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# The value of information risk: is there an acquisition discount for less readable financial disclosures?

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## ABSTRACT

The readability of financial disclosures plays a crucial role in how firms effectively communicate value-relevant information to the market. This study investigates the association between readability and firm valuation within the context of takeovers. We find that target firms with less readable annual reports receive lower bids and earn lower announcement returns. Our findings suggest that both acquirers and the market discount opaque targets, especially in inter-industry acquisitions, where adverse selection is more severe compared to intra-industry deals.

## KEYWORDS

Takeovers; premium; announcement returns; annual reports; readability

## JEL CLASSIFICATION

G34; M41

## I. Introduction

In this article, we examine the impact of annual report readability on firm value in the context of takeovers. Annual reports serve as the primary source of information for capital market participants. Their textual complexity may hinder investors' information processing and comprehension, increase information risk, and deter effective communication of valuation-relevant information between the firm and the market (Loughran and McDonald 2014; Rjiba et al. 2021). Consistent with this notion, prior literature documents that less readable financial disclosures are associated with greater valuation uncertainty (Loughran and McDonald 2011, 2013, 2014), higher cost of equity (Rjiba et al. 2021), less favourable ratings, higher rating disagreement and analyst dispersion, stricter loan terms, and higher borrowing cost (Bonsall and Miller 2017; Ertugrul et al. 2017). While these findings underscore the importance of firm annual report readability for the capital market, extant literature has largely neglected to consider the impact of annual report readability on shareholders' value in takeovers, which are among the most information-intensive investment decisions that firms make (Balachandran et al. 2022; Chircop and Tarsalewska 2020). Accordingly, we

address this gap by empirically investigating whether and how target firm's annual report readability explains the variation in the premium paid in takeovers and target shareholders returns around the announcement date of takeover transactions.

Capital market theories suggest that investors would demand a higher rate of returns for bearing information risk when there is information asymmetry between managers and outside investors (Barry and Brown 1985; Myers and Majluf 1984). While acquirers can obtain information about the target that is inaccessible to the public through extensive due diligence analysis, low readability could imply a poor corporate information environment (Loughran and McDonald 2014) and thus higher information costs. Indeed, firms' annual report readability affects not only individual investors with limited information-processing expertise (Lawrence 2013; Miller 2010), but also experienced market participants such as financial analysts (Lehavy, Li, and Merkley 2011; Loughran and McDonald 2014), rating agencies (Bonsall and Miller 2017) and sophisticated creditors like banks (Ertugrul et al. 2017). The information disadvantages stemming from less readable reports may make acquirers more vulnerable to adverse

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selection risk and overpayment (Akerlof 1970), leading them to offer a lower takeover premium. Furthermore, the quality of the target firm's annual report could significantly influence the dynamics of deal negotiations, especially regarding the target firm's bargaining power. Considering the negative market impacts associated with less readable annual reports (Bonsall and Miller 2017; Boubaker, Gounopoulos, and Rjiba 2019; Ertugrul et al. 2017), we contend that low readability of these reports is likely to diminish the target firm's bargaining power, leading to lower takeover premium.

To the extent that acquirers of a more opaque target obtain private information regarding the value of the target that is not available to other market participants, effectively becoming relatively informed investors, the remaining market participants continue to be relatively uninformed investors. Therefore, we further examine how relatively uninformed investors (market participants) respond to takeovers involving targets with less readable corporate disclosures. High-quality financial reports enhance investment efficiency by reducing information gaps, minimizing market issues such as friction, moral hazard, and adverse selection (Biddle, Hilary, and Verdi 2009; Leuz and Verrecchia 2000). Conversely, less readable financial disclosures diminish firm-specific information available to the market (Bai, Dong, and Hu 2019; Rjiba et al. 2021), increase investor information processing costs (Boubaker, Gounopoulos, and Rjiba 2019; Li 2008; Miller 2010), and amplify valuation uncertainty (Loughran and McDonald 2011, 2013, 2014). In the context of takeovers, a top-notch financial report at the target level is likely to boost a deal's efficiency. For instance, Marquardt and Zur (2015) find that better accounting information speeds up takeover deals and enhances deal completion chances, positively impacting capital resource allocation. Additionally, access to detailed information about the target firm allows acquirers to identify hidden synergies, as shown by Martin and Shalev (2017) and Uysal et al. (2008), especially in diversifying acquisitions. However, limited access to key information about the target firm reduces the acquirer's accuracy in

determining its value and potential synergies. While the acquirer can reduce information gaps during due diligence, any information advantage gained may not be recognized by the market, resulting in lower target announcement returns.<sup>1</sup> Moreover, when the acquirer lacks sufficient information about the target's valuation, the market's perceived risk increases, lowering expectations of deal completion and consequently reducing firm shareholders' returns (Lim and Lee 2016). Given these market outcomes coupled with lower bargaining power at the target level, we expect the takeover gain accrued to target shareholders to be lower among firms with less readable annual reports.

When acquiring a firm in the same industry, the acquirer typically possesses more knowledge about the target's assets, potential synergies, management, stakeholders, and future prospects. Accounting practices are also more consistent within the same industry. This familiarity reduces the risk of making poor investment decisions due to information gaps (Perafan-Pena, Gill-de-Albornoz, and Giner 2022). In contrast, inter-industry acquisitions present greater challenges. In such acquisitions, acquirers have limited knowledge of the target's operations and assets, increasing the risk of overvaluation (Capron and Shen 2007; Reuer, Tong, and Wu 2012; Shen and Reuer 2005). Accordingly, we expect to see a more pronounced association between the low readability of target annual reports and two important takeover outcomes, namely takeover premium and announcement-period market reaction for targets in inter-industry compared to intra-industry takeover deals.

To examine our predictions, we use a large sample of US completed takeovers that took place between publicly held firms over the period 1995–2017. After controlling for acquirer, target, and transaction-related characteristics, our analyses provide support for our hypotheses. We find that targets with less readable annual reports receive a lower premium and realize a lower announcement returns upon the announcement of a takeover. These findings align with the notion

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<sup>1</sup>Renneboog and Zhao (2014) find that while director connection in acquisitions have important implications for deal terms such probability of deal completion, time to complete the deal, and method of payment, the director networks is not acknowledged by market participants as it is not affecting the acquirer announcement return.

that both investors with higher levels of information and those with less knowledge tend to discount the opaque target. Furthermore, our analyses reveal that these results are primarily driven by inter-industry deals in which asymmetric information problem accentuates. Our results continue to hold under different specifications and alternative measurements of our main variables. To mitigate the concern that observable firm-level characteristics associated with annual reports' readability cause differences in the relationship between disclosure readability and firm valuation in the takeover context, following Rjiba et al. (2021), we employ propensity score matching methodology to check the robustness of our results. We obtain qualitatively consistent results.

This study contributes to a better understanding of the association between corporate disclosures' readability and informationally demanding investment decisions made by firms, such as takeovers. Our study extends the literature examining the economic consequences of firm annual report readability (see e.g. Bonsall and Miller 2017; Ertugrul et al. 2017; Loughran and McDonald 2011, 2013, 2014; Rjiba et al. 2021) by showing that both the acquirers (as informed investors) and the market (as uninformed investors) discount opaque targets. This is in line with Hwang and Kim (2017) who document that hard-to-read financial disclosures decrease firm value. Our findings indicate that aside from ineffective communication of value-relevant information, shareholders of a firm with less readable annual reports experience a reduction in wealth in the form of decreased premiums and announcement returns in takeover scenarios.

