate period (1999 and 2000) and a value of 0 for the pre-Mandate period (1996 and 1997). The treatment group is defined using the binary variable PROSP, which takes a value of 1 if a firm filed a prospectus during either 1999 or 2000, and 0 otherwise. Treatment and control groups are matched on the covariates in the model using an entropy-balancing approach to mitigate their confounding effects. We construct a placebo event where the Mandate is assumed to take place three years prior to its actual occurrence (POST_PSEUDO). The results for the placebo test are reported in column (3). Sample period: 1992–2018. Beneath each coefficient estimate is the robust *t*-statistic. Definitions and data sources for the variables are provided in Appendix A.

***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

TABLE 4 | Cost of bank loan.

	(2) Lnspread
Readability	−0.005**
	(−2.528)
Size	−0.092***
	(−5.907)
Leverage	0.576***
	(10.125)
Tangibility	−0.270***
	(−2.678)
Profitability	−0.710***
	(−6.298)
Tobin	−0.049***
	(−4.377)
z-score	0
	(−1.42)
Loan maturity	0.040***
	(4.072)
Loan amount	−0.180***
	(−20.805)
Constant	6.014***
	(31.594)
Observations	10,719
Adj R^2	0.725
Firm-fixed effects	Yes
Year-fixed effects	Yes
Loan purpose-fixed effects	Yes

Note: This table presents the regression results for the impact of 10-K reports' readability on the cost of bank loans. The dependent variable is the natural logarithm of the all-in drawn spread (Lnspread) from DealScan. We control for Loan maturity, which is the natural logarithm of the months until maturity of the loan's tranche, and Loan amount, which is the natural logarithm of the tranche's amount. We control for the firm-fixed, year-fixed, and loan tranche–fixed effects. The sample period is 1992–2018. Beneath each coefficient estimate, the robust *t*-statistic, clustered at the firm and year levels, is reported. Definitions and data sources for the variables are provided in Appendix A.
***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

TABLE 5 | Channel test—the role of Liquidity.

Variables	(1) Bank Debt	(2) Liquidity	(3) Bank Debt
Readability	−0.269***	0.005***	−0.148**
	(−4.394)	(7.667)	(−2.493)
Liquidity			−22.178***
			(−30.834)
Size	−17.432***	0.031***	−16.750***
	(−49.252)	(6.580)	(−48.281)
Leverage	−0.076***	0.002***	−0.024
	(−3.628)	(10.041)	(−1.153)
Tangibility	0.045***	−0.002***	−0.002
	(3.985)	(−15.801)	(−0.217)
Profitability	−0.127***	0.008***	0.058*
	(−4.310)	(25.161)	(1.930)
Tobin	−4.702***	0.084***	−2.841***
	(−14.662)	(23.791)	(−8.991)
z-score	1.376***	0.033***	2.103***
	(8.023)	(16.647)	(12.314)
Constant	69.656***	3.934***	156.896***
	(12.859)	(61.876)	(26.025)
Observations	15,095	15,095	15,095
Adj R^2	0.173	0.447	0.223
Year-fixed effects	Yes	Yes	Yes
Industry-fixed effects	Yes	Yes	Yes
Sobel test (*p* value)			0

Note: This table presents the regression results for the impact of 10-K report readability on a firm's debt choice. The dependent variable is the proportion of bank debt to total debt in Columns (1) and (3), and Liquidity is calculated as minus the logarithm of Qspread, calculated as the difference between the ask and bid prices divided by the average of the ask and bid prices in Column (2). The dependent variable is the proportion of bank debt to total debt. Year- and industry-fixed effects are first added separately. The sample period is 2001–2018. Beneath each coefficient estimate is the robust *t*-statistic, clustered at the firm and year levels. Definitions and data sources for the variables are provided in Appendix A.
***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

of the ratio of negative financial words over total words (Negative) and the natural logarithm of the ratio of uncertain financial words over total words (Uncertainty) as measures of textual sentiment.

Nonetheless, it is worth noting that these four proxies from Loughran and McDonald (2011) measure textual length and sentiment. Thus, as we did for the Bog index, we propose multiplying each by (−1), so that analyzing the relationship between textual analytics and the debt choices topics becomes more straightforward and meaningful.

The results, presented in Table 6, show that the estimated coefficients for Length and Lexical_var are negative and statistically significant, indicating that shorter and less lexically diverse disclosures are associated with lower bank debt ratios. We also find negative and significant coefficients for Negative and Uncertainty, suggesting that a less negative and less uncertain tone is likewise associated with reduced bank debt usage. Collectively, these findings indicate that beyond readability, textual attributes such as disclosure length and sentiment play an important role in shaping bank debt decisions, consistent with the information asymmetry channel.

TABLE 6 | Other aspects of textual analysis: length and sentiment.

	(1) Length	(2) Lexical_var	(3) Negative	(4) Uncertainty
Length	−1.862**			
	(−2.502)			
Lexical_var		−6.481***		
		(−3.799)		
Negative			−1.795***	
			(−2.991)	
Uncertainty				−5.892***
				(−7.714)
Size	−9.957***	−10.057***	−9.857***	−10.242***
	(−53.904)	(−55.242)	(−54.610)	(−56.576)
Leverage	−0.020	−0.019	−0.023	−0.027
	(−0.927)	(−0.892)	(−1.084)	(−1.290)
Tangibility	−0.003	−0.002	−0.009	0.011
	(−0.281)	(−0.183)	(−0.766)	(0.942)
Profitability	0.107***	0.108***	0.097***	0.094***
	(3.262)	(3.308)	(3.112)	(3.072)
Tobin	−2.406***	−2.415***	−2.247***	−2.148***
	(−7.130)	(−7.188)	(−7.016)	(−6.801)
z-score	2.236***	2.267***	1.965***	2.072***
	(12.139)	(12.302)	(11.258)	(11.962)
Constant	88.485***	57.139***	96.415***	72.358***
	(11.656)	(4.309)	(25.133)	(15.653)
Observations	14,318	14,318	14,684	14,682
Adj R^2	0.198	0.199	0.193	0.199
Industry-fixed effects	Yes	Yes	Yes	Yes
Year-fixed effects	Yes	Yes	Yes	Yes

Note: This table presents the regression results for the impact of 10-K reports' readability on a firm's debt choice using textual length and sentiment proxies. More specifically, we use Length and Lexical_var as measures of textual length in Columns (1) and (2) and Negative and Uncertainty as proxies for textual sentiment in Columns (3) and (4). The dependent variable is the proportion of bank debt to total debt. Sample period: 2001–2018. Beneath each coefficient estimate, the robust *t*-statistic, clustered at the firm and year levels, is reported. Definitions and data sources for the variables are provided in Appendix A.
***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

