

Fighting through the Flesch and Fog: the readability of risk disclosures

Fighting
through the
Flesch and Fog

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Received 29 March 2023
Revised 20 June 2023
25 August 2023
10 October 2023
Accepted 2 November 2023

Abstract

Purpose – The purpose of this study is to evaluate whether the amendments to International Accounting Standard (IAS) 39 and the introduction of International Financial Reporting Standards (IFRS) 9 enhanced the readability, and thus the quality and usefulness of risk disclosure information.

Design/methodology/approach – Readability analyses are performed on companies listed on the Johannesburg Stock Exchange (JSE) from 2005 to 2021. The sample period includes the period when companies disclosed information according to IAS 39 (2005–2017) and IFRS 9 (2018–2021).

Findings – The results of the analyses show risk disclosures for JSE-listed companies to be complex and difficult to understand. Furthermore, risk disclosures have become longer and less readable with the introduction of amendments to IAS 39 and the introduction of IFRS 9.

Research limitations/implications – This study uses readability measures as a proxy for the complexity and usefulness of risk disclosures. The amount of utility a user of financial statements derives could be dependent on other factors such as the quality of disclosure, individual user background and perceptions.

Practical implications – The results have valuable implications for the various stakeholders that make use of the information contained in financial statements. Stakeholders such as regulators and standard setters should carefully assess how accounting standards change to ensure that one of the key objectives of the IASB, namely, to provide information that is relevant, reliable and understandable, is met.

Originality/value – The results of this study contribute to the discourse on the usefulness of companies' risk disclosures. Though, to the best of the authors' knowledge, this is the first study to compare the readability of risk disclosures from an emerging market perspective, the results can be applied to other countries using IFRS to assess the readability of risk disclosures.

Keywords Complexity, Derivatives, Disclosure, Risk disclosures, Readability

Paper type Research paper

1. Introduction

Accounting standards guide financial instrument and risk disclosures, but the effects of changes, such as the 2018 adoption of International Financial Reporting Standards (IFRS) 9: Financial Instruments in South Africa to address complex risk issues under International Accounting Standard (IAS) 39: Financial Instruments: Recognition and Measurement, remain unclear (Helliard *et al.*, 2004; Huian, 2012; Gornjak, 2017; Morais, 2020).



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Accounting Research Journal
Vol. 37 No. 1, 2024
pp. 39-56
Emerald Publishing Limited
1030-9616
DOI 10.1108/ARJ-03-2023-0094

IFRS 9 was introduced partly to address the financial instabilities caused by the complexities of IAS 39 (Onali and Ginesti, 2014). A poll investigating the implementation of IFRS by European Union (EU) corporations identified IAS 39 as one of the most complex standards for financial instruments (Jermakowicz and Gornik-Tomaszewski, 2006). IAS 39 faced particular criticism for credit loss measurement problems (Gebhardt, 2012; Gornjak, 2017) and being rules-based rather than principles-based (Morais, 2020), but research on the impact of the new disclosure requirements is limited.

IAS 39 and IFRS 9 prescribe the disclosure requirements for financial instruments. Accounting standards aim to enhance financial statements' relevance, reliability, and comparability (Schipper, 2003; Schipper and Vincent, 2003). Misinterpretation of risks can have serious consequences, as evidenced during the 2008/2009 financial crisis. Investors struggled to fully comprehend the inherent risks of complex financial instruments, and the lack of transparency of the disclosures made it difficult for investors to properly assess those risks, leading to serious financial losses (Jickling, 2009; Barth and Landsman, 2010). Subsequent calls have highlighted the need to improve risk disclosure regulation to enhance quality and reduce information asymmetry by having more detailed and uniform disclosures (Campbell, 2015; Campbell *et al.*, 2015). The qualitative nature of reporting quality, however, makes disclosure usefulness (or utility) difficult to measure (Hairston and Brooks, 2019). This study uses readability tests to assess IAS 39 and IFRS 9's effectiveness in reducing the complexity of risk disclosures, thereby increasing their quality and usefulness.

Readability is vital for assessing information quality and utility. The reliability of disclosures informs decisions (Lawrence, 2013) and helps avoid hiding unfavourable information (Gosselin *et al.*, 2021). Annual reports are crucial for stakeholder engagement (Patten, 1991; Wilmschurst and Frost, 2000) and must be understandable for investors, analysts, auditors, and creditors (Miller, 2010; You and Zhang, 2009; Lehavy *et al.*, 2011; Abernathy *et al.*, 2019; Chen and Tseng, 2021). If accounting standards or disclosures are too complex to read and understand, they fail one of their primary objectives.

Tahat *et al.* (2019) highlighted in a meta-study that risk disclosure studies are mostly limited to developed markets. Analysing disclosures from an emerging market such as South Africa can contribute to a broader understanding of the international financial environment and address this limitation in the research. South Africa was an early adopter of IFRS, with the Johannesburg Stock Exchange (JSE) requiring all listed companies to be in full compliance with IFRS since 2005 (Sellami and Fendri, 2017). South Africa also compares well internationally in terms of reporting quality of financial statements (Ames, 2013).