In a concurrent study, Balachandran et al. (2022) investigate the economic and value effects of target's annual report readability for acquirer's shareholders. The authors find that acquirer's shareholders experience higher announcement returns when buying a target with annual reports characterized by higher readability. Among other insightful findings, they also show that target's annual report readability leads to a higher premium paid in takeovers. In another study, Chircop and Tarsalewska (2020) find that lengthier annual reports at the target level correlate with higher returns for acquirers, as well as combined

returns for both acquirers and targets. Our article distinguishes itself from these notable studies in at least two key aspects. First, we focus on the target's announcement return, which provides valuable insights into their shareholders' perceptions regarding the deal's value, strategic fit, and potential synergies. We document that target shareholders experience lower takeover announcement returns when their annual reports are less readable. As one of the main beneficiaries of takeovers are the shareholders of the acquired firm, it is important to examine how the variation in the target's annual report readability explains the variation in the wealth effect that target's shareholders experience around the takeover announcement date. Second, we draw a clear distinction between transaction categories, specifically distinguishing between intra-industry and inter-industry deals. Our analysis reveals that the observed associations predominantly manifest in inter-industry transactions, where the challenge of adverse selection is notably more pronounced. This underscores the importance of understanding the context of industry dynamics when assessing the value effects of target's annual report readability in acquisitions. Accordingly, our study provides novel insights into the relationship between business disclosures' readability and the most significant and informationally demanding investment decisions made by firms.

Our results have important managerial implications and highlight the fact that managers should prioritize improving the readability and comprehensibility of their annual reports to enhance shareholder understanding and confidence. When shareholders have confidence in the firm's financial standing and strategy cultivated through higher transparency in business disclosures, they may be more inclined to participate and endorse an acquisition. This could elevate the transaction's value and lead to greater returns for shareholders. Shareholders should understand the potential disadvantages of their firms providing annual reports that are less easy to comprehend, as this can lead to decreased premiums and lower announcement returns in case of an acquisition. Additionally, our study provides valuable insights for policymakers regarding the significance of annual report readability in one of the most important investment

decisions made by firms. This underscores the broader implications of annual report readability for market integrity and investor protection, aligning with the Securities and Exchange Commission's (SEC) emphasis on the importance of providing transparent information to the market participants. Regulatory initiatives, such as the SEC's Plain English Rule (Securities and Exchange Commission 1998), have advocated for business disclosures to be presented in a more comprehensible manner by enhancing their readability and clarity. However, our results indicate that both relatively informed and less informed investors continue to be affected by less readable business disclosures. This highlights the ongoing challenges in policymaking in ensuring that financial information is not only accessible but also comprehensible to all investors, regardless of their level of expertise or familiarity with financial reporting.

The rest of the article is organized as follows. Section II, reviews relevant literature and develops the study hypotheses. Section III describes the data, variables, and research design. Section IV presents the findings. Section V concludes.

## II. Literature review and hypotheses development

### *Annual report readability*

Financial reports are crucial means through which firms communicate valuation-relevant information to market participants. It is axiomatic that a complex and less readable financial report would exacerbate a firm's information risk (Bai, Dong, and Hu 2019; Bonsall and Miller 2017; Ertugrul et al. 2017; Rjiba et al. 2021), increase information processing costs for investors (Boubaker, Gounopoulos, and Rjiba 2019; Li 2008; Miller 2010), and foster greater valuation uncertainty (Loughran and McDonald 2011, 2013, 2014). These in turn affect various capital market outcome variables. For instance, Lawrence (2013) finds that individuals invest more in firms with clear financial disclosures and achieve higher returns, suggesting that clear disclosures reduce their information disadvantage. Hwang and Kim (2017) analyse shareholder reports of closed-end investment companies and show that low

readability causes firms to trade at significant discounts relative to their fundamental values. Ertugrul et al. (2017) find that less readable annual reports are associated with firms' information hoarding and can make it difficult for banks to assess risk, leading to higher loan spreads and increased future stock price crash risk. Similarly, Bonsall and Miller (2017) find that less readable annual reports are associated with lower bond ratings, higher bond rating agency disagreement, and higher cost of debt. Rjiba et al. (2021) show that poor readability in annual reports increases information risk and the cost of equity capital by deterring investor comprehension.

Collectively, this evidence reveals that annual reports' readability affects not only individual investors with limited information-processing expertise (Lawrence 2013; Miller 2010) and credit default swap market participants (Hu, Liu, and Zhu 2018), but also experienced market participants such as financial analysts (Lehavy, Li, and Merkley 2011; Loughran and McDonald 2014), rating agencies (Bonsall and Miller 2017) and sophisticated creditors such as banks (Ertugrul et al. 2017).

In the takeover context where annual reports are integral input in the information set of the acquirer (Raman, Shivakumar, and Tamayo 2013), less readability in corporate disclosures and thus higher valuation uncertainty, can potentially affect various aspects of the transaction. In what follows we motivate and develop our hypotheses as to the implications of the target firm's annual report readability in takeovers across two key dimensions: premium and target shareholders' announcement returns.

### *Premium paid in takeovers*

An acquirer typically faces the fundamental problem of asymmetric information when valuing a target. The higher the information asymmetry regarding the value of a target, the greater the misvaluation risk the acquirer faces. One way for the acquirer to mitigate this risk is by offering a lower premium for the target. Consistent with this argument, Coff (1999) maintains that the acquirer's information disadvantage with respect to the target firm, makes them vulnerable to overpayment for a target that might turn out to be



a lemon. The author finds that acquirers pay relatively low takeover premiums for targets in knowledge-based industries that are characterized by high information asymmetry to cope with this problem. Reuer et al. (2012) find that IPO targets that signal their quality through association with prominent underwriters, venture capitalists, and alliance partners, reduce information asymmetry regarding their value and prevent any discount offer that might arise from their poor information environment.

It is well-established that acquirers usually base their initial assessments of the potential benefits associated with acquiring a firm on publicly available information, such as the firm's annual reports (Chen et al. 2018). Consistent with this argument, Ortiz et al. (2023) find evidence that the volume of private firms becoming the target in acquisition transactions is positively associated with mandatory disclosure. The authors attribute this finding to the fact that financial disclosure increases acquisition activity by reducing asymmetric information and uncertainty. While the high quality of the target firm's financial report can expedite the due diligence process and increase the probability of deal completion (Marquardt and Zur 2015), it is expected that low-quality business disclosure interferes with the effective communication of valuation-relevant information. In addition, low readability could evoke feelings of distrust, uncertainty, and negative sentiment towards the quality of the firm (Hwang and Kim 2017; Oppenheimer 2006). This interference could potentially affect the acquirer's decision regarding the premium paid to target shareholders.

Furthermore, the quality of the target firm's annual report could play a substantial role in the dynamics of the deal negotiation, particularly the bargaining power of the target firm. Recent evidence show that low readability of annual reports is associated with higher cost of bank loans (Ertugrul et al. 2017), higher cost of debt (Bonsall and Miller 2017), and lower stock liquidity (Boubaker, Gounopoulos, and Rjiba 2019). Given these unfavourable market outcomes, we argue that low readability of annual reports is likely to weaken the bargaining power of the target firm in takeovers. Previous studies highlight the importance of the dynamics of bargaining power in acquisitions,

with the party possessing stronger bargaining power extracting greater value from the deal (see e.g. Fuller, Netter, and Stegemoller 2002; Officer 2007). For instance, Officer (2007) finds that private targets involve fewer competing bids as compared with public targets and are acquired at discount. Based upon the above-reviewed literature, we expect that an acquirer is likely to offer a lower premium for a target with a low readability annual report. Accordingly, we posit the following hypothesis:

**Hypothesis 1:** A target firm with less readable annual reports receives a relatively lower takeover premium.

### **Target announcement returns**

The next question this study aims to answer is whether and how the variation in the readability of the target firm's annual report, primary information source for the acquirer, is associated with the variation in the target shareholders' returns around the takeover announcement date. The heterogeneity with respect to the information distribution regarding the value of the target to the potential acquirer and market participants warrants investigating such a question. While the acquirer gets some limited access to private information regarding the target firm after signing the confidentiality agreement, market participants continue to be less informed investors. Therefore, whereas the investigation of the takeover premium shows how a relatively more informed investor (acquirer) considers the low readability of the target firm's annual reports, an examination of the market reaction to these takeover deals offers insights into the value implications of such deals for relatively less informed investors (market participants).