5.2 | Alternative Regression Models

We use several alternative models. First, we substitute the contemporaneous readability measure for its delayed counterpart. We opt for this specification since a firm's debt choice is unlikely to affect the readability of past narrative disclosures. This partially helps mitigate the reverse causality concern. The results are portrayed in Column (1) of Table 7. Second, we use lagged independent variables to capture temporal changes in these variables. We regress the current bank ratio on lagged Readability and controls. The results reported in Column (2) of Table 7 show that Readability remains negative and significant at the 1% level, reinforcing our findings. Third, we include firm-fixed effects in our regression in Column (3). This approach should alleviate concerns about our results being biased by unknown or omitted characteristics of the firm. Fourth, we use weighted least squares regression to deal with possible heteroskedasticity. The results reported in Column (4) show that readability loads negative and significant at the 1% level. Fifth, we use generalized equation estimation (GEE) in cases where our sample may suffer from any possible unmeasured correlation between observations. The results reported in Column (5) indicate that the coefficient for readability remains negative and significant at the 1% level. Sixth, we use Tobit regression due to the bounded nature of the dependent variable, that is, bank debt ratio, which ranges between 0 and 100. The results reported in Column (6) further support our earlier findings.

TABLE 7 | Alternative estimate methods.

	(1)	(2)	(3)	(4)	(5)	(6)
	Lagged Readability	**Lagged Readability and Controls**	**FFE**	**WLS**	**GEE**	**Tobit**
Readability	−0.236***	−0.239***	−0.160**	−0.352***	−0.354***	−0.629***
	(−3.981)	(−4.035)	(−2.054)	(−18.904)	(−5.318)	(−3.765)
Size	−9.821***	−9.892***	2.468***	−6.021***	−5.293***	−3.705***
	(−58.811)	(−57.966)	(3.487)	(−62.313)	(−16.050)	(−3.226)
Leverage	−0.079***	−0.064***	−0.048*	0.004	−0.020	−0.076
	(−3.617)	(−2.810)	(−1.811)	(0.642)	(−0.908)	(−1.347)
Tangibility	−0.005	0.013	0.006	−0.044***	−0.015	−0.010
	(−0.463)	(1.046)	(0.285)	(−10.222)	(−1.065)	(−0.265)
Profitability	0.136***	0.154***	0.014	−0.008	0.006	−0.024
	(4.148)	(4.431)	(0.510)	(−0.941)	(0.224)	(−0.340)
Tobin	−2.324***	−2.375***	−0.086	−1.245***	−1.370***	−2.811***
	(−7.138)	(−7.069)	(−0.251)	(−13.531)	(−4.653)	(−3.335)
z-score	1.869***	1.716***	−0.681**	1.035***	1.069***	0.887
	(9.914)	(8.553)	(−2.358)	(15.965)	(5.733)	(1.526)
Constant	89.198***	88.370***	11.255	53.624***	47.029***	−6.233
	(17.109)	(16.707)	(1.591)	(22.802)	(6.153)	(−0.227)
Observations	13,852	12,529	16,126	16,134	16,134	16,134
Adj R^2	0.210	0.223	0.650	*z*	*z*	*z*
Industry-fixed effects	Yes	Yes	No	Yes	Yes	Yes
Firm-fixed effects	No	No	Yes	No	No	No
Year-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Note: This table presents the regression results for the impact of 10-K report readability on a firm's debt choice. The dependent variable is the proportion of bank debt to total debt. The lagged readability is used as the measure of the firm's readability in Column (1). Firm-fixed effects are added in Column (2). Weighted least squares, generalized estimation equation, and Tobit regressions' results are reported in Columns (3)–(5), respectively. Sample period: 2001–2018. Beneath each coefficient estimate, the robust *t*-statistic, clustered at the firm and year levels, is reported. Definitions and data sources for the variables are provided in Appendix A.

***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Once again, all the estimates in Table 7 show a negative and significant association between the 10-K readability reports and the firm's reliance on bank debt, confirming our main findings reported in Table 2.

5.3 | Cross-Sectional Heterogeneity: The Role of Information Environment

We investigate how credit ratings affect the relationship between readability and the bank debt ratio. According to previous studies, credit rating agencies provide a refined assessment of a company's creditworthiness. These agencies are expected to drastically assist in minimizing information asymmetry in credit markets by communicating their opinions with market participants (Barber et al. 2010; Becker and Milbourn 2011; Kisgen 2006; Tang 2009). We distinguish between two types of credit ratings: long-term debt and investment grade. Credit ratings are announced on the basis of short- or long-term maturity. We consider the latter because it gives forward-looking assessments of a firm's credit quality independent of business cycle effects. We use a dummy variable that takes the value of one if the firm has an S&P long-term debt rating and zero otherwise (Debt rating). We also look at whether the company is rated as investment grade (Invest grade). A corporate debt with a credit rating of BBB- or higher is considered an investment grade, which implies a lower risk of default. Firms with a high default risk are less able to raise debt in public debt markets and, hence, are more likely to rely on bank debt. Indeed, banks are able to monitor the firm and renegotiate the bank loan terms afterward. However, by contributing to the reduction of information asymmetries, higher readability provides better access to public debt. Consequently, we predict the negative relationship between readability and reliance on bank loans to be more pronounced for enterprises without ratings.

TABLE 8 | Cross-sectional heterogeneity: the role of information environment.

	(1) Debt rating	(2) Invest grade	(3) Institutional	(4) Fluidity
READ × HIGH	0.081	0.090	−0.122*	−0.272***
	(1.332)	(1.462)	(−1.894)	(−4.593)
READ × LOW	−0.189***	−0.113*	−0.154**	−0.342***
	(−3.141)	(−1.868)	(−2.352)	(−5.637)
Size	−5.476***	−6.746***	−9.127***	−9.239***
	(−21.373)	(−27.841)	(−43.643)	(−56.666)
Leverage	0.039*	−0.101***	−0.060**	−0.027
	(1.708)	(−4.558)	(−2.220)	(−1.341)
Tangibility	0.016	0.014	0.006	−0.007
	(1.346)	(1.210)	(0.407)	(−0.649)
Profitability	0.066**	0.069**	0.033	0.097***
	(2.087)	(2.168)	(0.696)	(3.332)
Tobin	−2.682***	−2.187***	−2.458***	−2.275***
	(−8.027)	(−6.523)	(−5.820)	(−7.602)
z-score	1.918***	2.007***	2.781***	1.870***
	(10.550)	(10.954)	(9.126)	(11.297)
Constant	67.835***	79.780***	87.555***	77.909***
	(12.493)	(14.879)	(14.781)	(14.969)
HIGH-LOW (*F*-test)	442.840	338.670	9.490	56.950
HIGH-LOW (*p* value)	0	0	0.002	0
Observations	13,428	13,428	9551	15,869
Adj R^2	0.210	0.197	0.198	0.182
Industry-fixed effects	Yes	Yes	Yes	Yes
Year-fixed effects	Yes	Yes	Yes	Yes

Note: This table presents the regression results for the impact of 10-K report readability on a firm's debt choice. The dependent variable is the proportion of bank debt to total debt. We use Readability as the firm's readability measure. We consider "Debt rating," a dummy variable that takes one if the firm has an S&P long-term debt rating, and Invest grade, a dummy variable that takes one if the firm has an investment-grade S&P long-term rating, are in Columns (1) and (2). Finally, we consider Institutional, the percentage of a firm's shares held by institutions, and fluidity, a proxy for product market competition, in Columns (3) and (4), respectively. For each one of these moderating variables, we generate a dummy variable HIGH (LOW) that takes the value of one whenever the variable is above (below) the median of the distribution and a value of zero otherwise. READ × HIGH (READ × LOW) is the interaction term between the firm's readability score and the dummy variable HIGH (LOW). Sample period: 2001–2018. Beneath each coefficient estimate, the robust *t*-statistic, clustered at the firm and year levels, is reported. Definitions and data sources for the variables are provided in Appendix A.