Several studies suggest the IASB's new standards have improved financial instrument risk disclosures (Bischof, 2009; Zhang, 2009; Ahmed *et al.*, 2011; Tahat *et al.*, 2016), while others argue they negatively affected information usefulness (Gebhardt, 2012; Morais, 2020). Tahat *et al.* (2019) note that existing studies on risk disclosures predominantly use disclosure indexes (Thai and Birt, 2019; Potin *et al.*, 2016) or interviews, surveys, and questionnaires (Malaquias and Zambra, 2019) to investigate disclosure usefulness. In contrast, our paper uses readability tests to broaden the scope of analysis.

Our findings indicate that the amendments to IAS 39 and the introduction of IFRS 9 did not improve the readability of risk disclosures. This has important implications for accounting regulators and standard setters, who should reflect on the complexity of disclosure requirements. Likewise, companies should strive to disclose information that is relevant, reliable, and understandable to make it useful for decision-making.

The rest of the paper is structured as follows: the next section provides an overview of the relevant literature and the hypothesis development. Thereafter follows a discussion of the data and methodology used in the study, as well as the data analysis and results. We finally discuss our results and contribution in the concluding section and offer recommendations for further studies.

2. Literature review and hypothesis development

2.1 Complexity of risk disclosures

The derivatives market has experienced significant growth in recent years, necessitating proper disclosure of risk and risk management in financial statements (Abdel-Khalik and Chen, 2015; Ehlers and Packer, 2013). The demand for enhanced risk reporting stems from the belief that it can improve stakeholders' understanding of business risks, promote effective resource allocation and enhance stewardship (ICAEW, 2011).

Complexity, from the perspective of reporting users, refers to the difficulty in comprehending the translation of economic activities and reporting requirements into financial statements (Chang *et al.*, 2016). Several researchers have highlighted the complexity of risk disclosures specifically (Chang *et al.*, 2016; Huang and Gao, 2014; Jermakowicz and Gornik-Tomaszewski, 2006; Onali and Ginesti, 2014; Tyrrall *et al.*, 2007; Zhang, 2009).

Chung *et al.* (2019) suggest that comprehensive and lengthy annual reports provide value-relevant data for efficient information price discovery and investor evaluation. However, the length and complexity of disclosures can impact the readability of financial reports (Cheung and Lau, 2016), with the need for transparency often driving the length of financial reports. It is possible that, because of the complexity of IFRS 9, managers disclose more information (Guay *et al.*, 2016), which could have a detrimental effect on readability.

Firms with higher readability reports tend to have lower agency costs (Luo *et al.*, 2018). More readable reports may contribute to better information transparency, lowering information asymmetry to stakeholders and allowing external stakeholders to better evaluate company insiders' behaviour. Bradley *et al.* (2021), however, found that managers may be motivated to use their judgment in estimating the fair value of unverifiable assets and liabilities, leading to more agency conflicts. Because managerial estimation is required for financial instruments disclosed under IAS 39/IFRS 9, it can increase agency costs and potentially affect the readability of risk disclosures.

The complexity of disclosure requirements can lead to incorrect application or inconsistent implementation by companies, resulting in stakeholders' incorrect assessments of a company's derivatives activities (Kawaller, 2004). This poses challenges for both financial experts (Ryan, 2012) and novice investors (Ramnath *et al.*, 2008). Investors face difficulties in evaluating corporate derivatives operations because of the complex rules for accounting and reporting the treatment of derivatives (Hodder *et al.*, 2001).

2.2 Decision-usefulness of risk disclosures

Previous studies examining the usefulness of derivative disclosures have yielded mixed and sometimes contradictory findings. The concept of usefulness lacks a formal definition in the accounting literature, but value-relevance research is a commonly used methodology to assess usefulness (Tahat *et al.*, 2019). Value relevance focuses on whether the information contained in financial statements leads to differences in how companies are valued, indicating decision-usefulness for analysts and investors (Barth *et al.*, 1996).

Surveys, questionnaires, and interviews have also been used to evaluate the value of risk disclosures. Gumb *et al.* (2018) found that corporate treasurers often express concerns about

increased earnings volatility, particularly because of the complexity of the process for qualifying financial instruments for hedge accounting under IAS 39 and IFRS 9. Similar views have been observed in Latin America, where accountants still perceive accounting for derivatives, hedge accounting, fair value measurement of financial instruments, and related disclosures as complex, in spite of extensive accounting standards in place (Malaquias and Zambra, 2019). However, Chinese institutional investors tend to believe that the information on the use of derivatives disclosed by Chinese listed companies assists them in making investment decisions (Huang and Gao, 2014).

Potin *et al.* (2016), through an analysis of accounting information quality using relevance criteria and book earnings informativeness, found a positive and significant association between accounting information relevance and the disclosure of derivatives in Brazilian companies. Thai and Birt (2019) found that financial instrument-related risk disclosures, assessed using a manually crafted disclosure index, provided meaningful information for equity investors.

Overall, the literature demonstrates varying perspectives on the usefulness of derivative disclosures, with differing findings across different markets and stakeholders.