High-quality financial reports can enhance investment efficiency by mitigating information asymmetry between firms and market participants that otherwise lead to market friction, moral hazard, and adverse selection (Biddle, Hilary, and Verdi 2009; Leuz and Verrecchia 2000). In the takeover context, a high-quality financial report at

the target level is likely to improve takeover efficiency. Marquardt and Zur (2015) show that higher quality accounting information is positively associated with the speed of the takeover deal and the likelihood that the deal is ultimately completed. The authors conclude that financial accounting quality relates positively to the efficient allocation of the economy's capital resources. Acquirers' access to valuation-relevant information regarding the target firm makes them able to discover less obvious forms of synergy and design high-synergy transactions (Uysal, Kedia, and Panchapagesan 2008). Martin and Shalev (2017) support this argument and document a positive association between target firm-specific information and acquisition efficiency that is driven mainly by diversifying acquisitions where the information asymmetry between the parties is likely to be greater. They further find that the probability of withdrawal and future divestiture of a target decrease with target firm-specific information.

On the contrary, limited access to valuation-relevant information about the target firm makes the acquirer less accurate in determining the value of the target and future expected synergy, which in turn would be reflected by a lower announcement return for the target firm. The acquirer may mitigate part of the information asymmetry regarding the value of the target firm during the due diligence process. However, the information advantage that the acquirer gains through negotiation with an opaque target may not be captured by the market. In other words, the market may not acknowledge the fact that the information advantage that the acquirer gains matters in terms of expected value creation. This, in turn, could lead to lower target announcement returns. Additionally, while the level of perceived risk is lower in deals where the acquirer has high levels of knowledge and understanding regarding the target firm (Lim and Lee 2016), the acquirer's limited access to valuation-relevant information about the target firm could translate into a higher level of perceived risk, and therefore, lower expectations of the deal's completion. Consequently, this is expected to result in lower target shareholders' returns. Additionally, a decrease in bargaining power alongside the acceptance of lower premiums could translate into diminished returns for the target firm.

Taken together, we expect that the low readability of the target firm's annual report, which hinders the effective communication of valuation-relevant information, increases the information risk for the acquirer, exacerbates the perceived risk of the deal completion, lower the premium paid, and is thus associated with wealth loss for target shareholders around the announcement of the acquisition of such a target. In line with this, we propose the following hypothesis:

**Hypothesis 2:** Shareholders of a target firm with less readable annual reports experience a relatively lower return around the takeover announcement.

### *Intra-industry and inter-industry takeovers*

When purchasing a target in its own industry, an acquirer generally has more tacit knowledge and information regarding the target's key resources, potential sources of synergy, management capabilities, buyers, and suppliers, as well as risks and future prospects. In other words, firms operating in the same industry are likely to be well-informed about each other's activities (Raman, Shivakumar, and Tamayo 2013). Such familiarity could translate into an enhanced ability to appraise claims made by the target, reducing the likelihood of adverse selection. Additionally, accounting and business disclosure policies and practices tend to be similar among firms within the same industry. In line with this argument, Perafan-Pena et al. (2022) argue and find that acquirer and target industry relatedness facilitates detecting earnings manipulations and prevents the acquirer to overpay for the target. Consistently, Lim and Lee (2016) document that the probability of takeover deal completion is higher in cross-border transactions when the acquirer and target belong to the same industry. The authors attribute this finding to the low information asymmetry between the acquirer and the target in such deals.

In contrast, in inter-industry deals, acquirers are less familiar with target operations and resources and therefore, are more likely to lack the capacity to efficiently evaluate the target and therefore are more exposed to overvaluation risk. In line with this argument, Shen and Reuer (2005) provide evidence

that public acquirers tend to avoid purchasing private firms in unrelated industries due to the increased risk of overvaluation. Similar findings are reported by Capron and Shen (2007) who argue that acquirers prefer low information asymmetry target firms to mitigate any decision errors. Consistently, Reuer et al. (2012) find that acquirers do not pay a higher premium for targets that are outside their own industry, indicating their sensitivity to valuation issues in diversifying acquisitions. Corroborating these findings, Raman et al. (2013) find that when buying a target with poor earnings quality, acquirers prefer negotiated deals, pay lower premium, and use more equity as payment method. These results are prevalent in inter-industry takeover deals, where information asymmetry concerns are more pronounced compared to intra-industry deals.

Collectively, the availability of target information is likely to be more critical for estimating the synergy and future prospect of a deal, especially in situations where acquirers have less ability to collect/comprehend information about the target firm, such as in inter-industry deals. Accordingly, we expect that the association observed between the low readability of the target's annual report and the premium paid in takeovers (target shareholders' return) will be more prevalent in inter-industry deals than in intra-industry takeovers. Therefore, we posit the following two hypotheses:

**Hypothesis 3:** The association between the low readability of target annual reports and premium is stronger in inter-industry takeover deals.

**Hypothesis 4:** The association between the low readability of target annual reports and announcement-period market reaction for targets is stronger in inter-industry takeover deals.

### III. Data and method

To test our predictions, we rely on a dataset of US domestic and completed takeovers between

publicly held firms from 1995 to 2017, which are recorded in Thomson Reuters' EIKON mergers and acquisitions database. Acquirers maintain ownership of less than 5% of the target firm's shares prior to the transaction. This is to mitigate any potential informational advantages and to better assess the nuanced impact of target annual report readability in acquisition transactions. Dionne et al. (2015) contend that acquirers possessing at least 5% ownership in the target firm prior to transactions tend to be well-informed bidders and typically offer lower premiums compared to uninformed counterparts. Additionally, acquirers aim to hold more than 50% ownership of the target firm post-transaction to ensure effective control transfer. We also need the choice of payment method to be available (cash, stock, or a mix of cash and stock). Next, accounting and stock price data are obtained from COMPUSTAT and the Center for Research in Security Prices (CRSP), respectively.

In the last stage we collect measures of annual report readability. To this end, we merge our data with a comprehensive data set that Loughran and McDonald have created. The data set is available at The Notre Dame Software Repository for Accounting and Finance (SRAF). The data set comprises the SEC' Central Index Key (CIK) number, along with the filing date, form type, and file size for all 10-K filings. Next, we integrate our data set with an extensive data set crafted by Bonsall et al. (2017). This openly available data set, which encompasses the Bog Index, is elaborated and validated in Bonsall et al. (2017).<sup>2</sup> A total of 835 deals is available for testing the hypothesis concerning the premium and 842 deals for target shareholders' gain around the takeover announcement.

Our two dependent variables are premium and target shareholders' gain around the takeover announcement date. Regarding the premium, scholars commonly use four weeks prior to the transaction target share price as a choice of premium measurement (Jory, Ngo, and Wang 2016; J. J. Kim, Haleblan, and Finkelstein 2011). The rationale behind such a choice is to avoid any run-up bias in the share price of target due to

<sup>2</sup>We are grateful to Tim Loughran and Bill McDonald for making the file size data available at <https://sraf.nd.edu/>. Furthermore, we thank Brian P. Miller for providing the Bog index data that is publicly available at <https://kelley.iu.edu/bpm/activities/bogindex.html>.



anticipation of the transaction. Additionally, it is short enough to exclude any noise in the measurement. Accordingly, we measure premium as the percentage difference between the final bid and the target share price four weeks prior to the takeover announcement. As it can be noted in Table 2, premium averages at 0.4165 with a standard deviation of 0.3535.