***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

The past literature also establishes the institutional ownership's monitoring effect. Indeed, as the share of equity held by institutions increases, managers are less likely to engage in any fraudulent actions (Callen and Fang 2013; Glaum et al. 2018; Ward et al. 2018). In other words, enhanced institutional monitoring will reduce moral hazard, that is, lower ex post information asymmetries. As a result, we expect the negative relationship between readability and reliance on bank debt to be less prominent for companies with higher institutional ownership since readability and institutional ownership may act as substitutes. We use the ownership stake in a company that is held by large financial organizations, pension funds, or endowments (Institutional) from Thomson Reuters.

Market competition pressure is another proxy for external monitoring and hence, the degree of ex post information asymmetries. Increased pressure will act as a backup mechanism to ensure more effective monitoring (Boubaker et al. 2018; Hart 1983; Shleifer and Vishny 1997; Tian and Twite 2011). In other words, decreased competitive pressure is likely to be coupled with an increase in information asymmetries. Therefore, we expect that readability plays a stronger role in mitigating information asymmetry in firms facing less product market competition. As a result, we argue that the negative correlation between readability and reliance on bank debt should be more robust for enterprises operating in less competitive environments. We use a textual measure of product market competition based on the product

TABLE 9 | Cross-sectional heterogeneity: the role of financial constraints.

	(1) Size	(2) HP	(3) KZ	(4) WW
READ_HIGH	−0.223***	−0.218***	−0.202***	−0.194***
	(−3.992)	(−3.591)	(−3.343)	(−3.196)
READ_LOW	−0.319***	−0.159***	−0.145**	−0.175***
	(−5.678)	(−2.633)	(−2.377)	(−2.868)
Size	−7.746***	−8.232***	−9.034***	−8.884***
	(−30.169)	(−30.524)	(−51.958)	(−34.854)
Leverage	−0.015	−0.056**	−0.143***	−0.069***
	(−0.724)	(−2.567)	(−5.724)	(−3.176)
Tangibility	−0.003	0.009	0.010	0.008
	(−0.280)	(0.785)	(0.838)	(0.675)
Profitability	0.110***	0.093***	0.104***	0.091***
	(3.807)	(2.970)	(3.312)	(2.883)
Tobin	−2.291***	−2.428***	−2.707***	−2.446***
	(−7.727)	(−7.515)	(−8.380)	(−7.528)
z-score	1.855***	2.035***	2.016***	2.027***
	(11.324)	(11.463)	(11.139)	(11.195)
Constant	70.669***	79.702***	88.296***	84.553***
	(13.868)	(14.456)	(16.573)	(15.520)
Observations	16,134	14,062	13,926	13,926
Adj R^2	0.184	0.181	0.182	0.180
Industry-fixed effects	Yes	Yes	Yes	Yes
Year-fixed effects	Yes	Yes	Yes	Yes

Note: This table presents the regression results for the impact of 10-K report readability on a firm's debt choice. The dependent variable is the proportion of bank debt to total debt. We use Readability as the firm's readability measure. "Size" is the firm's size. "HP" is the Hadlock and Pierce (2010) financial constraint index. "KZ" is the Kaplan and Zingales (1997) financial constraint index. "WW" is the Whited and Wu (2006) financial constraint index. For each one of these moderating variables, we generate a dummy variable HIGH (LOW) that takes the value of one whenever the variable is above (below) the median of the distribution and a value of zero otherwise. READ × HIGH (READ × LOW) is the interaction term between the firm's readability score and the dummy variable HIGH (LOW). Sample period: 2001–2018. Beneath each coefficient estimate, the robust *t*-statistic, clustered at the firm and year levels, is reported. Definitions and data sources for the variables are provided in Appendix A.

***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

descriptions found in firms' 10-K filings (Fluidity) from Hoberg et al. (2014). The higher the similarity between a firm's own words vector and its rivals' words vector, the higher the competitive pressure.

We perform our baseline regression using each one of the above moderating variables. More specifically, we generate a dummy variable HIGH (LOW) that takes the value of one whenever the variable is above (below) the median of the distribution and a value of zero otherwise. Then, we run the regression using the interaction terms between the firm's readability and the dummy variable. Table 8 summarizes the findings of the analysis. For example, the variable READ × HIGH in Column (1) reports the readability score of firms with a high "Debt rating." As can be seen in Columns (1) and (2), only the coefficients for READ × LOW are negative and significant, suggesting that the negative relationship between readability and the bank debt ratio is stronger for firms with low debt rating and not rated as investment grade, supporting our prediction. The results reported in Column (3) show that the coefficient for READ × LOW loads negative and significant and is statistically higher than the coefficient for READ × HIGH, suggesting that the negative association between readability and bank debt ratio is stronger (weaker) in firms with low (high) institutional ownership, supporting the view that readability and institutional ownership act as substitutes. The results reported in Column (5) show that the negative and significant coefficient for READ × LOW is higher than the coefficient for READ × HIGH, suggesting that the negative association between readability and bank debt ratio is stronger for firms with high fluidity index, supporting the view that firms with low product market competition benefit more from the reduction in information asymmetry due to the improvement of annual reports readability.

5.4 | Cross-Sectional Heterogeneity: The Role of Financing Constraints

We then investigate how financing constraints possibly influence the relationship between the firm's narrative disclosure readability and its debt choices. Prior research indicates that firms' financing constraints significantly shape their debt choices (Denis and Mihov 2003; Fazzari et al. 1988; Stiglitz and Weiss 1981). Firms with financing constraints are less appealing to bond investors due to their poor financial conditions. As a result, firms that face more significant financing constraints are more likely to rely on bank loans. Nonetheless, by contributing to the reduction of information asymmetries, higher readability should alleviate these constraints and provide better access to the public debt market. As a result, we anticipate that the negative relationship between readability and bank debt will be stronger for firms with more significant financing constraints.