2.3 International Accounting Standard 39 versus International Financial Reporting Standards 9

The complexities of IAS 39 (see Table 1) have led to amendments by the IASB to improve the financial reporting of derivatives (Onali and Ginesti, 2014). IFRS 9 is seen as a simplification of IAS 39, reducing the number of rules and enhancing comparability across countries (Onali and Ginesti, 2014). According to Chen *et al.* (2013), the adoption of IFRS increases information comparability and improves the efficiency of accounting information for stakeholders, ultimately enhancing the value relevance of accounting data for investment decisions.

The qualitative aspects of IFRS, including understandability, timeliness, comparability, verifiability, and reliability of accounting data, can also contribute to increased confidence in financial markets (Gornjak, 2017). CFOs generally support the simplification of accounting standards and the reduction of rules established by standard setters, as well as the convergence between IFRS and US GAAP (Dichev *et al.*, 2013).

The adoption of IFRS has increased accounting quality (Barth *et al.*, 2008). In spite of this, challenges remain. IFRS may be more complex than previous standards, and its implementation involves costs specifically regarding the complexity of reporting financial instruments (Malaquias and Zambra, 2019; Pawsey, 2017). Therefore, the IASB has implemented some responsive measures to improve the usefulness of information about financial instruments (Malaquias and Zambra, 2019). Onali and Ginesti (2014) suggest that investors have faith in IFRS 9's capacity to resolve the issues raised by the application of IAS 39.

2.4 Readability of annual reports

Loughran and McDonald (2016) define readability in the accounting context, describing it as a facet of textual analysis that assesses the reader's ability to understand the intended message and the ability of investors and analysts to extract valuation-relevant information from financial documents. Readability is crucial in enabling users to comprehend and interpret the information being conveyed (Gosselin *et al.*, 2021).

Accounting and its associated theories aim to provide relevant, transparent, and comparable information to users of financial statements. Agency theory (Jensen and Meckling, 1976) emphasises the alignment of interests between shareholders and management through financial

Accounting standard information	Key differences	Potential impact on narrative risk disclosures (readability)
Accounting basis	IAS 39 is based on rules, which could be detrimental in an environment with many new innovative instruments. IFRS 9 is principles-based, which allows for more flexibility and reduces complexity	Principles-based framework reduces complexity, thereby increasing readability (Morais, 2020)
Scope	IFRS 9 includes the same financial instruments as those included in the scope of IAS 39. However, some instruments can be subjected to the own-use exception at fair value through profit or loss (FVTPL) under IFRS 9	The own-use exception, allows for a more nuanced depiction of risk exposures associated with specific instruments. For example, the IAS 39 exception that allowed for some investments in unquoted equity instruments to be assessed at cost if their fair value could not be determined with reasonable assurance is eliminated by IFRS 9 (Huian, 2012)
Classification and measurement	Under IAS 39, financial instruments are classified into different categories, and the classification determines how they are measured and presented. IFRS 9 simplified the classification of financial assets by introducing three categories: amortised cost, fair value through other comprehensive income (FVOCI) and fair value through profit or loss (FVPL). This streamlined approach is based on the business model for managing the assets and their contractual cash flow characteristics. This change may result in reclassifications and changes in measurement for certain financial instruments	IFRS 9 introduces a new classification model for financial instruments, which is more principles-based, thereby reducing complexity and enhancing readability (Morais, 2020)
Impairment	In place of the several models used for various financial instruments under IAS 39, IFRS 9 uses a single impairment model for all financial instruments that are subject to impairment testing. IFRS 9 uses an expected credit loss (ECL) model, which requires entities to recognise impairment allowances based on expected credit losses over the life of the financial instruments, even if no loss event has occurred	The new approach under IFRS 9 can result in earlier recognition of impairment losses and a more proactive assessment of credit risk addressing the problems with the recognition and measurement of credit losses (Gebhardt, 2012; Gornjak, 2017)
Hedge accounting	IFRS 9 provides improved guidance on hedge accounting compared to IAS 39. It introduces a principles-based approach that better aligns with an institution's risk management operations. IFRS 9 expands the range of eligible hedging strategies, simplifies documentation requirements, and enhances methods for assessing hedge performance	IFRS 9 includes a more principles-based approach to hedge accounting, allowing companies to better reflect their risk management activities in their financial statements, making the information more understandable for the users of financial statements (Morais, 2020)

Sources: Adapted from Huian (2012), Gornjak (2017), Morais (2020), IAS 39 = Financial Instruments and Measurement and IFRS 9 = Financial instruments

Table 1.
Key differences
between IAS 39 and
IFRS 9

reporting, reducing information asymmetry and agency conflicts. Stakeholder theory (Freeman, 1984) expands the focus beyond shareholders, emphasising the consideration of all stakeholders' wants and needs. Financial reporting should serve the interests of stakeholders by providing pertinent, transparent, and comparable information, facilitating risk identification, and fostering accountability. Legitimacy theory (Deegan, 2002) suggests that companies strive to maintain their legitimacy by exhibiting responsibility, transparency, and adherence to reporting standards. Providing pertinent, transparent, and comparable information in financial reporting enhances a company's legitimacy.