Furthermore, we proxy for target shareholders' gain with a five-day cumulative abnormal return (CAR) around the deal announcement. We compute the target's CAR by applying the market model on daily returns over the period of -210 days to -11 days before the takeover announcement. We employ the CRSP equal-weighted returns as the market return. Our approach aligns with prior studies (Masulis, Wang, and Xie 2007; Tunyi 2021). Shown in Table 2, the target's five-day CAR averages at 0.28 with a standard deviation of 0.28.

Regulatory efforts, such as the SEC's Plain English Rule (Securities and Exchange Commission 1998), advocated for business disclosures to be crafted in a more comprehensible manner by enhancing their readability and clarity. To this end, several researchers have started to introduce various measures of annual report readability, as there are divergent views on what constitutes the most appropriate measure of readability. The Fog index stands as one of the initial measures of readability used in accounting and finance literature (see e.g. Li 2008). The Fog index evaluates the complexity of text based on sentence length and the use of complex words. However, Loughran and McDonald (2014) criticize the use of such measures in the context of business disclosures, as some very typical words in business are considered complex when applying the Fog index. Considering the limitations of the previous readability metrics in the realm of business, Loughran and McDonald (2014) proposed annual report file size as a robust and relevant proxy for readability in the context of financial reports. The authors argue that file size is less subject to measurement errors, compares well with alternative measures of readability, and is an omnibus measure capturing several

dimensions of readability. A larger file size implies worse document readability. Along the same line, Bonsall et al. (2017) introduced the Bog index that captures the linguistic attributes of disclosures, such as sentence length, passive voice, weak verbs, overused words, complex words, and jargon. The authors argue that this measure is more appropriate to capture the plain English attributes of disclosures. A higher value of the Bog index implies worse document readability. Given these insights, in our study, we use File size and the Bog index as measures of annual report readability. The average log of gross file size of the target's annual reports in our sample in megabytes is 0.3804, whereas the mean of the Bog index is 85.17, similar to those documented in prior studies (Bonsall and Miller 2017).<sup>3</sup>

We regress takeover premium and target shareholders' gain around the takeover announcement date on target's annual report readability using the following generic ordinary least square (OLS) model:-

$$Y_i = +\beta X_i + Z_i + \eta Industry.FE + \eta Year.FE + \varepsilon_i \quad (1)$$

where  $Y_i$  is our dependent variables and can be either takeover premium or target shareholders' gain around the takeover announcement date.  $X_i$  is a vector of our variables of interest that are target's annual reports readability measures.  $Z_i$  is a vector of control variables that according to the literature may affect the estimation of our dependent variables. These variables include acquirer free cash flow (Acquirer FCF), acquirer market-to-book ratio (Acquirer MTB), acquirer size (Acquirer size), acquirer leverage ratio (Acquirer leverage), number of analysts following the acquirer (Acquirer analyst), acquirer stock returns before the acquisition announcement date (Acquirer stock returns), target market-to-book ratio (Target MTB), relative size of the target to the acquirer (Relative size), target leverage ratio (Target leverage), number of analysts following the target (Target analyst), target sales growth (Target sales growth), target research and

<sup>3</sup>While the Bog index scores range between zero and over 1000, for general writing, the scores can be broken down as follows: 0–20 = excellent; 21–40 = good; 41–70 = average; 71–100 = poor; 101–130 = bad; 131–1000 = dreadful; 1000+ = gobbledegook. According to Stylewriter, most business and governmental writing scores between 60 to 100. More details about the measure can be found in. A plain English measure of financial reporting readability. Journal of Accounting and Economics, 63(2–3), 329–357.

development expenditure (Target R&D), target being in the high technology industry (Target high tech), acquirer and target are operating in the same industry (Intra-industry), acquirer and target are from the same state in the US (Same state), transaction being paid by cash only (Cash only), and transaction being paid by stock only (Stock only). To address possible concerns due to biased outliers, continuous variables are winsorized at the 1st and 99th percentiles. In all estimations,

we account for year fixed effects to capture broad-scale economic fluctuations that may influence the outcome of deals. Our models also incorporate fixed effects for industries to mitigate the potential impact of unobserved heterogeneity across industries.<sup>4</sup> Having controlled for year effects would take into account the increasing file size over time as noted by Bonsall et al. (2017). Unless otherwise stated, all variables are measured in the fiscal year before the takeover announcement date.

**Table 1.** Variables' definitions.

Variable	Definition/Measure
Premium	Percentage difference between final bid and target share price four weeks prior to the takeover announcement.
Target 5-day CAR	Target's CAR [-2, +2], calculated by applying the market model on daily returns over the period of -210 days to -11 days before the announcement.
Log of Gross File Size	Log of the target's 10-K gross file size in megabytes prior to the announcement.
Bog Index	Reported by Editor Software's Stylewriter 4, a comprehensive measure of a document's plain English problems, including passive voice, redundant verbs, use of jargon, and sentence complexity.
Acquirer FCF	Operating income before depreciation minus interest expenses, taxes, preferred dividend, and common dividend divided by book value of total assets.
Acquirer (Target) MTB	Market capitalization divided by book value of equity.
Acquirer Size	Log of acquirer's total assets.
Acquirer (Target) Leverage	Total long-term debt divided by total assets.
Acquirer (Target) Analyst	Maximum number of analysts providing EPS estimation in any month in the most recent fiscal year prior to the deal announcement from I/B/E/S
Acquirer Stock Return	$\frac{P_{-28} - P_{-154}}{P_{-154}}$ , where $P_{-n}$ is the acquirer's share price $n$ business days before the deal announcement.
Relative Size	Target's total assets divided by acquirer total assets.
Target Sales Growth	Target's sales growth in the fiscal year prior to the deal announcement.
Target R&D	R&D investment divided by total assets.
Target High Tech	Equals one if the target is in the high-tech industry, zero otherwise.
Intra-industry	Equals one if the acquirer and target share the same two-digit SIC industry codes, zero otherwise.
Same State	Equals one if the acquirer and target are located in the same state, zero otherwise.
Cash (Stock) Only	Equals one if the method of payment is cash (stock) only, zero otherwise.

**Table 2.** Descriptive statistics.

Variable	N	Mean	St. Dev.	Min	Pctl(25)	Median	Pctl(75)	Max
Premium	835	0.4167	0.3535	-0.3333	0.1982	0.3512	0.5600	1.7638
Target 5-day CAR	842	0.2872	0.2801	-0.1583	0.1082	0.2346	0.4020	1.5974
Log (Gross File Size in Megabyte)	842	0.3804	0.7134	-0.8985	-0.1598	0.2565	1.0755	1.6367
Bog Index	842	85.1781	7.2454	55	81	85	90	109
Acquirer FCF	842	0.0610	0.0796	-0.2957	0.0104	0.0665	0.1097	0.2615
Acquirer MTB	842	3.9696	4.6066	0.2369	1.6761	2.5642	4.1488	28.9669
Acquirer Size	842	3.6353	0.8466	1.5927	3.0499	3.6545	4.2207	5.4352
Acquirer Leverage	842	0.1763	0.1685	0	0.0371	0.1396	0.2568	0.7455
Acquirer Analyst	842	14.234	10.4263	0	6	12	21	54
Acquirer Stock Return	842	0.0962	0.2665	-0.4584	-0.0534	0.0586	0.2050	1.2178
Target MTB	842	2.9967	4.7815	-11.9988	1.1784	1.9640	3.3991	33.784
Relative Size	842	0.2996	0.4691	0.0009	0.0318	0.1211	0.3766	3.1221
Target Leverage	842	0.1457	0.1998	0	0.0002	0.0568	0.2164	0.9097
Target Analyst	842	6.5404	6.8583	0	2	4	9	44
Target Sales Growth	842	0.2035	0.6336	-0.6146	-0.0198	0.0799	0.2276	4.7710
Target R&D	842	0.0721	0.1183	0	0	0	0.1055	0.5975
Target High Tech	842	0.2470	0.4315	0	0	0	0	1
Intra-industry	842	0.6805	0.4666	0	0	1	1	1
Same State	842	0.2542	0.4356	0	0	0	1	1
Cash Only	842	0.5024	0.5003	0	0	1	1	1
Stock Only	842	0.2542	0.4356	0	0	0	1	1

<sup>4</sup>We use two-digit SIC code at the target level reported in Thomson Reuters' EIKON database to control for industry effects.

