Investigating the relationship between integrated reporting quality and its effect on risk of the top 100 JSE listed companies in South Africa.

A research report submitted by

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Abstract

This thesis investigates the relationship between the quality of an organization's integrated report, as defined by the EY Integrated Reporting Awards, and the risk of the organisation. To achieve this the relationship between an entity's financial ratios and the quality of the integrated report it produces are calculated and explored. A quantitative research approach is used and risk is proxied using debt and equity ratios collected from the IRESS database, as well as integrated reports found on the websites of the top 100 JSE-listed companies over five years from 2017 to 2021. A regression is performed using the Statistical Package for the Social Sciences (SPSS) software. The results suggest a significant relationship between the costs of debt and integrated reporting quality, when compared to the cost of equity and the weighted average cost of capital. In addition, other variables hold a stronger relationship with integrated reporting quality, such as the ability of a firm to produce a standalone CSR report, as well as the firm's equity market-to-book ratio and a firm's size.

Keywords: Risk, EY Integrated Reporting Awards, JSE, Integrated reporting

Chapter 1: Introduction

Integrated reporting has brought about a fundamental change in the way in which companies not only report but also shifts how companies operate (Kannenberg and Schreck, 2019). This type of reporting attempts to provide a relationship between financial and non-financial performance, and how these interrelated dimensions can "create, preserve or erode" value for stakeholders, including shareholders (Institute of Directors in Southern Africa, 2016, International Integrated Reporting Council, 2021). It differs from sustainability reporting in that it places a greater focus on the interest of the company's stakeholders and provides explanations of how the company creates value in the short-, medium- and long-term framed in terms of the six capitals[1] (Sriani and Agustia, 2020, Atkins and Maroun, 2015, International Integrated Reporting Council, 2021).

Integrated reporting is often framed as a solution to overcome a capitalistic ideology as it incorporates disclosures on all aspects of an organization as opposed to merely financial information (Tweedie, 2022). However, Atkins and Maroun (2015) raise concerns over the use of integrated reporting as a mechanism for enhancing legitimacy and of integrated reporting culminating in a culture of merely 'tick-box' (see, for example,Stubbs and Higgins, 2014, La Torre et al., 2019). Integrated reporting has also been criticized for providing an opportunity to present manipulated and ambiguous information (Vitolla et al., 2019), by greenwashing[2] their reports (Stubbs and Higgins, 2014). Other issues relating to integrated reporting acknowledge the difficulty of predicting and measuring the impact of integrated reporting in the future as well as the limited evidence that is available to suggest that this form of reporting encourages organizations to reduce their negative environmental and social impacts (Thomson, 2015). The challenges in integrated reporting have also been explored by looking at the cost of preparing one and often management control and accounting systems are too underdeveloped to produce a verifiable integrated report (McNally et al., 2017).

[1] The capitals described by the IIRC include financial capital, manufactured capital, intellectual capital, human capital, social and relationship capital, and natural capital.

[2] Greenwashing is a process of conveying a false impression or misleading information about how a company's products/processes are environmentally sound, to gain favour with users who care about the firm's impact on the environment. This technique is a façade because what is written in the report usually differs from the effort the firm is putting in improving sustainability and reducing its carbon footprint (de Freitas Netto et al., 2020)

Conversely, other literature notes the importance of integrated reporting, which highlights the role this reporting style fulfils as a globally accepted manner in which to present financial and non-financial information (Thomson, 2015). Additionally, prior literature has tested the value relevance of integrated reporting (Zhou et al., 2017) and others have considered its importance in enhancing the legitimacy of the firm (Plumlee et al., 2015, Vitolla et al., 2019). The various benefits of companies employing integrated reporting, as envisaged by the International Integrated Reporting Council (IIRC), cannot be understated. These benefits range from reducing information asymmetry (Zhou et al., 2017, Vitolla et al., 2020), to signalling the quality of a company by conveying the value creation process of the company (Zhou et al., 2017), whether it incorporates sustainability within its practices and how it directs significant risks and opportunities (Sriani and Agustia, 2020, Herbert and Graham, 2019, Vitolla and Raimo, 2018).

The benefits of integrated reporting to capital markets and long-term investors have been assessed qualitatively (see, for example, Vitolla and Raimo, 2018, Ackers and Adebayo, 2021), with Atkins and Maroun (2015) focusing solely on institutional investors. The benefits of integrated reporting for investors have also been assessed quantitatively (Vitolla et al., 2019, Herbert and Graham, 2021), with other researchers having considered integrated reporting in a South African context (Herbert and Graham, 2021, Atkins and Maroun, 2015, Carels et al., 2013, Ackers and Adebayo, 2021). Additionally, the study performed by Barth et al. (2017) has a specific focus on South Africa, by testing JSE-listed companies over a period from 2011 to 2014, at a time when Integrated Reporting was maturing following the introduction of King III.