Readability tests have been extensively applied in various studies, including the relationship between readability and current earnings and earnings persistence (Li, 2008); investors' trading behaviour (Miller, 2010; You and Zhang, 2009); analysts' following (Lehavy *et al.*, 2011); analysts' reports (De Franco *et al.*, 2015); and earnings management activities (Lo *et al.*, 2017). For example, Jia and Li (2022) found that the presence of risk management committees improved the readability of risk management disclosures for Australian companies.

The Flesch Reading Ease score, initially developed by the US Navy, measures the ease of reading a text and indicates the grade level required to comprehend it comfortably. For example, a high Flesch Reading Ease score between 90 and 100 indicates easy-to-understand text equivalent to a US 5th grade level requirement to understand the text, while a low score of 0 to 10 indicates extreme difficulty in understanding even at the university level (Flesch, 1948). The Gunning Fog Index categorises writing into readability levels, ranging from youth magazines to technical books. A higher Gunning Fog Index suggests more complex material that may require specialised knowledge or education to understand.

Few studies have specifically focused on the readability of risk disclosures. Linsley and Lawrence (2007) found that the level of readability in risk disclosures was difficult or very difficult for UK companies. Jia and Li (2022) suggested a positive association between the presence of risk committees and the readability of risk management disclosures for Australian companies.

There have not yet been studies specifically comparing the readability between IFRS 9 and IAS 39: comparing the readability of risk disclosure between two different accounting standards to evaluate whether the introduction of amendments and a new accounting standard improved the readability of risk disclosures. The amendments to IAS 39 and IFRS 9 were introduced to address the complexities identified under IAS 39 (see Table 1). The theories associated with disclosure indicate that disclosures ought to be of good quality to alleviate the agency effect, ensure stakeholders can use the information, and ensure the company maintains legitimacy. Therefore, one would expect that those amendments to accounting standards and the implementation of a new standard would improve the quality of disclosure and readability over time. Based on the theoretical foundation, as well as previous literature and our expectations of the outcome of our analyses, we developed the following hypothesis:

- H1. The introduction of amendments to IAS 39 and the transition to IFRS 9 improved the readability of risk disclosures.

3. Data and methodology

Even though considered an emerging economy, South Africa tends to perform in line with developed economies in terms of governance and disclosure quality (Du Toit and Esterhuysen, 2021). The same can be said specifically for the use of derivatives and the development of the derivatives market (Correia *et al.*, 2012; Upper and Valli, 2016).

Some 57% of listed non-financial companies made use of derivatives from 2005 to 2017 (Toerien, 2021), which compared well to 60% of developed economies (Ayadi *et al.*, 2022).

All listed EU companies are required to prepare their consolidated financial statements per IFRS for years beginning on or after 1 January 2005 (Regulation (EC) 1606/2002) (Jermakowicz and Gornik-Tomaszewski, 2006). Though IFRS were developed in advanced economies, they are also increasingly being applied in emerging market economies (Tyrrall *et al.*, 2007). This makes our sample not just comparable to other emerging market economies but also to developed markets such as European companies.

The study makes use of a purposive sampling technique, using all the companies listed on the JSE that made use of derivatives from 2005 to 2021. IAS 39 came into effect on 1 January 2005, with amendments introduced in 2008 and 2012. IFRS 9 became effective on 1 January 2018 in South Africa, replacing IAS 39 (Companies Act, 2008). The sample period thus consists of the following sub-periods (as shown in Table 2):

- 2005–2008 – IAS 39 was introduced (IASB, 2004).
- 2009–2012 – IAS 39 was amended (IASB, 2008).
- 2013–2017 – IAS 39 was further amended (IASB, 2010).
- 2018–2021 – IFRS 9 was implemented (IASB, 2014).

The subdivision not only ensures a more equal distribution between the periods but also allows the study to investigate whether the amendments to IAS 39, which were implemented to bring the standard closer to IFRS 9, improved the disclosure quality.

In the study, a sample of companies was selected based on their use of derivatives during the specified sample period. The Thomson Reuters Datastream was used to identify companies that disclosed information about derivatives in their financial statements. The annual reports in PDF format were then collected from the IRESS database, a reputable source of market data.

The IASB and IFRS do not prescribe a standardised title mandate for IAS 39/IFRS 9. We used a search function to locate the specific sections in the annual reports where risk disclosures were provided, using variations of keywords such as “risk disclosure,” “risk management,” and “derivatives”. When unsuccessful, we manually searched the reports. Companies typically address the adoption of IAS 39/IFRS 9 and provide details about the classification and measurement of financial instruments, impairments, and hedge accounting principles in the accounting policies, while the risk disclosure note to the financial statements provides in-depth explanations about the application of IAS 39/IFRS 9.

To facilitate the analysis of readability, the original PDF versions of the risk disclosure in the accounting policies and the risk disclosure note were converted into MS Word format. We used the software application “Readability Studio 2019” to evaluate the readability of

Period	No. of reports
2005–2008	189
2009–2012	355
2013–2017	518
2018–2021	480
Total	1,542

Source: Authors' compilation

Table 2.
Sample selection

the risk disclosures. This software offers multiple readability metrics, allowing for a comprehensive assessment of the entries across various pages. The use of readability software enables quick, objective, and systematic analysis of numerous entries within financial statements.