Table 1 provides variables' definitions. Table 2 reports summary statistics for the variables representing acquirer, target, and takeover transactions in our sample.

## IV. Results

### Results from the main analysis

Table 3 reports the main estimation results of Equation (1). Given our concern regarding multicollinearity in our regression models, we examined

the variance inflation factor (VIF). We include maximum VIFs for each model at the bottom of the regression table. All VIFs are within the acceptable range. The highest VIF is 3.05, which is well below the conventional rule of thumb of 10 (Neter et al. 1996) and a more conservative factor of 5. Therefore, multicollinearity appears not to be a concern in our results. The dependent variable is premium in Models 1–3, and the target five-day CAR in Models 4–6.

While our Hypothesis 1 posits that a target firm with less readable annual reports receives

**Table 3.** The impact of target annual report readability on premium and target 5-day CAR.

	Dependent Variable = Premium			Dependent Variable = Target 5-day CAR		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Constant	0.2204 (0.1730)	0.5054** (0.0103)	0.3119 (0.1511)	-0.0372 (0.7645)	0.2678* (0.0746)	0.1126 (0.4982)
Log (Gross File Size in Megabyte)	-0.0423** (0.0353)		-0.0401** (0.0486)	-0.0364** (0.0291)		-0.0330** (0.0493)
Bog Index		-0.0022 (0.3507)	-0.0014 (0.5601)		-0.0029* (0.0902)	-0.0023 (0.1816)
Acquirer FCF	-0.081 (0.7268)	-0.0876 (0.7079)	-0.08 (0.7311)	0.0555 (0.6816)	0.0503 (0.7080)	0.0566 (0.6732)
Acquirer MTB	0.0068** (0.0391)	0.0066** (0.0470)	0.0069** (0.0381)	0.0024 (0.2363)	0.0023 (0.2760)	0.0025 (0.2216)
Acquirer Size	0.0479* (0.0703)	0.0414 (0.1163)	0.0487* (0.0681)	0.0430** (0.0365)	0.0389* (0.0574)	0.0448** (0.0308)
Acquirer Leverage	-0.1972** (0.0121)	-0.1868** (0.0182)	-0.1972** (0.0121)	-0.0409 (0.4623)	-0.0338 (0.5404)	-0.042 (0.4484)
Acquirer Analyst	-0.0036** (0.0479)	-0.0033* (0.0631)	-0.0035** (0.0487)	-0.0013 (0.3281)	-0.0011 (0.4200)	-0.0013 (0.3426)
Acquirer Stock Return	-0.0318 (0.5527)	-0.0334 (0.5321)	-0.0308 (0.5646)	-0.0620** (0.0297)	-0.0625** (0.0259)	-0.0605** (0.0325)
Target MTB	-0.0111*** (0.0000)	-0.0108*** (0.0000)	-0.0111*** (0.0000)	-0.0047** (0.0303)	-0.0045** (0.0378)	-0.0048** (0.0284)
Relative Size	-0.0381 (0.1582)	-0.0436 (0.1093)	-0.0362 (0.1834)	-0.0457** (0.0111)	-0.0483*** (0.0081)	-0.0418** (0.0214)
Target Leverage	0.1984*** (0.0083)	0.1891** (0.0123)	0.1994*** (0.0080)	0.1045 (0.1218)	0.0979 (0.1489)	0.1065 (0.1150)
Target Analyst	-0.0022 (0.2936)	-0.0027 (0.1893)	-0.0021 (0.3047)	-0.0027 (0.1217)	-0.0032* (0.0634)	-0.0026 (0.1306)
Target Sales Growth	0.0097 (0.7488)	0.0119 (0.6936)	0.0103 (0.7337)	-0.0137 (0.3099)	-0.0115 (0.3820)	-0.0129 (0.3341)
Target R&D	0.7508*** (0.0000)	0.7893*** (0.0000)	0.7693*** (0.0000)	0.7069*** (0.0000)	0.7511*** (0.0000)	0.7371*** (0.0000)
Target High Tech	-0.0524 (0.3227)	-0.0485 (0.3632)	-0.0527 (0.3197)	-0.0961** (0.0108)	-0.0946** (0.0123)	-0.0975*** (0.0097)
Intra-industry	0.0151 (0.5755)	0.0107 (0.6903)	0.0141 (0.5997)	0.0189 (0.3693)	0.0155 (0.4669)	0.0179 (0.3980)
Same State	0.0215 (0.4103)	0.0238 (0.3663)	0.022 (0.3991)	0.0163 (0.3870)	0.0201 (0.2878)	0.0177 (0.3481)
Cash Only	0.0595* (0.0810)	0.0644* (0.0580)	0.0594* (0.0817)	0.0786*** (0.0007)	0.0818*** (0.0004)	0.0784*** (0.0008)
Stock Only	0.0171 (0.6337)	0.0196 (0.5885)	0.0177 (0.6229)	-0.0034 (0.8789)	-0.0026 (0.9097)	-0.003 (0.8947)
Industry Effect	Yes	Yes	Yes	Yes	Yes	Yes
Year Effect	Yes	Yes	Yes	Yes	Yes	Yes
Observations	835	835	835	842	842	842
Adjusted R <sup>2</sup>	0.1469	0.143	0.1462	0.2188	0.216	0.2195
F Statistic	2.5283***	2.4806***	2.5032***	3.5059***	3.4656***	3.4901***
Maximum VIF	2.96	1.93	3	3.01	1.94	3.05

The dependent variable in Models 1–3 is the premium and is target 5-day CAR in Models 4–6. All the continuous variables are winsorized at the 1st and 99th percentile. The symbols \*, \*\*, \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively. t-statistics are calculated using White heteroscedasticity-consistent standard errors. p-values are presented in parentheses.

a relatively lower takeover premium, our Hypothesis 2 contends shareholders of a target firm with less readable annual reports experience a relatively lower return around the takeover announcement. Consistent with these conjectures, the gross file size exhibits a significant and negative relationship with both premium and target's five-day CAR (Models 1 and 4). From an economic perspective, the result suggests that, *ceteris paribus*, one standard deviation increase in the gross file size of the target's annual report is associated with a 3.01% (2.59%) decrease in premium (five-day CAR), which is substantially large. The coefficient for the Bog index is negative, but insignificant in the premium projection (Model 2) and only marginally significant in the announcement return estimation (Model 5). In Models 3 and 6, we employ both measures of readability simultaneously. The coefficient for the gross file size consistently stands out as negative and significant. One possible explanation for the limited impact of the Bog index coefficient, particularly in the case of premium, could be attributed to the Bog index primarily capturing linguistic aspects of disclosures, such as factors like sentence length, passive voice usage, weak verb usage, overused words, complex words, and jargon. These aspects might not pose significant challenges for acquirers to comprehend the reports. In contrast, File size, encompassing the entirety of annual reports, may contain more pertinent information valuable to acquirers, which is not encompassed within the Bog index. Our findings also support this argument, as they indicate that while the File size plays a significant role in predicting our dependent variables, the Bog index only proves relevant in the context of announcement returns. This suggests that market participants, who may struggle to understand annual reports characterized as having poor readability according to the Bog index, might be the ones reacting to this index. Overall, the results are in line with our predictions: target firms with less readable annual reports receive a lower premium and earn lower abnormal returns upon the deal announcement. In other words, less readable annual reports derive a negative reaction from both informed and uninformed investors.