To evaluate the hypothesis above, we employ four proxies for financing constraints. In addition to firm size (size), there are the HP index (HP), KZ index (KZ), and the WW index (WW). Indeed, earlier research has suggested that large corporations have easy access to external financing (Farre-Mensa and Ljungqvist 2016; Faulkender and Petersen 2006). The HP (Hadlock and Pierce 2010), KZ (Kaplan and Zingales 1997), and the WW index (Whited and Wu 2006) measures of financial constraints are also extensively acknowledged in the literature. The relationship is more significant with financial constraints when firm size is small and HP, KZ, and WW indices are large.

On the basis of the previous discussion, we divide our sample based on the median values of various financial restriction proxies. If a variable is above (below) the median of its distribution, the dummy variable HIGH (LOW) takes the value of one, and zero otherwise. We then run the regression of our baseline model. Our main variables of interest are the interactions between the

readability score READ and dummy variables HIGH and LOW, respectively. Table 9 summarizes the results of the subsample study for companies with high and low financial constraints through Columns (1)–(4). Consistent with the arguments stated previously, we find that Readability is negatively associated and statistically significant for the subsample of companies that have more binding financial constraints, that is, firms with smaller size and higher HP, KZ, and WW index scores. Additionally, except for the WW index, the difference between READ × HIGH and READ × LOW estimations is statistically different from zero across all columns at the 1% level. These findings suggest that financing constraints magnify the inverse relationship between a firm's disclosure readability and its proportion of bank debt.

6 | Conclusion

We examine and provide novel evidence on the association between the readability of narrative disclosures and firm debt choice. We show that enhanced readability helps alleviate information asymmetry, thus leading firms to substitute less information-sensitive debt instruments, such as bank loans, with more information-sensitive ones, such as public debt. Using a sample of 16,532 firm-year observations spanning 2001–2018, we document a negative and significant association between the readability of a firm's narrative disclosures and its reliance on bank loans.

Our findings remain robust after controlling for alternative readability metrics, additional control variables, and alternative regression specifications. We also show that readability is associated with less borrowing in the syndicated loan market. We use the Plain English Mandate of 1998 as a quasi-natural experiment. We show that treated firms that were subject to the Plain English Mandate's requirement experienced less bank issuance. We examine whether banks extract concessions from firms with low readability. The results indicate that low readability is associated with higher bank loan costs. Furthermore, liquidity, as measured by a low bid–ask spread, partially mediates the relationship between readability and the bank debt ratio. Additionally, shorter texts and less lexically diverse disclosures, as well as those exhibiting less negative and less uncertain tones, are associated with lower bank debt ratios.

Moreover, cross-sectional analysis reveals a more pronounced negative correlation between readability and the proportion of bank debt to total debt for informationally opaque and financially restricted firms.

Our analysis demonstrates that firms with higher readability are more likely to switch from private to public debt, implying that readability is more valuable when issuing bonds than borrowing from banks. From a practical standpoint, this study offers important implications for investors, firms, and policymakers, shedding light on how the clarity of financial disclosures influences capital structure decisions. For investors, the findings offer valuable insights into firm transparency and risk assessment. Enhanced readability reduces information asymmetry, enabling investors to make more informed decisions regarding firm valuation and capital allocation. Clear and accessible financial disclosures facilitate a better understanding of a firm's financial health, risk profile, and debt composition—factors that directly affect investment strategies and portfolio construction. By understanding how readability influences a firm's preference for public versus bank debt, investors can more accurately assess liquidity risk, cost of capital, and exposure to market volatility. These insights contribute to more efficient resource allocation and improved risk management, ultimately enhancing investment outcomes.

For firms, the research provides strategic guidance on aligning financial reporting practices with financing objectives. The choice between public and bank debt is closely tied to the firm's capacity to attract investors, which depends in part on the clarity of its financial statements. Firms seeking to issue public debt—which requires appealing to a broad base of investors—may benefit from improving the readability of disclosures to reduce borrowing costs and broaden their investor reach. This is particularly pertinent given prior evidence suggesting that firms with stronger corporate governance, often linked to more transparent reporting, are more likely to favor public debt (Kabir et al. 2024; Tan et al. 2020). Additionally, enhanced readability may strengthen relationships with lenders and lower financing costs (Ertugrul et al. 2017). Moreover, previous research indicates that less readable financial statements are associated with longer audit report lags and higher audit fees, indicating that improving disclosure clarity can also reduce compliance costs and thereby indirectly influence debt financing decisions (Abernathy et al. 2019; Blanco et al. 2021).

For policymakers, the study underscores the importance of promoting transparency through improved financial reporting standards. Regulatory authorities can leverage these findings to refine disclosure frameworks, promoting market efficiency and investor protection. Initiatives such as the US SEC's 1998 "Plain English Disclosure" rule—which encourages clear and concise language in corporate filings—and the Financial Reporting Council's (FRC) (2025) guidance in the United Kingdom on effective annual reporting both reflect a growing recognition of readability's role in ensuring market transparency. These regulatory efforts demonstrate how readability metrics can inform the design of policies that improve disclosure quality, facilitate more effective capital allocation, and reduce systemic risks linked to opaque reporting practices. Taken together, the findings highlight the multifaceted role that financial statement readability plays in modern financial systems, impacting investment decisions, corporate financing strategies, and regulatory approaches alike.

Acknowledgments

We are most grateful for comments and feedback by the Editor and two anonymous reviewers of *Financial Management* as well as many colleagues including Marco Bigelli, Wanfu Li, Xiaoran Ni, Walid Saffar, Syrine Sassi, Richard Taffler, Shouyu Yao and seminar participants at Cardiff Business School and EM Normandie Business School. The usual caveats apply.

Conflicts of Interest

The authors declare no conflicts of interest.

Endnotes

[1] Similarly, Lawrence (2013) reports a positive association between improved readability and individual investors' holdings, whereas Miller (2010) shows that lower readability leads to a reduction in small investors' aggregate trading volume. In another vein, Lehavy et al. (2011) examine the impact of readability on analyst performance. They provide evidence that lower readability of narrative disclosures is associated with lower accuracy and greater dispersion of forecasted earnings compared to realized ones.

[2] The Bog index is reported by Editor Software's StyleWriter 4.

[3] The index is available at https://kelley.iu.edu/bpm/activities/bogindex.html.

[4] $\text{Readability\_s} = 1 / \frac{(\text{readability} - \text{mean})}{\text{stddeviation}}$

[5] The formula for Gunning Fog index is $0.4 \times [(\frac{\text{totalwords}}{\text{totalsentences}}) + 100(\frac{\text{complexwords}}{\text{totalwords}})]$. Complex words are those containing three or more syllables.

[6] In its "A Plain English Handbook," the SEC identifies nine common mistakes likely to degrade the readability of a firm's disclosures, namely, long sentences, passive voice, weak verbs, superfluous words, legal and financial jargon, numerous defined terms, abstract words, unnecessary details, and unreadable design and layout.