The research protocol, similar to the process followed by [Du Toit \(2017\)](#) and [Du Toit and Esterhuysen \(2021\)](#), is summarised in [Table 3](#).

The variables for readability considered in the study are presented in [Table 4](#).

The Flesch Reading Ease ([Flesch, 1948](#)) and Gunning-Fog ([Gunning, 1969](#)) measures are recommended for evaluating the readability of material that is meant for adult readers, for

Step no.	Description of the step
1	<i>Data collection</i> Extracted annual or integrated reports from the IRESS financial database
2	<i>Data selection criteria</i> Included all available annual or integrated reports from all JSE sectors from 2005 to 2021 Focused on the sections containing derivative disclosures
3	<i>Text extraction</i> The extracted text specifically related to derivative disclosures was manually copied into Word documents
4	<i>Data analysis tools</i> Used Readability Studio 2019 to measure the text according to length and various readability measures (e.g. Flesch-Kincaid, Gunning Fog)
5	<i>Measures and metrics</i> Used established readability metrics to evaluate text complexity
6	<i>Data cleaning and pre-processing</i> Conducted minimal data cleaning, apart from extracting relevant sections
7	<i>Data analysis process</i> Calculated various readability scores for each report Compared readability scores between the IAS 39 (2005–2017) and IFRS 9 (2018–2021) periods
8	<i>Data validation and reliability</i> Ensured consistency in the selection of the disclosure sections

Table 3.
Text identification and readability measurement protocol

Source: Authors' analysis

Measure	Kruskal–Wallis	df	<i>p</i> -value	Bonferroni adjustment	ϵ^2
Flesch Reading Ease	29.153	3	0.000***	0.000***	0.0170
Gunning Fog	10.042	3	0.018**	0.005**	0.0046
Total words	100.867	3	0.000***	0.000***	0.0636
% of complex words	10.096	3	0.018**	0.004**	0.0046
% of long words	8.239	3	0.041**	0.010**	0.0034
% of Fog hard words	7.201	3	0.066*	0.016**	0.0027
Overly long sentences	111.767	3	0.000***	0.000***	0.0707
Passive voice	44.058	3	0.000***	0.000***	0.0267
Wordy items	94.005	3	0.000***	0.000***	0.0591

Table 4.
Kruskal–Wallis test

Notes: Significance is shown as * = 0.100; ** = 0.050; and *** = 0.001; $n_{(2005-2008)} = 189$; $n_{(2009-2012)} = 355$; $n_{(2013-2017)} = 518$; and $n_{(2018-2021)} = 480$

Source: Created by the authors

example, technical reports. These measures have been used by previous researchers for analysing the readability of corporate disclosures (Courtis, 1986; Du Toit, 2017). The Readability Studio software also recommends the Flesch Reading Ease and Gunning Fog Index measures for technical reports. The Flesch Reading Ease focuses on total syllables per word and total words per sentence, providing a numerical score. A higher score indicates easier readability. It is useful for identifying how fluidly a text reads, even in a technical context. The Gunning Fog Index considers complex words and sentence length. It is tailored to identify the difficulty level of technical texts, estimating the number of years of education required to understand the material. Together, these indices provide a comprehensive understanding of readability, targeting different aspects of text complexity. Even though originally designed for children's reading material, they can be applied to technical material to ensure that it is accessible to the intended audience.

The study examines readability measures, word complexity (3-syllable words), and lengthy words (6 characters) in reports. Complex words reflect text complexity, impacting readability. Analysing these helps identify areas for simplification. Additionally, passive voice, long sentences, and verbosity affect readability negatively. Total words gauge disclosure length. Results from Readability Studio 2019 are analysed for reliability and objectivity, in line with Al-Najjar and Abed (2014). Using software is more objective and user-friendly than manual analysis.

4. Data analysis and results

We investigated a variety of readability measures from 2005 to 2017 (IAS 39) and from 2018 to 2021 (IFRS 9). The IAS 39 period is split into separate periods to account for amendments that were introduced. The periods being investigated for IAS 39 are thus 2005–2008, 2009–2012 and 2013–2017. The subdivisions also allow for the investigation of periods of similar length, i.e. approximately four years. The descriptive statistics of the separate periods are shown in Table 5.

As an initial indication of how derivative disclosures developed over time, readability as a quality measure appears to have decreased. After a sharp once-off improvement in the 2005–2008 period, the Flesch Reading Ease decreased over time and the Gunning Fog steadily increased [1]. The total number of words used in these disclosures increased over time. Derivative disclosures make use of increasingly longer sentences, more passive voice sentences, and more so-called wordy items. Further analyses are warranted to investigate whether these changes were significant over the four periods under consideration. The changes over time are graphically illustrated in Figure 1.

A Levene test (see Table 6) indicated through significance in p -values that the assumption of equal variances has been violated for some of the variables being considered, namely, Gunning Fog, % of complex words, % of long words and % of Fog hard words.