Our Hypothesis 3 (Hypothesis 4) posits that the association observed between the low readability of

target annual report and the takeover premium (target announcement returns) is stronger in inter-industry takeover deals where the information asymmetry problem could be more severe. To test this conjecture, we segment our sample into subsamples of inter- and intra-industry takeovers based on the two-digit SIC codes. The estimation results reported in Tables 4 and 5 show that the association between low financial disclosure readability and firm valuation (as measured by takeover premium and target's five-day CAR) is linked to inter-industry rather than intra-industry deals where adverse selection problem is accentuated. Furthermore, the results indicate a stronger effect for the case of target's five-day CAR, in which both gross file size and Bog index carry negative and significant coefficients, thus suggesting that uninformed investors discount the opaque target more aggressively.

### **Robustness tests**

We further perform multiple supplemental tests to assess the robustness of our findings. First, as the association between disclosure readability and firm valuation in the takeover context may be driven by firm-level characteristics, we employ propensity score matching methodology to address this concern. We estimate the Average Treatment Effect on the Treated on groups of comparable targets along observable dimensions but dissimilar with regard to the disclosure readability (treatment effect). Following Rjiba et al. (2021), we create a dummy variable that takes the value of one if the log file size (Bog index) is above the sample median and zero otherwise. We consider targets with the log file size (Bog index) above the sample median as our treatment group and those with the log file size (Bog index) below the sample median as our control group. Next, we estimate propensity scores using a logistic model that regresses the disclosure readability measure on a set of observable variables at the target level as follows: market to book ratio, size, leverage ratio, analyst coverage, sales growth, R&D expenditure, and being in the high-tech industry. We then extract the predicted probability from the logit model, perform a one-to-one match with replacement, and retain matches that

**Table 4.** The impact of target annual report readability on premium in intra-industry versus inter-industry deals.

	Dependent Variable = Premium					
	Intra-industry Deals			Inter-industry Deals		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Constant	0.3545* (0.0653)	0.3863 (0.1452)	0.2854 (0.2951)	0.0572 (0.8185)	0.7189** (0.0191)	0.3412 (0.3260)
Log (Gross File Size in Megabyte)	-0.0363 (0.1569)		-0.0379 (0.1427)	-0.0820** (0.0119)		-0.0752** (0.0227)
Bog Index		0.0001 (0.9749)	0.0009 (0.7486)		-0.0058 (0.1456)	-0.0047 (0.2431)
Acquirer FCF	-0.3006 (0.2662)	-0.319 (0.2446)	-0.3079 (0.2604)	0.3511 (0.4072)	0.3355 (0.4196)	0.2758 (0.5058)
Acquirer MTB	0.0119*** (0.0079)	0.0117*** (0.0090)	0.0119*** (0.0078)	0.0027 (0.4819)	0.0024 (0.5395)	0.0027 (0.4831)
Acquirer Size	0.0850** (0.0178)	0.0790** (0.0251)	0.0851** (0.0173)	-0.0027 (0.9463)	-0.009 (0.8250)	0.0067 (0.8705)
Acquirer Leverage	-0.3141*** (0.0011)	-0.3135*** (0.0012)	-0.3149*** (0.0011)	0.091 (0.5385)	0.0996 (0.5100)	0.0827 (0.5778)
Acquirer Analyst	-0.0054** (0.0302)	-0.0053** (0.0341)	-0.0054** (0.0280)	0.0005 (0.8682)	0.0011 (0.7122)	0.0007 (0.8095)
Acquirer Stock Return	-0.0462 (0.4798)	-0.0514 (0.4286)	-0.0468 (0.4727)	0.0243 (0.7861)	0.0495 (0.5761)	0.0284 (0.7488)
Target MTB	-0.0105*** (0.0006)	-0.0103*** (0.0008)	-0.0105*** (0.0006)	-0.0186*** (0.0000)	-0.0183*** (0.0000)	-0.0193*** (0.0000)
Relative Size	-0.0386 (0.2451)	-0.0461 (0.1692)	-0.0391 (0.2436)	0.0093 (0.8767)	0.0047 (0.9347)	0.0288 (0.6306)
Target Leverage	0.2760*** (0.0075)	0.2650** (0.0104)	0.2770*** (0.0073)	0.1393 (0.2054)	0.1593 (0.1561)	0.1614 (0.1467)
Target Analyst	-0.0048** (0.0422)	-0.0054** (0.0259)	-0.0049** (0.0405)	0.0014 (0.7328)	0.0002 (0.9583)	0.0013 (0.7364)
Target Sales Growth	-0.0039 (0.9229)	-0.0035 (0.9301)	-0.0043 (0.9156)	0.0386 (0.4282)	0.0449 (0.3408)	0.0429 (0.3732)
Target R&D	0.6937*** (0.0022)	0.7023*** (0.0024)	0.6809*** (0.0032)	0.7704*** (0.0036)	0.8593*** (0.0022)	0.8323*** (0.0022)
Target High Tech	-0.0421 (0.5773)	-0.043 (0.5716)	-0.0406 (0.5905)	-0.0889 (0.2618)	-0.0595 (0.4509)	-0.0782 (0.3224)
Same State	0.0141 (0.6457)	0.0157 (0.6146)	0.014 (0.6470)	0.0278 (0.5685)	0.0387 (0.4312)	0.0325 (0.5107)
Cash Only	0.0581 (0.1637)	0.0651 (0.1146)	0.0584 (0.1623)	0.0849 (0.1743)	0.0891 (0.1684)	0.0936 (0.1416)
Stock Only	0.0396 (0.3380)	0.046 (0.2709)	0.0398 (0.3357)	-0.0208 (0.7455)	-0.023 (0.7290)	-0.007 (0.9146)
Industry Effect	Yes	Yes	Yes	Yes	Yes	Yes
Year Effect	Yes	Yes	Yes	Yes	Yes	Yes
Observations	568	568	568	267	267	267
Adjusted R <sup>2</sup>	0.1513	0.1477	0.1498	0.1618	0.1529	0.1621
F Statistic	2.2330***	2.1985***	2.2032***	1.6260***	1.5856***	1.6200***
Maximum VIF	3.04	2.12	3.1	3.43	2.07	3.47

The dependent variable in all Models is the premium. All the continuous variables are winsorized at the 1st and 99th percentile. The symbols \*, \*\*, \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively. t-statistics are calculated using White heteroscedasticity-consistent standard errors. p-values are presented in parentheses.

are within a small caliper distance of 0.01. Results from this analysis are reported in Table 6. Our findings support the rationale that, after balancing the key covariates, targets with less readable annual reports receive lower bids and earn lower announcement returns relative to comparable targets with better annual report readability, which is more pronounced in inter-industry rather than intra-industry deals. In addition, unreported results demonstrate the success of the matching in balancing the key covariates in the analysis. More specifically, most of the differences in

means of the covariates between the treated and control group appear statistically insignificant after matching.