In accordance with agency theory, lower information asymmetry and improved decision-making should reduce agency costs. Consequently, the ratios often associated with risk[3] should improve based on the quality and content of the information available in the integrated report (Sriani and Agustia, 2020, Atkins and Maroun, 2015, Linsley and Shrives, 2006). This benefit, however, is seldom researched (see, for example Muttakin et al., 2020). Whilst the practice of Integrated Reporting has not been mandated worldwide, Hamad et al. (2020) find there is a significant increase in the uptake of integrated reporting worldwide. Countries such as New Zealand, South Africa and the United Kingdom are a few of the many countries that

[3] Risk within this report refers to financial risk that investors are exposed to. The risk profile of a company is assessed by investors and other stakeholders using various ratios to determine whether an unfavourable outcome will likely result in financial loss. According to (Linsley and Shrives, 2006), ratios often used by investors include the gearing ratio, asset cover, the equity book-to-market ratio and the beta factor.

are at the forefront of the integrated reporting concept and instilling the practice (Soriya and Rastogi, 2022).

Figure 1: A depiction of the recent developments in integrated reporting per region

Statement of the problem

The IIRC's Framework (The Framework) identifies two goals for integrated reporting: improved information for outside providers of financial capital and better internal decision-making. As mentioned, the reduction in information asymmetry, between management of the company and financial capital providers, should reduce the perceived financial risk of the company. This report will aim to explore whether or not there is a relationship between an entity's financial ratios which are often associated with risk, and the quality of the integrated report it produces.

Purpose statement

The purpose of this research is to investigate the relationship between the quality of an organization's integrated report and the organisational risk. The study encompasses gaining an understanding of integrated reporting, its determinants, and its benefits, the need for

greater transparency, as well as determining how organizations attempt to legitimize their operations, using existing research. The relationship between the quality of integrated reports and the financing they have received from financial capital providers will also be investigated.

Significance of the study

This research will contribute to the literature and practice in several ways. First, we add to the empirical research on integrated reporting by extending Lee and Yeo (2016) and Zhou et al. (2017), which also focus on South African firms. In a similar manner to the study performed by Barth et al. (2017), this paper will investigate the channels by which integrated reporting quality (IR quality) is associated with firm value. This paper answers a call by Vitolla et al. (2019) which suggests an exploration into integrated reporting quality, the benefits of this type of reporting, as well as investigating the relationship between the financial characteristics of firms and integrated reporting quality.

Second, this paper will extend the literature on the implications of extra-financial information (Dhaliwal et al., 2011, Dhaliwal et al., 2012, Lu and Abeysekera, 2017, Plumlee et al., 2015). Third, the findings of the paper may be of practical use to preparers of integrated reports in South Africa. Although there is uncertainty regarding the future of integrated reporting this paper may provide insight into the benefits of preparing one which may be useful when debating whether or not to continue to prepare an integrated report in the future (Adams, 2015).

Research hypothesis

To complete the research the following hypotheses will be empirically addressed:

- H1: an increase in the quality of an integrated report of a company, will be associated with a lower cost of debt.
- H2: an increase in the quality of an integrated report of a company, will be associated with a higher cost of equity.
- H3: an increase in the quality of an integrated report of a company, will be associated with a lower weighted average cost of capital.

In exploring the three hypotheses above, the following research questions will also be addressed:

- Does the industry have an impact on the integrated reporting quality?
- Does the industry have an impact on the key financial ratios (cost of debt, cost of equity and weighted average cost of capital)?

Assumptions, limitations, and delimitations

Similar to other research, this thesis has assumptions, delimitations, and limitations. There is an assumption that all the Ernst & Young (EY) scores assigned to the organisations which will form part of the study are valid. Barth et al. (2017) have also assessed the underpinning content elements and guiding principles of the IIRC framework and based on the evaluation that the scores are awarded by three external, independent adjudicators and that the scoring criteria are consistent with the Framework, Barth et al. (2017) consider the EY scores to be a suitable proxy for IR quality.

The delimitations placed on this study include that all organisations included in this study were listed on the JSE during the respective years included in the sample and formed part of the top 100[4] companies during those years as well. Only companies that produce an integrated report and form part of the EY integrated reporting awards will be included in the study.