[7] The sample period for our analysis in Tables 3 and 4 using DealScan covers the period from 1992 to 2018.

[8] We agree that inclusion of firm fixed effects can address concerns of unobserved firm-level heterogeneity. However, many of the earlier financial reporting quality studies in corporate finance control for industry and year effects. A potential explanation of this practice is that the complexity of annual reports varies across industries (Loughran and McDonald 2014).

[9] https://finance.wharton.upenn.edu/~mrrobert/research.html.

References

Abernathy, J. L., F. Guo, T. R. Kubick, and A. Masli. 2019. "Financial Statement Footnote Readability and Corporate Audit Outcomes." *Auditing: A Journal of Practice and Theory* 38, no. 2: 1–26.

Akerlof, G. A. 1978. "The Market for 'Lemons': Quality Uncertainty and the Market Mechanism." In *Uncertainty in Economics*. Elsevier.

Almazan, A., and J. Suarez. 2003. "Entrenchment and Severance Pay in Optimal Governance Structures." *Journal of Finance* 58, no. 2: 519–547.

Alter, A. L., and D. M. Oppenheimer. 2008. "Easy on the Mind, Easy on the Wallet: the Roles of Familiarity and Processing Fluency in Valuation Judgments." *Psychonomic Bulletin & Review* 15, no. 5: 985–990.

Altman, E. I. 1968. "Financial ratios, discriminant analysis and the prediction of corporate bankruptcy." *The journal of finance* 23, no. 4: 589–609.

Armstrong, C. S., J. E. Core, D. J. Taylor, and R. E. Verrecchia. 2011. "When Does Information Asymmetry Affect the Cost of Capital?" *Journal of Accounting Research* 49, no. 1: 1–40.

Bagnoli, M., and S. G. Watts. 2010. "Oligopoly, Disclosure, and Earnings Management." *Accounting Review* 85, no. 4: 1191–1214.

Baker, K., H. Rjiba, S. Saadi, and S. Sassi. 2024. "Does Litigation Risk Matter for the Choice Between Bank Debt and Public Debt?" *Journal of Corporate Finance* 89: 102688.

Barber, B. M., R. Lehavy, and B. Trueman. 2010. "Ratings Changes, Ratings Levels, and the Predictive Value of Analysts' Recommendations." *Financial Management* 39, no. 2: 533–553.

Barker, R. 2002. "A Three-Point Plan for SEC Reform." *Business Week*, June 3.

Becker, B. O., and T. Milbourn. 2011. "How Did Increased Competition Affect Credit Ratings?" *Journal of Financial Economics* 101, no. 3: 493–514.

Ben-Nasr, H. 2019. "Do Unemployment Benefits Affect the Choice of Debt Source?" *Journal of Corporate Finance* 56: 88–107.

Ben-Nasr, H., S. Boubaker, and S. Sassi. 2021. "Board Reforms and Debt Choice." *Journal of Corporate Finance* 69: 102009.

Berlin, M., and J. Loeys. 1988. "Bond Covenants and Delegated Monitoring." *Journal of Finance* 43, no. 2: 397–412.

Best, R., and H. Zhang. 1993. "Alternative Information Sources and the Information Content of Bank Loans." *Journal of Finance* 48, no. 4: 1507–1522.

Bharath, S. T., and M. Hertzel. 2019. "External Governance and Debt Structure." *Review of Financial Studies* 32, no. 9: 3335–3365.

Biddle, G. C., G. Hilary, and R. S. Verdi. 2009. "How Does Financial Reporting Quality Relate to Investment Efficiency?" *Journal of Accounting and Economics* 48, no. 2–3: 112–131.

Billett, M. T., M. J. Flannery, and J. A. Garfinkel. 1995. "The Effect of Lender Identity on a Borrowing Firm's Equity Return." *Journal of Finance* 50, no. 2: 699–718.

Blackwell, D. W., and D. S. Kidwell. 1988. "An Investigation of Cost Differences Between Public Sales and Private Placements of Debt." *Journal of Financial Economics* 22, no. 2: 253–278.

Blanco, B., P. Coram, S. Dhole, and P. Kent. 2021. "How Do Auditors Respond to Low Annual Report Readability?" *Journal of Accounting and Public Policy* 40, no. 3: 106769. https://doi.org/10.1016/j.jaccpubpol.2020.106769.

Bloomfield, R. J. 2002. "The Incomplete Revelation Hypothesis and Financial Reporting." *Accounting Horizons* 16, no. 3: 233–343.

Bonsall, IV, B. Samuel, A. J. Leone, B. P. Miller, and K. Rennekamp. 2017. "A Plain English Measure of Financial Reporting Readability." *Journal of Accounting and Economics* 63, no. 2–3: 329–357.

Bonsall, IV, B. Samuel, and B. P. Miller. 2017. "The Impact of Narrative Disclosure Readability on Bond Ratings and the Cost of Debt." *Review of Accounting Studies* 22, no. 2: 608–643.

Boot, A. W. A. 2000. "Relationship Banking: What Do We Know?" *Journal of Financial Intermediation* 9, no. 1: 7–25.

Boubaker, S., D. Gounopoulos, and H. Rjiba. 2019. "Annual Report Readability and Stock Liquidity." *Financial Markets, Institutions & Instruments* 28, no. 2: 159–186.

Boubaker, S., W. Rouatbi, and W. Saffar. 2017. "The Role of Multiple Large Shareholders in the Choice of Debt Source." *Financial Management* 46, no. 1: 241–274.

Boubaker, S., W. Saffar, and S. Sassi. 2018. "Product Market Competition and Debt Choice." *Journal of Corporate Finance* 49: 204–224.

Boyd, J. H., and E. C. Prescott. 1986. "Financial Intermediary-Coalitions." *Journal of Economic Theory* 38, no. 2: 211–232.

Bushman, R. M., and A. J. Smith. 2001. "Financial Accounting Information and Corporate Governance." *Journal of Accounting and Economics* 32, no. 1–3: 237–333.

Callen, J. L., and X. Fang. 2013. "Institutional Investor Stability and Crash Risk: Monitoring Versus Short-Termism?" *Journal of Banking & Finance* 37, no. 8: 3047–3063.

Campbell, T. S. 1979. "Optimal Investment Financing Decisions and the Value of Confidentiality." *Journal of Financial and Quantitative Analysis* 14, no. 5: 913–924.

Chakraborty, I., A. J. Leone, M. Minutti-Meza, and M. Phillips. 2022. "Financial Statement Complexity and Bank Lending." *Accounting Review* 97, no. 3: 155–178.

Chemmanur, T. J., and P. Fulghieri. 1994. "Reputation, Renegotiation, and the Choice Between Bank Loans and Publicly Traded Debt." *Review of Financial Studies* 7, no. 3: 475–506.