Second, several studies highlighted the fact that 10-K file size has been increasing over time (C. Kim, Wang, and Zhang 2019; Li 2008; Loughran and McDonald 2014). This can be partially attributed to the introduction of eXtensible Business Reporting Language (XBRL). Although implementing XBRL may lead to larger file sizes, it can effectively simplify the process of gathering and managing



**Table 5.** The impact of target annual report readability on target 5-day CAR in intra-industry deals versus inter-industry deals.

	Dependent Variable = Target 5-day CAR					
	Intra-industry Deals			Inter-industry Deals		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Constant	0.0798 (0.4941)	0.1679 (0.3400)	0.0982 (0.5915)	-0.1096 (0.4942)	0.6651*** (0.0018)	0.2886 (0.2392)
Log (Gross File Size in Megabyte)	-0.028 (0.1917)		-0.0276 (0.2002)	-0.0834*** (0.0039)		-0.0739** (0.0117)
Bog Index		-0.0008 (0.6950)	-0.0003 (0.9032)		-0.0077** (0.0152)	-0.0066** (0.0399)
Acquirer FCF	-0.0641 (0.7043)	-0.0662 (0.6904)	-0.0626 (0.7071)	0.2298 (0.4038)	0.1506 (0.5801)	0.1381 (0.6013)
Acquirer MTB	0.0045* (0.0747)	0.0043* (0.0868)	0.0045* (0.0735)	0.0025 (0.3909)	0.0022 (0.4677)	0.0023 (0.4344)
Acquirer Size	0.0532* (0.0554)	0.0491* (0.0718)	0.0532* (0.0556)	0.0364 (0.2311)	0.0344 (0.2562)	0.0508* (0.0930)
Acquirer Leverage	-0.1131 (0.1136)	-0.1119 (0.1153)	-0.113 (0.1135)	0.0162 (0.8913)	0.013 (0.9133)	-0.001 (0.9932)
Acquirer Analyst	-0.0021 (0.2725)	-0.002 (0.3063)	-0.0021 (0.2712)	0.0003 (0.9130)	0.0009 (0.7122)	0.0005 (0.8393)
Acquirer Stock Return	-0.0618* (0.0754)	-0.0645* (0.0578)	-0.0616* (0.0748)	0.0365 (0.5414)	0.0607 (0.2956)	0.0391 (0.5131)
Target MTB	-0.0025 (0.2517)	-0.0023 (0.2826)	-0.0025 (0.2504)	-0.0141*** (0.0007)	-0.0141*** (0.0010)	-0.0149*** (0.0005)
Relative Size	-0.0439* (0.0578)	-0.0490** (0.0350)	-0.0437* (0.0607)	-0.0239 (0.4997)	-0.0201 (0.5605)	0.0034 (0.9244)
Target Leverage	0.1302* (0.0972)	0.121 (0.1272)	0.1300* (0.0981)	0.076 (0.5464)	0.1001 (0.4377)	0.1041 (0.4139)
Target Analyst	-0.0025 (0.2186)	-0.0029 (0.1435)	-0.0024 (0.2205)	-0.0041 (0.1751)	-0.0053* (0.0827)	-0.0042 (0.1632)
Target Sales Growth	-0.0135 (0.4243)	-0.0126 (0.4497)	-0.0134 (0.4277)	0.0158 (0.6254)	0.025 (0.4307)	0.0175 (0.5970)
Target R&D	0.6365*** (0.0011)	0.6529*** (0.0014)	0.6399*** (0.0016)	0.7697*** (0.0012)	0.8816*** (0.0005)	0.8535*** (0.0004)
Target High Tech	-0.0945** (0.0139)	-0.0975** (0.0126)	-0.0950** (0.0154)	-0.1327** (0.0453)	-0.1015 (0.1390)	-0.1178* (0.0726)
Same State	0.0296 (0.1800)	0.0318 (0.1576)	0.0297 (0.1791)	-0.0147 (0.6938)	-0.0001 (0.9989)	-0.0076 (0.8377)
Cash Only	0.0783*** (0.0098)	0.0821*** (0.0058)	0.0781** (0.0102)	0.0983*** (0.0100)	0.1069*** (0.0057)	0.1116*** (0.0039)
Stock Only	0.0087 (0.7448)	0.0113 (0.6722)	0.0085 (0.7472)	0.0023 (0.9628)	0.0087 (0.8647)	0.0262 (0.6071)
Industry Effect	Yes	Yes	Yes	Yes	Yes	Yes
Year Effect	Yes	Yes	Yes	Yes	Yes	Yes
Observations	573	573	573	269	269	269
Adjusted R <sup>2</sup>	0.1985	0.1952	0.1969	0.2718	0.2675	0.2813
F Statistic	2.7278***	2.6916***	2.6897***	2.2199***	2.1933***	2.2640***
Maximum VIF	3.08	2.12	3.14	3.47	2.08	3.51

The dependent variable in all Models is target 5-day CAR. All the continuous variables are winsorized at the 1st and 99th percentile. The symbols \*, \*\*, \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively. t-statistics are calculated using White heteroscedasticity-consistent standard errors. p-values are presented in parentheses.

information (C. Kim, Wang, and Zhang 2019). To address this concern and check if our results are influenced by the implementation of XBRL, we conduct an additional analysis in which we control for XBRL characters in 10-K files. The data for this variable was gathered from the Loughran and McDonald data set. The result of this supplementary analysis is reported in Table 7 of the manuscript and confirms our earlier findings. More specifically, our results suggest that both acquirers and the market discount opaque targets, especially in inter-industry

acquisitions, where adverse selection is more severe compared to intra-industry deals.

Third, we employ alternative measures for our two dependent variables to examine how sensitive our results are to the choice of the measures. More specifically, we use the target stock price one week prior to the takeover announcement to compute the premium and employ the target's three-day CAR to capture the target's economic benefit from the takeover announcement. Fourth, we use industry classification based on three-digit and four-digit SIC codes to divide our sample into inter- and intra-

**Table 6.** Propensity score matching analyses.

Premium as Dependent Variable		Full sample	Intra-industry	Inter-industry
<i>Panel A: File Size Analyses</i>				
	Matching algorithm	Caliper	Caliper	Caliper
	Caliper	0.01	0.01	0.01
	Matched observations per treated firm	1:1	1:1	1:1
	Original number of observations	835	568	267
	Original number of treated observations	416	284	133
	Matched number of observations	312	191	76
	Average treatment effect on the treated (Abadie and Imbens 2006) standard errors	-0.0579**	-0.0623**	-0.1422***
		0.0234	0.0303	0.0383
Target 5-day CAR as Dependent Variable				
	Matching algorithm	Caliper	Caliper	Caliper
	Caliper	0.01	0.01	0.01
	Matched observations per treated firm	1:1	1:1	1:1
	Original number of observations	842	573	269
	Original number of treated observations	421	286	134
	Matched number of observations	304	191	62
	Average treatment effect on the treated (Abadie and Imbens 2006) standard errors	-0.0151	-0.0037	-0.0701***
		0.0172	0.0218	0.0199
<i>Panel B: Bog Index Analyses</i>				
Premium as Dependent Variable				
	Matching algorithm	Caliper	Caliper	Caliper
	Caliper	0.01	0.01	0.01
	Matched observations per treated firm	1:1	1:1	1:1
	Original number of observations	835	568	267
	Original number of treated observations	385	252	133
	Matched number of observations	287	169	73
	Average treatment effect on the treated (Abadie and Imbens 2006) standard errors	0.0061	0.0707**	-0.0916***
		0.0220	0.0280	0.0287
Target 5-day CAR as Dependent Variable				
	Matching algorithm	Caliper	Caliper	Caliper
	Caliper	0.01	0.01	0.01
	Matched observations per treated firm	1:1	1:1	1:1
	Original number of observations	842	573	269
	Original number of treated observations	392	258	134
	Matched number of observations	297	167	71
	Average treatment effect on the treated (Abadie and Imbens 2006) standard errors	-0.0256	0.0209	-0.0559**
		0.0197	0.0206	0.0249

This table reports the estimation of the average treatment effect on the treated using propensity score matching method. The symbols \*, \*\*, \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively.

industry deals. Fifth, the results of the study might be biased by a particular firm's behaviour characterizing the period of economic distress. To address this concern, we exclude takeovers announced during the December 2007 to June 2009 financial crisis (according to the National Bureau of Economic Research). In addition, as financial firms follow different reporting policies and are subject to different regulations, the results of the study could likely be biased by the inclusion of financial firms. To control for such issues, we exclude transactions in which either acquirer or target belongs to the financial industry (SIC codes 6000–6999). Running these extra analyses, we obtain qualitatively consistent results.<sup>5</sup> Lastly, we examine whether the annual report readability at the target level has any influence

on the acquirer shareholders' gain around the takeover announcement date. Unlike Balachandran et al. (2022), in unreported results, we find no association between target annual report readability and acquirer returns around the takeover announcement date which could be due to different sample sizes.