When a Levene test finds that the assumption of equal variances is violated for some variables, it is common practice to use non-parametric tests for all variables, including those for which equal variances can be assumed (Rosner, 2015). This approach maintains consistency and ensures that the statistical analysis is robust to the unequal variances present in some of the variables. This approach provides a consistent and robust analysis that does not rely on the assumption of equal variances.

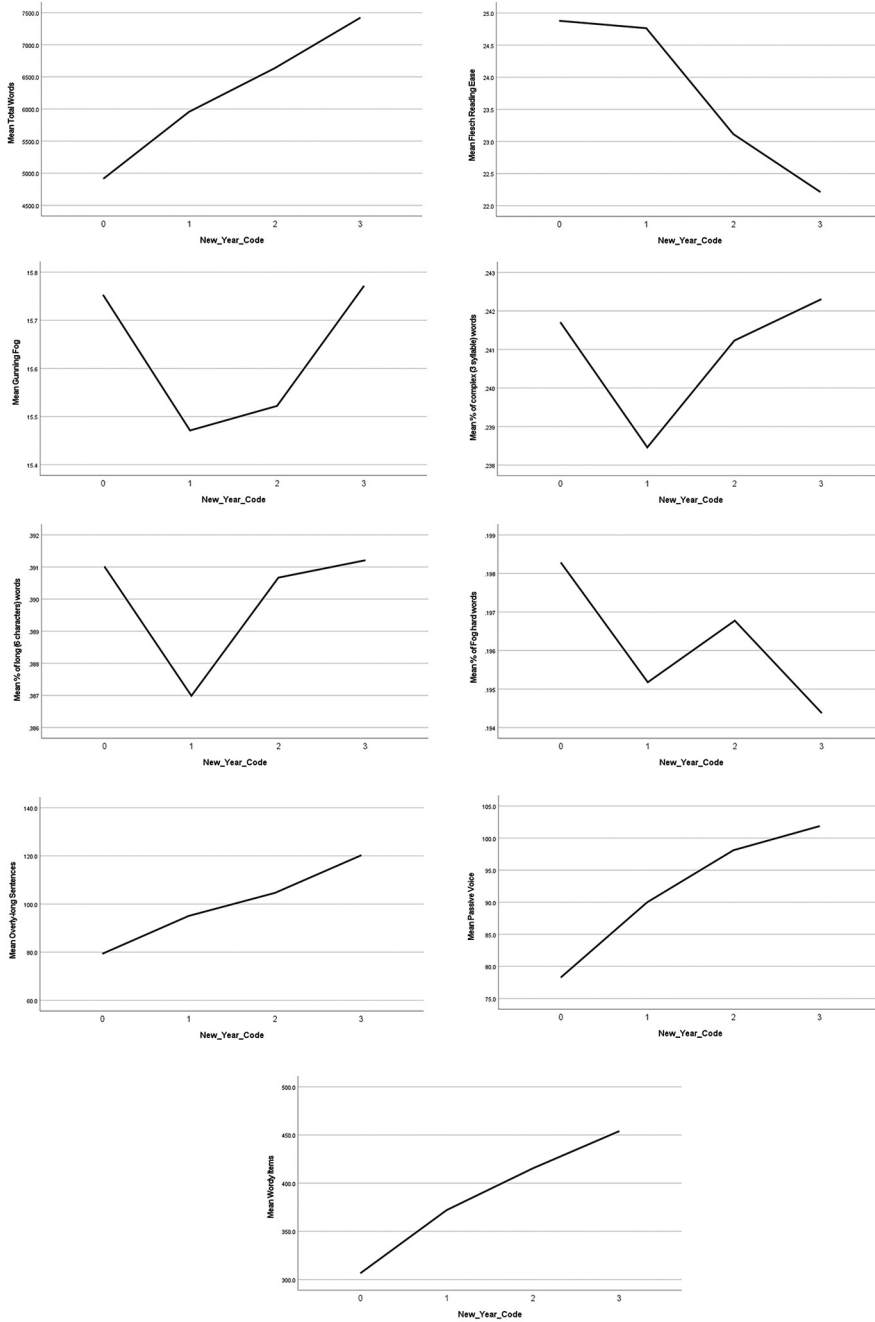
It is, therefore, appropriate to use the non-parametric Kruskal–Wallis test as an alternative to the parametric ANOVA to investigate whether the amendments to IAS 39 and the introduction of IFRS 9 brought significant changes to the quality of derivative disclosures (i.e. multiple independent groups). The Kruskal–Wallis test is a robust test to use in cases where the assumptions of parametric tests are not met or violated