Chen, H., D. A. Maslar, and M. Serfling. 2020. "Asset Redeployability and the Choice Between Bank Debt and Public Debt." *Journal of Corporate Finance* 64: 101678.

Cline, B. N., X. Fu, and T. Tang. 2020. "Shareholder Investment Horizons and Bank Debt Financing." *Journal of Banking and Finance* 110: 105656.

Correia, S. 2015. *Singletons, Cluster-Robust Standard Errors, and Fixed Effects: A Bad Mix*. Duke University.

Denis, D. J., and V. T. Mihov. 2003. "The Choice Among Bank Debt, Non-Bank Private Debt, and Public Debt: Evidence From New Corporate Borrowings." *Journal of Financial Economics* 70, no. 1: 3–28.

Diamond, D. W. 1984. "Financial Intermediation and Delegated Monitoring." *Review of Economic Studies* 51, no. 3: 393–414.

Diamond, D. W. 1991. "Monitoring and Reputation: The Choice Between Bank Loans and Directly Placed Debt." *Journal of Political Economy* 99, no. 4: 689–721.

Ertugrul, M., J. Lei, J. Qiu, and C. Wan. 2017. "Annual Report Readability, Tone Ambiguity, and the Cost of Borrowing." *Journal of Financial and Quantitative Analysis* 52, no. 2: 811–836.

Fama, E. F. 1985. "What's Different About Banks?" *Journal of Monetary Economics* 15, no. 1: 29–39.

Farre-Mensa, J., and A. Ljungqvist. 2016. "Do Measures of Financial Constraints Measure Financial Constraints?" *Review of Financial Studies* 29, no. 2: 271–308.

Faulkender, M., and M. A. Petersen. 2006. "Does the Source of Capital Affect Capital Structure?" *Review of Financial Studies* 19, no. 1: 45–79.

Fazzari, S., R. Glenn Hubbard, and B. Petersen. 1988. "Investment, Financing Decisions, and Tax Policy." *American Economic Review* 78, no. 2: 200–205.

Financial Reporting Council. "Structured Digital Reporting—2024/25 Insights," Financial Reporting Council. Published 2025. https://www.frc.org.uk/library/digital-reporting/structured-digital-reporting-202425-insights/.

Gao, Q., M. Lin, and R. Sias. 2023. "Words Matter: The Role of Readability, Tone, and Deception Cues in Online Credit Markets." *Journal of Financial and Quantitative Analysis* 58, no. 1: 1–28.

Ge, L., T. Jamil, and J. Yu. 2024. "CEO Overconfidence and the Choice of Debt Issuance." *Journal of Banking and Finance* 161: 107099.

Glaum, M., W. R. Landsman, and S. Wyrwa. 2018. "Goodwill Impairment: The Effects of Public Enforcement and Monitoring by Institutional Investors." *Accounting Review* 93, no. 6: 149–180.

Hadlock, C. J., and C. M. James. 2002. "Do Banks Provide Financial Slack?" *Journal of Finance* 57, no. 3: 1383–1419.

Hadlock, C. J., and J. R. Pierce. 2010. "New Evidence on Measuring Financial Constraints: Moving Beyond the KZ Index." *Review of Financial Studies* 23, no. 5: 1909–1940.

Hart, O. D. 1983. "The Market Mechanism as an Incentive Scheme." *Bell Journal of Economics* 14: 366–382.

Hasan, M. M. 2020. "Readability of Narrative Disclosures in 10-K Reports: Does Managerial Ability Matter?" *European Accounting Review* 29, no. 1: 147–168.

Hoberg, G., G. Phillips, and N. Prabhala. 2014. "Product Market Threats, Payouts, and Financial Flexibility." *Journal of Finance* 69, no. 1: 293–324.

Hoshi, T., A. Kashyap, and D. Scharfstein. 1993. The Choice Between Public and Private Debt: *An Analysis of Post-Deregulation Corporate Financing in Japan*. National Bureau of Economic Research.

Houston, J., and C. James. 1996. "Bank Information Monopolies and the Mix of Private and Public Debt Claims." *Journal of Finance* 51, no. 5: 1863–1889.

Humphery-Jenner, M., Y. Liu, V. Nanda, S. Silveri, and M. Sun. 2024. "Of Fogs and Bogs: Does Litigation Risk Make Financial Reports Less Readable?" *Journal of Banking and Finance* 163: 107180.

Hwang, B.-H., and H. H. Kim. 2017. "It Pays to Write Well." *Journal of Financial Economics* 124, no. 2: 373–394.

James, C. 1987. "Some Evidence on the Uniqueness of Bank Loans." *Journal of Financial Economics* 19, no. 2: 217–235.

Johnson, S. A. 1997. "An Empirical Analysis of the Determinants of Corporate Debt Ownership Structure." *Journal of Financial and Quantitative Analysis* 32: 47–69.

Kabir, M., D. Rahman, and T. Jamil. 2024. "Torn Between Two Debt Types? The Role of Managerial Ability in a Firm's Choice Between Bank Loans and Public Debt." *Journal of Banking and Finance* 164: 107205.

Kaplan, S. N., and L. Zingales. 1997. "Do Investment-Cash Flow Sensitivities Provide Useful Measures of Financing Constraints?" *Quarterly Journal of Economics* 112, no. 1: 169–215.

Kim, O., and R. E. Verrecchia. 1994. "Market Liquidity and Volume Around Earnings Announcements." *Journal of Accounting and Economics* 17, no. 1–2: 41–67.

Kisgen, D. J. 2006. "Credit Ratings and Capital Structure." *Journal of Finance* 61, no. 3: 1035–1072.

Krishnaswami, S., P. A. Spindt, and V. Subramaniam. 1999. "Information Asymmetry, Monitoring, and the Placement Structure of Corporate Debt." *Journal of Financial Economics* 51, no. 3: 407–434.

Lambert, R. A. 2001. "Contracting Theory and Accounting." *Journal of Accounting and Economics* 32, no. 1–3: 3–87.

Lambert, R. A., C. Leuz, and R. E. Verrecchia. 2012. "Information Asymmetry, Information Precision, and the Cost of Capital." *Review of Finance* 16, no. 1: 1–29.

Lawrence, A. 2013. "Individual Investors and Financial Disclosure." *Journal of Accounting and Economics* 56, no. 1: 130–147.

Lehavy, R., F. Li, and K. Merkley. 2011. "The Effect of Annual Report Readability on Analyst Following and the Properties of Their Earnings Forecasts." *Accounting Review* 86, no. 3: 1087–1115.

Leuz, C., and R. E. Verrecchia. 2000. "The Economic Consequences of Increased Disclosure." *Journal of Accounting Research* 38: 91–124.

Li, F. 2008. "Annual Report Readability, Current Earnings, and Earnings Persistence." *Journal of Accounting and Economics* 45, no. 2–3: 221–247.