Another delimitation is that specific ratios are used within this study (See Chapter 3: Methodology for more detail). In addition, the focus of the research is to determine if IR quality has a relationship with the debt and equity ratios, as a result, this research will not attempt to measure or define IR quality. In addition to this, other financial risk ratios will be used as proxies of risk to determine the relationship between risk and integrated reporting quality.

A key limitation is that the thesis draws upon a synthesis of the existing literature to support the hypotheses. Statistical analysis must also be interpreted with caution given the limited amount of data available for analysis. Other limitations include the fact that certain industries are too heavily represented instead of there being a mix of industries representing the entire market listed on the JSE and that a substantial proportion of the companies are large, listed companies. As a result, the results may not be representative of the overall market listed on the JSE.

The rest of the study proceeds as follows: Chapter 2 provides background, discusses the theory, and develops the hypothesis. Chapter 3 outlines the methodology to be conducted and Chapter 4 details the results of the research. Finally, Chapter 5 concludes the study and provides areas for further research.

[4] The top 100 companies are a benchmark for market capitalisation as approximately 90% of the market is covered with the Top 100 companies (Barth et al. 2017).

Chapter 2: Literature Review

Integrated reporting

The underpinning philosophies of King IV, including sustainable development, stakeholder-inclusivity, the organisation as an integral part of society and corporate citizenship are now perceived as prerequisites that can be taken for granted. In the context of any successful firm, this supports the relevance and benefit of presenting integrated reports to stakeholders (Barth et al., 2017, The Institute of Directors in Southern Africa, 2016).

Integrated reporting is intended to concisely communicate how a company generates value in the short, medium and long term (Meintjes, 2021, International Integrated Reporting Council, 2021). It is a fundamental shift from traditional financial reporting as prepared using IFRS. Barth et al. (2017) note the shift may be to receive optimal funding, based on the company's weighted average cost of capital (WACC) and to achieve various investment opportunities (Vena et al., 2020). Although IFRS and integrated reporting both seek to improve the information available to providers of financial capital, there are substantial differences. For example, both the Framework and IFRS are principles-based, however, the latter specifies how to account for and disclose information. Additionally, integrated reporting combines financial and non-financial information into a single report with a focus on value creation. In this regard the integrated report provides additional non-financial information which may influence firm value by decreasing information asymmetry and improving the legitimacy of the company (Dhaliwal et al., 2011, Dhaliwal et al., 2014, Plumlee et al., 2015, Lu and Abeysekera, 2017).

Information asymmetry is reduced by the improvement of disclosures within integrated reports about a company's business and organisational model, its risks and opportunities, detail about its strategic goals and corporate governance, as well as its remuneration policy, value creation and future outlook. This reduces the expectation gap between investors and reduces the advantage that only informed investors may have, ultimately reducing information asymmetry (García-Sánchez and Noguera-Gámez, 2018). Similarly, the provision of additional information within integrated reports facilitates an improvement in decision-making through an integrated thinking approach as well as a reduction in agency costs that arise when there are conflicts of interest between managers and different stakeholders (García-Sánchez and Noguera-Gámez, 2018). Additionally, compliance with an integrated reporting framework becomes an indication of organisational credibility, according to Atkins and Maroun (2015).

According to Herbert and Graham (2019), there are various signals within integrated reports, utilised by companies. The first is intent signals, intent signals provide various stakeholders with information about the entity's social and relational capital, camouflage signal comprises information regarding the decrease of pollution rather than speaking to the actual effects of the pollution itself, and finally need signals that are composed of information within the report that encourages investors to continue providing financial support, by including information about dividends.

There are various bodies internationally that emphasise the importance of non-financial information, such as sustainability and the issues that arise as companies continue to operate. For example, the Basel requirements represent a regulation and supervision that underpins the banking system (Ayadi et al., 2016, ElBannan, 2017). The transparency of information disclosures and adherence to the requirements have proven to result in a positive bank performance, highlighting the significance of integrated reporting in conveying valuable financial and non-financial information to stakeholders (ElBannan, 2017, Dhaliwal et al., 2014). Green bonds represent a further development in financing specifically for sustainability initiatives. The bonds can be beneficial to firm value and performance and therefore require effective communication to shareholders of these bonds and other stakeholders, raising the importance of integrated reporting, which will accommodate the disclosures specific to the green bonds being issued (Tang and Zhang, 2020).

Integrated thinking

Integrated thinking is an extension of integrated reporting, and involves the interconnectedness of many factors including the six capitals, the ability of the company to address key stakeholders' needs, how the company develops its business model and strategy to respond to the external environment and the risks and opportunities, as well as the company's activities, performance and outcomes in terms of the capitals in the past, present and future (La Torre et al., 2019).