Measure	Period	Mean	Median	SD	Min	Max
Flesch Reading Ease	2005–2008	24.88	24.00	7.09	7	50
	2009–2012	24.76	24.00	7.86	0	58
	2013–2017	23.11	22.50	7.13	0	51
	2018–2021	22.21	22.00	6.10	0	44
Gunning Fog	2005–2008	15.75	15.90	1.93	11	19
	2009–2012	15.47	15.70	1.67	12	19
	2013–2017	15.52	15.50	1.52	11	19
	2018–2021	15.77	15.70	1.50	12	19
Total words	2005–2008	4,913.43	3,134.00	6,145.43	234	49,420
	2009–2012	5,955.64	4,385.00	6,563.91	63	54,222
	2013–2017	6,635.42	4,841.00	7,230.02	78	75,455
	2018–2021	7,421.99	5,859.00	5,783.05	283	40,027
% of complex words	2005–2008	24.2%	2.4%	2.4%	15.0%	35.0%
	2009–2012	23.8%	23.9%	2.1%	18.2%	34.5%
	2013–2017	24.1%	24.2%	1.7%	19.4%	35.0%
	2018–2021	24.2%	24.3%	1.8%	18.0%	29.7%
% of long words	2005–2008	39.1%	39.1%	3.1%	25.9%	45.0%
	2009–2012	38.7%	38.9%	2.6%	31.1%	54.1%
	2013–2017	39.1%	39.1%	2.4%	31.9%	55.1%
	2018–2021	39.1%	39.2%	2.4%	30.5%	46.1%
% of Fog hard words	2005–2008	19.8%	19.8%	2.5%	11.1%	27.4%
	2009–2012	19.5%	19.5%	2.2%	12.1%	30.2%
	2013–2017	19.7%	19.7%	1.8%	11.5%	27.3%
	2018–2021	19.4%	19.4%	1.9%	13.6%	25.1%
Overly long sentences	2005–2008	79.35	54.00	104.59	1	851
	2009–2012	95.08	73.00	107.93	1	893
	2013–2017	104.66	81.00	110.14	1	1160
	2018–2021	120.30	97.00	88.45	4	561
Passive voice	2005–2008	78.29	59.00	83.18	4	719
	2009–2012	90.00	71.00	87.80	5	701
	2013–2017	98.11	77.00	91.15	1	887
	2018–2021	101.88	83.00	73.68	2	512
Wordy items	2005–2008	306.55	212.00	400.27	14	3336
	2009–2012	372.07	273.00	416.84	3	3433
	2013–2017	415.45	311.00	439.24	4	4361
	2018–2021	454.00	354.00	354.95	16	2131

Table 5.
Descriptive statistics

Notes: $n_{(2005-2008)} = 189$; $n_{(2009-2012)} = 355$; $n_{(2013-2017)} = 518$; and $n_{(2018-2021)} = 480$
Source: Created by the authors

(Conover and Iman, 1981; Rosner, 2006; Agresti, 2018). The Kruskal–Wallis test evaluates whether the medians of the groups are statistically significantly different from each other. Therefore, the Kruskal–Wallis test is often used when the data violates the normality and/or homogeneity of variance assumptions. Moreover, the Kruskal–Wallis test is more robust to outliers and extreme values than the one-way ANOVA. Additionally, the Kruskal–Wallis test can manage ordinal data or data that is not evenly spaced, while the one-way ANOVA requires interval-level data. The Kruskal–Wallis test is a more appropriate choice when the assumptions of the one-way ANOVA are violated or when the data is ordinal or not evenly spaced. The Kruskal–Wallis test can be conducted over multiple periods and is thus ideal to determine whether changes in readability variables changed significantly over the periods under consideration.



Source: Created by the authors

Figure 1.
Readability scores

Table 6.
Levene test

Measure	<i>F</i> -value	df1	df2	<i>p</i> -value
Flesch Reading Ease	0.669	667	303	0.414
Gunning Fog	19.538	667	282	0.000
% of complex (three syllable) words	17.471	667	275	0.000
% of long (six characters) words	16.174	667	286	0.000
% of Fog hard words	27.469	667	275	0.000
Overly long sentences	0.196	664	295	0.658
Passive voice	0.060	667	310	0.806
Wordy items	0.537	667	311	0.464

Source: Created by the authors

A Bonferroni adjustment is then made to control the overall Type I error rate that can be found in multiple comparisons. When conducting multiple statistical tests simultaneously, the risk of obtaining a false positive result (Type I error) increases with the number of tests performed. The Bonferroni adjustment reduces the risk of Type I errors by adjusting the significance level (*p*-value) for each test. The Bonferroni adjustment involves dividing the original significance level by the number of comparisons being made. If the *p*-value for comparison is less than the adjusted significance level, one can conclude that the difference between the groups is statistically significant after the Bonferroni correction.

As an additional test, one can calculate an effect size measure called Epsilon-squared (ε^2) to estimate the proportion of variance explained by each variable:

$$\varepsilon^2 = (H - df)/(N - df)$$

where *H* is the Kruskal–Wallis test statistic; *df* is the degrees of freedom, which is equal to the number of groups minus 1; and *N* is the total sample size across all groups.

Epsilon-squared (ε^2) ranges from 0 to 1, where a higher value indicates a larger effect size, with values closer to one suggesting a stronger association in the statistical test results. It is important to note that Epsilon-squared approximates the effect size in non-parametric tests such as the Kruskal–Wallis test and may not have a direct interpretation similar to *R*-squared in parametric tests. Nevertheless, it provides an estimate of the proportion of variance explained in the variables.