## V. Conclusion

We study the effect of target's annual report readability on the premium paid in takeovers and the wealth effect experienced by target shareholders around the deal announcement. We find evidence that targets with less readable annual reports receive a lower premium and realize lower returns upon the announcement of a takeover. These

<sup>5</sup>These robustness check results are not reported but are available upon request.

**Table 7.** Controlling for the effect of XBRL.

Dependent Variable	Premium		Target 5-day CAR	
	Intra-industry deals	Inter-industry deals	Intra-industry deals	Inter-industry deals
Constant	Model 1 0.3601* (0.0609)	Model 2 0.055 (0.8273)	Model 3 0.0924 (0.4272)	Model 4 -0.1265 (0.4290)
Log (Gross File Size Megabyte)	-0.0232 (0.4657)	-0.0830** (0.0321)	-0.0047 (0.8532)	-0.0904*** (0.0024)
Log (XBRL chars)	-0.0066 (0.2578)	0.0007 (0.9443)	-0.0119** (0.0158)	0.0047 (0.6349)
Acquirer FCF	-0.3091 (0.2537)	0.3493 (0.4164)	-0.0738 (0.6634)	0.2247 (0.4114)
Acquirer MTB	0.0119*** (0.0079)	0.0027 (0.4819)	0.0044* (0.0837)	0.0024 (0.3973)
Acquirer Size	0.0846** (0.0184)	-0.0027 (0.9468)	0.0518* (0.0628)	0.0368 (0.2255)
Acquirer Leverage	-0.3127*** (0.0011)	0.0904 (0.5445)	-0.1128 (0.1120)	0.0123 (0.9173)
Acquirer Analyst	-0.0054** (0.0295)	0.0005 (0.8741)	-0.0022 (0.2646)	0.0001 (0.9571)
Acquirer Stock Return	-0.0485 (0.4593)	0.0241 (0.7889)	-0.0664* (0.0562)	0.0347 (0.5657)
Target MTB	-0.0105*** (0.0006)	-0.0186*** (0.0000)	-0.0025 (0.2420)	-0.0142*** (0.0007)
Relative Size	-0.0383 (0.2496)	0.009 (0.8800)	-0.0434* (0.0611)	-0.0257 (0.4648)
Target Leverage	0.2765*** (0.0073)	0.1393 (0.2054)	0.1303* (0.0963)	0.0759 (0.5458)
Target Analyst	-0.0048** (0.0424)	0.0014 (0.7347)	-0.0024 (0.2304)	-0.004 (0.1999)
Target Sales Growth	-0.0041 (0.9186)	0.0385 (0.4307)	-0.0127 (0.4664)	0.0145 (0.6581)
Target R&D	0.6952*** (0.0022)	0.7703*** (0.0036)	0.6387*** (0.0009)	0.7691*** (0.0012)
Target High Tech	-0.0488 (0.5224)	-0.089 (0.2619)	-0.1055*** (0.0072)	-0.1327** (0.0452)
Same State	0.0143 (0.6407)	0.0279 (0.5669)	0.0301 (0.1733)	-0.0138 (0.7130)
Cash Only	0.0591 (0.1570)	0.0853 (0.1808)	0.0796*** (0.0085)	0.1006*** (0.0082)
Stock Only	0.0387 (0.3495)	-0.0202 (0.7570)	0.0073 (0.7826)	0.0066 (0.8959)
Industry Effect	Yes	Yes	Yes	Yes
Year Effect	Yes	Yes	Yes	Yes
Observations	568	267	573	269
Adjusted R <sup>2</sup>	0.151	0.1572	0.2049	0.2686
F Statistic	2.2153***	1.5977***	2.7761***	2.1857***
Maximum VIF	3.96	5.03	3.97	5.07

The dependent variable is *Premium* in Models 1–2 and *Target 5-day CAR* in Models 3–4. *Log (XBRL chars)* is the log of the total number of characters attributable to XBRL encoding in 10-K files. All the continuous variables are winsorized at the 1<sup>st</sup> and 99<sup>th</sup> percentile. The symbols \*, \*\*, \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively. t-statistics are calculated using White heteroscedasticity-consistent standard errors. p-values are presented in parentheses.

findings suggest that both acquirers as relatively informed investors and the market participants as relatively uninformed investors discount opaque targets. Furthermore, we make a differentiation between transaction categories, specifically distinguishing between intra-industry and inter-industry deals. Our analysis reveals that the observed associations predominantly manifest in inter-industry transactions, where the challenge of adverse selection is notably more pronounced.

Our study extends the literature examining the economic consequences of firm annual report readability (see e.g. Bonsall and Miller

2017; Ertugrul et al. 2017; Loughran and McDonald 2011, 2013, 2014; Rjiba et al. 2021) by investigating its implications in the context of takeovers, an area where the value implications of annual reports readability has received little attention (Balachandran et al. 2022; Chircop and Tarsalewska 2020). Our findings indicate that aside from ineffective communication of value-relevant information, shareholders of a firm with less readable annual reports experience a reduction in wealth in the form of decreased premiums and announcement returns in takeover scenarios. Thus, our study

advances understanding of the association between corporate disclosures' readability and informationally demanding investment decisions made by firms, takeovers.

Our results have important managerial implications and highlight the fact that managers should prioritize improving the readability and comprehensibility of their annual reports to enhance shareholder understanding and confidence. When shareholders have confidence in the firm's financial standing and strategy cultivated through higher transparency in business disclosures, they may be more inclined to participate and endorse an acquisition. This could elevate the transaction's value and lead to greater returns for shareholders. Shareholders should also recognize the potential downside of their firms producing less readable annual reports, as it increases the likelihood of receiving lower premiums and experiencing lower announcement returns in the event of an acquisition. Moreover, our study offers policymakers insights into the importance of annual report readability for firms' investment decisions and underscores its broader implications for market integrity and investor protection. It aligns with the SEC's emphasis on transparent information delivery. Despite regulatory initiatives like the SEC's Plain English Rule (Securities and Exchange Commission 1998), our results reveal that both informed and less informed investors are influenced by the low readability of business disclosures. This highlights the ongoing challenges in policymaking in ensuring that financial information is not only accessible but also comprehensible to all investors, regardless of their level of expertise or familiarity with financial reporting.

Although our study provides novel insights into the value implications of annual report readability in takeovers, it is limited in that it is focused on US firms. While accounting regulations and the requirement for transparent business disclosures are converging internationally, there are still differences across countries. Therefore, it would be interesting to investigate this issue in an international setting. Moreover, it would be worthwhile to explore the impact of the textual properties of the acquirer firm's annual reports on a takeover transaction.

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