IFAC (2017) suggests that "integrated thinking involves organizational change to require everyone in the organization to increase their contribution to a much broader, and longer-term, concept of value creation through a better understanding of how value is created. This will hopefully lead to a better outcome from reporting that responds to systemic risks to capital and financial market systems, and sustainable development challenges" (IFAC, 2017, p6). In addition, more improved integrated thinking and reporting, results in lower reputational and regulatory risks as well as a reduction in financial risk owing to improved decision-making and improved disclosures for investors and other stakeholders according to the agency theory (De Villiers et al., 2017).

The principles of integrated thinking include purpose, governance, culture, strategy, risks and opportunities and performance. Whilst it is difficult to measure integrated thinking as it forms part of the internal aspects of a company, some proxies can be assessed such as Integrated Reporting Quality (International Integrated Reporting Council, 2021).

Integrated reporting quality

The International Integrated Reporting Council (2021) provides a suitable starting point in the consideration of integrated reporting quality within this research. It suggests that integrated reports of high quality improve the opportunity for providers of financial capital to allocate appropriate capital to companies (International Integrated Reporting Council, 2021).

Various determinants of integrated reporting affect its quality (Kannenberg and Schreck, 2019, Piesiewicz et al., 2021). Factors such as firm characteristics, corporate governance and firm processes can affect the quality of these corporate reports (Velte and Stawinoga, 2017). Additionally, prior research identifies the impact of shareholder and consumer protection on the outcome of adopting integrated reporting (Vitolla et al., 2019), whereas Ghani et al. (2018) discovered an improvement in the disclosure level of integrated reporting based on increased company size and audit firm size (Vitolla et al., 2019).

Integrated reporting quality is often measured with content analysis, or by using self-developed criteria by which to rate a report, for example as done by firms like RobecoSAM and Ernst and Young (Kannenberg and Schreck, 2019) as well as within the research of Pistoni et al. (2018). Unlike Vitolla et al. (2020), this study does not attempt to quantify or define integrated reporting quality. Instead, this study accepts the quality of the reports determined by the Ernst & Young Excellence in Integrated Reporting Awards, to probe the relationship between the quality assigned and the financing which the organisation has received (Pistoni et al., 2018).

Integrated reporting quality has been a subject of focus for many papers, with some solely looking at whether an entity produces an IR report or not (Muttakin et al., 2020), other research studies using externally developed indexes such as the EY Excellence in Integrated Reporting Survey (Barth et al., 2017) and lastly, some researchers using self-developed proxies that have been formulated based on the guiding principles of integrated reporting (Vitolla et al., 2020, Zhou et al., 2017).

Using externally developed indexes reduces any bias a researcher may have while creating self-developed proxies, thus it is a reliable tool. In addition, the use of an externally developed proxy, the EY Excellence in Integrated Reporting Survey is also reliable as it has occurred for over 11 years. To encourage excellence in the quality of integrated reports to investors and other stakeholders (Barth et al., 2017).

It is important to note the the industry of a firm can have an impact on its integrated reporting quality. This is because the level of disclosure required may be a legal requirement based on the regulatory environment that the entity forms part of. For example, firms operating in the banking sector would tend to disclose information relating to compliance with the Banks Act, Directives, Circulars and Guidance Notes as well as the Basel Committee on Banking Supervision (BCBS). This contrasts with the health and environmental rehabilitation disclosures and mineral reserve reports necessary in the mining sector. The extent of these disclosures can enhance the integrated reporting quality.

Financial risk

Financial risk, as risk commonly referred to by investors, exposes investors to financial loss. This risk is a result of investors' investment decisions as opposed to business risks which are generally referred to as uncertainties inherent in an organisation (Gabriel and Baker, 1980). The structures of organisations rely on the separation of managers and the providers of capital, however, as a result of this separation, investor protection is required as these individuals place reliance on the disclosures and assertions made by management (Muttakin et al., 2020). Based on this, Atkins and Maroun (2015) confirm that integrated reports facilitate effective communication with stakeholders. They are a form of legitimisation for the firm in ensuring that stakeholders, particularly investors, are not taking on "excessive or uninformed risks" (Eccles and Serafeim, 2011, page 70)

Financial reports play a crucial role as a source of information for investors as they can place confidence in the company when they realise that the company is reporting reliable information (Asiri, 2015). Atrill and McLaney (2005) suggest that financial ratios provide a quick and simple way to assess the risk of a business and Widagdo et al. (2020) conclude that the more favourable the financial ratio of a company, the lower the investment risk will be.