The results from the Kruskal–Wallis test (see [Table 3](#)) show that all the variables changed significantly over time. This is evidenced by the fact that the *p*-values of the Flesch Reading Ease, Gunning Fog, total words, percentage of complex words, percentage of long words, overly long sentences, passive voice sentences and wordy items are all significant at the 0.001 or 0.050 level. These results should be viewed in conjunction with the graphs in [Figure 1](#). From that it appears that the first amendment to IAS 39 had a positive effect on the Gunning Fog measure as well as the mean percentages of long and complex words. However, these positive effects were negated over the remaining periods because all the variables indicated poorer readability.

A Bonferroni adjustment of each *p*-value shows that the adjusted value is less than the significance level; therefore, we can conclude that the difference between the periods for each variable is statistically significant. The Epsilon-squared (ε^2) indicates that the most significant effect can be seen for the change in the total words of derivative disclosures over time, as it is the value closest to one.

The findings from the study contradict the expectation that amendments to IAS 39 or the introduction of IFRS 9 would improve the readability of risk disclosures. As a result, there is

insufficient evidence to reject the null hypothesis for *H1*, because *the introduction of amendments to IAS 39 and the transition to IFRS 9 did not improve the readability of risk disclosures*. The study's findings defy conventional expectations rooted in agency theory, stakeholder theory, and legitimacy theory. According to agency theory, where shareholders rely on management for information, incomprehensible or limited-risk disclosures may signal an agency issue. Management might obscure facts to maintain control or manipulate perceptions, leading to an informational imbalance that hampers shareholder oversight. In the context of stakeholder theory, companies owe clarity to various parties, including society, consumers, employees and investors. Complex risk disclosures may fail to meet stakeholders' informational needs, potentially harming relationships and trust. Legitimacy theory emphasises the importance of transparency, accountability, and credibility in maintaining a company's reputation. Clear and practical risk disclosures contribute to legitimacy, whereas complexity may erode public trust and damage a company's standing by falling short of public expectations.

In conclusion, because our research reveals that derivative disclosures are difficult to read and are thus only marginally useful, this may point to issues with agency theory, stakeholder theory, and legitimacy theory. It raises possible concerns about information asymmetry, failure to meet the interests of stakeholders, and difficulties upholding transparency and legitimacy.

5. Conclusions and discussion

The findings indicate that risk disclosures have low readability, highlighting the complexity of the information presented in financial statements (Curtis, 1986). The introduction of amendments to IAS 39 and the transition to IFRS 9 failed to improve the readability of risk disclosures, resulting in insufficient evidence to reject the null hypothesis, possibly because of the readability measurement tool used in the study or because IFRS 9 tends to offer more clarifications in comparison to IAS 39 at the expense of the readability of risk disclosures. The findings suggest that IFRS 9's attempt to reduce complexity by introducing a more principles-based framework, simplifying the classification and measurement of financial instruments, introducing a single impairment model for all financial instruments and providing improved guidance on hedge accounting failed. This suggests that accounting setters have room for improvement in making financial information more accessible to a broader range of users. The study's readability tests align with previous literature on risk disclosures, confirming their generally low readability (Jia and Li, 2022; Linsley and Lawrence, 2007). The complexity and difficulty of risk disclosures may hinder users' ability to understand and assess a company's derivatives activities (Hodder *et al.*, 2001; Kawaller, 2004; Ramnath *et al.*, 2008; Ryan, 2012).

The implications of the study extend to accounting standard boards, such as IAS and FASB, as the complexity of standards should be addressed to provide useful and transparent information (Chang *et al.*, 2016; Huang and Gao, 2014; Jermakowicz and Gornik-Tomaszewski, 2006; Onali and Ginesti, 2014; Tyrrall *et al.*, 2007; Zhang, 2009). Users of financial statements, including both financial experts and novice stakeholders, may struggle to correctly evaluate a company's derivatives activities because of the complexity of the disclosures (Hodder *et al.*, 2001; Kawaller, 2004; Ramnath *et al.*, 2008; Ryan, 2012). The readability of financial statements is crucial for stakeholders and can influence their behaviour and decision-making (Abernathy *et al.*, 2019; Chen and Tseng, 2021; Miller, 2010; You and Zhang, 2009).

Academically, the study highlights the potential impact of the change from IAS 39 to IFRS 9 on the complexity and value relevance of risk disclosures, warranting further

research (Barth, Beaver, and Landsman, 2001). However, using readability scores as a proxy for disclosure quality and decision-usefulness has limitations, such as which words are considered complex, sentence structure and length, and lack of context. The subjective nature of utility and usefulness in financial statements also suggests the need for comparative studies using different measures (Abernathy *et al.*, 2019; Chen and Tseng, 2021), and future studies could explore alternative approaches such as interviews or quality of disclosure indices. Future studies may also want to investigate the impact of the SEC Plain English Requirement on the readability of disclosures.

Note

1. Note that the Flesch Reading Ease measure decreases as readability becomes poorer, while the Gunning Fog measure increases as readability becomes poorer.

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