Li, F. 2010. "Textual Analysis of Corporate Disclosures: A Survey of the Literature." *Journal of Accounting Literature* 29, no. 1: 143–165.

Li, K. 2020. "Does Information Asymmetry Impede Market Efficiency? Evidence From Analyst Coverage." *Journal of Banking & Finance* 118: 105856.

Li, X., C. Lin, and X. Zhan. 2019. "Does Change in the Information Environment Affect Financing Choices?" *Management Science* 65, no. 12: 5676–5696.

Li, Y., L. Li, and B. Zhu. 2025. "Executive Compensation and Secured Debt: Evidence From REITs." *Journal of Corporate Finance* 91: 102727.

Lin, C., Y. Ma, P. Malatesta, and Y. Xuan. 2013. "Corporate Ownership Structure and the Choice Between Bank Debt and Public Debt." *Journal of Financial Economics* 109, no. 2: 517–534.

Lin, L. 2016. "Collateral and the Choice Between Bank Debt and Public Debt." *Management Science* 62, no. 1: 111–127.

Lo, K., F. Ramos, and R. Rogo. 2017. "Earnings Management and Annual Report Readability." *Journal of Accounting and Economics* 63, no. 1: 1–25.

Loughran, T., and B. McDonald. 2011. "When Is a Liability, Not a Liability? Textual Analysis, Dictionaries, and 10-Ks." *Journal of Finance* 66, no. 1: 35–65.

Loughran, T., and B. McDonald. 2014. "Measuring Readability in Financial Disclosures." *Journal of Finance* 69, no. 4: 1643–1671.

Lummer, S. L., and J. J. McConnell. 1989. "Further Evidence on the Bank Lending Process and the Capital-Market Response to Bank Loan Agreements." *Journal of Financial Economics* 25, no. 1: 99–122.

McGlone, M. S., and J. Tofighbakhsh. 2000. "Birds of a Feather Flock Conjointly (?): Rhyme as Reason in Aphorisms." *Psychological Science* 11, no. 5: 424–428.

Mikkelson, W. H., and M. M. Partch. 1986. "Valuation Effects of Security Offerings and the Issuance Process." *Journal of Financial Economics* 15, no. 1–2: 31–60.

Miller, B. P. 2010. "The Effects of Reporting Complexity on Small and Large Investor Trading." *Accounting Review* 85, no. 6: 2107–2143.

Myers, S. C., and N. S. Majluf. 1984. "Corporate Financing and Investment Decisions When Firms Have Information That Investors Do Not Have." *Journal of Financial Economics* 13, no. 2: 187–221.

Nakamura, L. I. 1991. "Commercial Bank Information: Implications for the Structure of Banking." Working Papers 92-1. Federal Reserve Bank of Philadelphia.

Oradi, J., R. Hesarzadeh, S. E-Vahdati, and M. Nadeem. 2024. "CEO Succession Origin and Annual Reports Readability." *British Accounting Review* 56: 101384.

Petersen, M. A., and R. G. Rajan. 1995. "The Effect of Credit Market Competition on Lending Relationships." *Quarterly Journal of Economics* 110, no. 2: 407–443.

Preece, D. C., and D. J. Mullineaux. 1994. "Monitoring by Financial Intermediaries: Banks vs. Nonbanks." *Journal of Financial Services Research* 8, no. 3: 193–202.

Rahman, D., and M. Kabir. 2023. "Does Board Independence Influence Annual Report Readability?" *European Accounting Review* 33: 1923–1950.

Rajan, R. G. 1992. "Insiders and Outsiders: The Choice Between Informed and Arm's-Length Debt." *Journal of Finance* 47, no. 4: 1367–1400.

Rjiba, H., S. Saadi, S. Boubaker, and X. S. Ding. 2021. "Annual Report Readability and the Cost of Equity Capital." *Journal of Corporate Finance* 67: 101902.

Roberts, M. R., and A. Sufi. 2009. "Renegotiation of Financial Contracts: Evidence From Private Credit Agreements." *Journal of Financial Economics* 93, no. 2: 159–184.

Shleifer, A., and R. W. Vishny. 1997. "A Survey of Corporate Governance." *Journal of Finance* 52, no. 2: 737–783.

Spence, M. 1978. "Job Market Signaling." In *Uncertainty in Economics*. Academic Press.

Spence, M. 2002. "Signaling in Retrospect and the Informational Structure of Markets." *American Economic Review* 92, no. 3: 434–459.

Stiglitz, J. E. 2002. "Information and the Change in the Paradigm in Economics." *American Economic Review* 92, no. 3: 460–501.

Stiglitz, J. E., and A. Weiss. 1981. "Credit Rationing in Markets With Imperfect Information." *American Economic Review* 71, no. 3: 393–410.

Sufi, A. 2009. "Bank Lines of Credit in Corporate Finance: An Empirical Analysis." *Review of Financial Studies* 22, no. 3: 1057–1088.

Tan, E. N., C. S. Wong-Lim, and E. K. Y. Lim. 2023. "Employment Quality and 10-K Report Readability." *Journal of Accounting and Public Policy* 42, no. 2: 107020.

Tan, W., A. Tsang, W. Wang, and W. Zhang. 2020. "Corporate Social Responsibility (CSR) Disclosure and the Choice Between Bank Debt and Public Debt." *Accounting Horizons* 34, no. 1: 151–173.

Tan, W., A. Tsang, W. Wang, and W. Zhang. 2020. "Corporate Social Responsibility (CSR) Disclosure and the Choice Between Bank Debt and Public Debt." *Accounting Horizons* 34, no. 1: 151–173.

Tang, T. T. 2009. "Information Asymmetry and Firms' Credit Market Access: Evidence From Moody's Credit Rating Format Refinement." *Journal of Financial Economics* 93, no. 2: 325–351.

Tian, G. Y., and G. Twite. 2011. "Corporate Governance, External Market Discipline and Firm Productivity." *Journal of Corporate Finance* 17, no. 3: 403–417.

Ullah, G. M. W., B. C. Osei, A. Mohammad, and D. S. Kumar. 2025. "Customer Concentration and the Readability of 10-K Reports." *British Accounting Review* 48: 101635.

U.S. Securities and Exchange Commission. 1998. *A Plain English Handbook: How to Create Clear SEC Disclosure Documents*. U.S. Securities and Exchange Commission. http://www.sec.gov/pdf/handbook.pdf.

Vajjala, S., and D. Meurers. 2012. "On Improving the Accuracy of Readability Classification Using Insights From Second Language Acquisition." In *Proceedings of the Seventh Workshop on Building Educational Applications Using NLP*. ACM Digital Library.

Verrecchia, R. E., and J. Weber. 2006. "Redacted Disclosure." *Journal of Accounting Research* 44, no. 4: 791–814.

Ward, C., C. Yin, and Y. Zeng. 2018. "Institutional Investor Monitoring Motivation and the Marginal Value of Cash." *Journal of Corporate Finance* 48: 49–75.

Welker, M. 1995. "Disclosure Policy, Information Asymmetry, and Liquidity in Equity Markets." *Contemporary Accounting Research* 11, no. 2: 801–827.

Whited, T. M., and G. Wu. 2006. "Financial Constraints Risk." *Review of Financial Studies* 19, no. 2: 531–559.

Wruck, K. H., and Y. Wu. 2021. "The Relation Between CEO Equity Incentives and the Quality of Accounting Disclosures: New Evidence." *Journal of Corporate Finance* 67: 101895.

Yosha, O. 1995. "Information Disclosure Costs and the Choice of Financing Source." *Journal of Financial Intermediation* 4, no. 1: 3–20.

You, H., and X.-J. Zhang. 2009. "Financial Reporting Complexity and Investor Underreaction to 10-K Information." *Review of Accounting Studies* 14, no. 4: 559–586.

Appendix A

Variable Definitions and Sources

Variable **Dependent variables**	**Definition**	**Source**
Bankratio	Bank debt over total debt. Bank debt is defined as the sum of term loans and revolving credit, and total debt is defined as the sum of all types of debt, including commercial paper, revolving credit, term loans, subordinated bonds and notes, senior bonds and notes, capital leases, and other debts	Capital IQ
Publicratio	Public debt over total debt. Public debt is defined as the sum of commercial paper, subordinated bonds and notes, and senior bonds and notes. Total debt is defined as the sum of all types of debt, including commercial paper, revolving credit, term loans, subordinated bonds and notes, senior bonds and notes, capital leases, and other debts	Capital IQ
Bank Loan Dummy	A dummy variable that is equal to one if the firm issues a bank loan and zero otherwise (i.e., the firm has a deal amount in DealScan)	DealScan
Lnspread	The cost of a bank loan is calculated as the natural logarithm of the all-in drawn spread	DealScan
Variables of interest		
Readability	A measure for financial statement readability computed as the Bog index multiplied by (−1). The calculation details of the Bog index are obtained from Equations (1) to (5)	Brian P. Miller Data Library
Readability_s	A measure for financial statement readability computed as the range standardization of the reciprocal of the Bog index. The calculation details of the Bog index are obtained from Equations (1) to (5).	Same as above
Control variables		
Size	Natural logarithm of total assets in $ (millions)	Compustat
Leverage	Sum of long-term debt and debt in current liabilities, divided by total assets	Same as above
Tangibility	Total property, plant, and equipment divided by total assets	Same as above
Profitability	Income before extraordinary items divided by total assets	Same as above
Tobin	Sum of the market value of equity and the book value of debt, divided by total assets	Same as above
z-score	Altman's (1968) *z*-score, calculated as (1.2 × working capital + 1.4 × retained earnings + 3.3 × earnings before interest and taxes + 0.999 × sales)/total assets + 0.6 × (market value of equity/book value of debt)	Same as above
Loan maturity	The natural logarithm of months till maturity of the loan's tranche	DealScan
Loan amount	The natural logarithm of the tranche's amount	DealScan
Variables used in robustness tests		
Liquidity	Minus the logarithm of Qspread, calculated as the difference between the ask and bid prices divided by the average of the ask and bid prices	DealScan

(Continues)

Variables used in robustness tests

Length	The natural logarithm of the number of words in the 10-K annual report, multiplied by (−1)	Loughran and McDonald (2011)
Lexical_var	The natural logarithm of the number of unique words in a firm's 10-K annual report, multiplied by (−1)	Same as above
Negative	The natural logarithm of the ratio of negative financial words over total words, multiplied by (−1)	Same as above
Uncertainty	The natural logarithm of the ratio of uncertainty financial words over total words, multiplied by (−1)	Same as above
Debt rating	Dummy variable that takes the value of one if the firm has an S&P long-term debt rating	Capital IQ
Invest grade	Dummy variable that takes the value of one if the firm has an investment-grade S&P long-term rating	Capital IQ
Fluidity	A text measure of product market competition based on the product descriptions found in firms' 10-K filings. The higher the similarity between a firm's own words vector and its rivals' words vector, the higher the competitive pressure	Hoberg and Phillips Data Library
Institutional	The ownership stake in a company that is held by large financial organizations, pension funds, or endowments	Thomson Reuters
HP	The Hadlock and Pierce (2010) index, a measure of firms' financial constraints, is calculated as follows: $-0.737 \times \text{Assets} + 0.043 \times \text{Assets}^2 - 0.040 \times \text{Age}$	Authors' calculation based on Compustat data
KZ	The Kaplan-Zingales (1997) index is an indicator of a company's financial constraints. Businesses with a higher KZ-Index score are more likely to face challenges when financial conditions tighten. The KZ index is computed as follows: $-1.001909 \times$ Cash flows/PPE $+ 0.2826389 \times Q + 3.139193 \times$ Debt/Total capital $- 39.3678 \times$ Dividends/PPE $- 1.314759 \times$ Cash/PPE	Same as above
WW	The Whited and Wu (2006) index, a measure of firms' financial constraints calculated as follows: $-0.091 \times$ (Cash flow to total assets) $- 0.062 \times$ Dummy_dividend $+ 0.021 \times$ Long-term debt $- 0.044 \times \ln(\text{Assets}) + 0.102 \times$ Industry sales growth $- 0.035 \times$ Firm's sales growth	Same as above

Appendix B

TABLE A1 | The impact of readability on debt choice (public debt).

	Readability				Readability_s			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Readability measure	0.029	0.035	0.269***	0.293***	0.007	0.009	0.040***	0.043***
	(−0.580)	(−0.647)	(5.517)	(5.645)	(−0.956)	(−1.118)	(5.334)	(5.342)
Controls	YES	YES	YES	YES	YES	YES	YES	YES
Observations	16,134	16,134	16,134	16,134	16,134	16,134	16,134	16,134
Adj R^2	0.172	0.183	0.209	0.220	0.172	0.183	0.209	0.220
Year-fixed effects	No	No	Yes	Yes	No	No	Yes	Yes
Industry-fixed effects	No	Yes	No	Yes	No	Yes	No	Yes

Note: This table presents the regression results for the impact of 10-K reports' readability on a firm's debt choice. The dependent variable is the proportion of public debt to total debt. We use Readability for Columns (1)–(4) and Readability_s for Columns (5)–(8), as the firm's readability measures. Year- and industry-fixed effects are first added separately, then jointly, to the regression in Columns (2)–(4), respectively. Controls are Size, Leverage, Tangibility, Profitability, Tobin, and *z*-score. The sample period is 2001–2018. Beneath each coefficient estimate, the robust *t*-statistic, clustered at the firm and year levels, is reported. Definitions and data sources for the variables are provided in Appendix A.

***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.