This notion of risk and its relationship with IR quality has been explored in prior research. (Cahan et al., 2016) suggests that additional disclosures about CSR activities reduce the estimation risk as investors aim to determine the future cash flows and profitability of an entity. This highlights the importance of using cost of debt, cost of equity or weighted average cost of capital as a proxy of risk.

Strong theoretical support on the negative effect of disclosure on the risk faced by investors has also been researched (see, for example, Verrecchia, 2001, Lombardo and Pagano, 2002, Lambert et al., 2007, García-Sánchez and Noguera-Gámez, 2017). However, the empirical evidence is less consistent (Zhou et al., 2017, Vitolla et al., 2020). Prior research has largely focused on financial disclosures and only in the last two decades has extended to non-financial

disclosure. Even though the negative relationship between non-financial information and the risk as proxied by the cost of equity is apparent (Salvi et al., 2018), there seems to be no consensus on the impact of non-financial disclosure. For example, Dhaliwal et al. (2014), Vitolla et al. (2020) and Plumlee et al. (2015) found a negative relationship between CSR disclosure and the cost of equity, while Richardson and Welker (2001) found a positive relationship between social disclosure and the cost of equity.

Agency Theory

The agency theory explores the relationship between two parties; the principal, being the shareholders of a company, and the agents who are the company's directors. This comprises recognising the priorities of both parties and aligning the two so that a balance can be achieved (Vitolla et al., 2020).

As the shareholders delegate decision-making authority to directors, differences in opinion, interests, goals and risk aversion can arise and this opens shareholders to risk because losses of the company will be borne by the shareholders. An example of this is that management tend to focus on maximising the current value of the firm (as this impacts remuneration), whereas shareholders are interested in the long-term value of a firm (Healy & Palepu, 2001).

It is vital that the board of a company which acts as a control mechanism to align both parties' interests, encourages management to adopt integrated reporting. High-quality reports can reduce asymmetric information ultimately decreasing agency costs. Management have an information advantage and the use of an integrated report which conveys both financial and non-financial information is a means of communicating the company's narrative concisely.

Practices such as linking executive compensation to shareholder returns are useful in aligning the interests of both parties thus reducing agency loss (Vitolla et al., 2020). Prior studies confirm that firms adopting integrated reporting are associated with lower levels of agency costs as this type of reporting plays a disciplining role for managers, by addressing the agency problem (Ahmed et al., 2020).

Hypotheses development

Zhou et al. (2017) explain, that integrated reports can provide new, value-relevant information, and can present information, even if previously disclosed, in a more concise and useful manner. In addition to financial capital, the Framework requires that managers of firms report on material aspects relating to manufactured, intellectual, human, social and relational, and natural capital. By providing more information, integrated reporting can reduce information asymmetry about the capitals that affect value (Hirshleifer and Teoh, 2003). The reduction in

information asymmetry can increase firm value (Verrecchia, 2001, Beyer et al., 2010, Zhou et al., 2017) and decrease the cost of equity (Sengupta, 1998, Agnew and Szykman, 2005, Franco et al., 2016).

Even though entity characteristics may change the impact that disclosures have on reducing the cost of capital (Dutta and Nezlobin, 2017), from a theoretical perspective, non-financial disclosures may result in a reduction in the cost of debt in several ways. First, disclosure can reduce information asymmetry which in turn reduces monitoring costs (Zhou et al., 2017, Lambert et al., 2007). Second, lower information asymmetry enables firms to attract increased investor demand for their securities, which would reduce their cost of capital (Verrecchia, 2001). The enhanced understandability of corporate value drivers conveyed in integrated reports would reduce lenders' costs of information monitoring which would reduce the cost of debt. Additionally, the premise poised by the IIRC (2021) that integrated reporting is founded on integrated thinking, which would further improve the firm's quality of decision-making should culminate in the reduction of the cost of debt (Churet and Eccles, 2014, Barth et al., 2017). This research has led to the development of the following hypotheses:

- H1: an increase in the quality of an integrated report of a company, will be associated with a lower cost of debt.
- H2: an increase in the quality of an integrated report of a company, will be associated with a higher cost of equity.

There is compelling research that explains that integrated reports provide useful information to capital markets, hence the focus on financial ratio consideration (Zhou et al., 2017). Asiri (2015) considers the debt/equity ratio as well as the return on equity as measures of risk. Additionally, prior research provides evidence that a reduced cost of capital is one of the capital market effects that can be observed as a result of corporate disclosures (Healy and Palepu, 2001, Nahar et al., 2016, Barth et al., 2017). Based on this, the following hypothesis is developed:

- H3: an increase in the quality of an integrated report of a company, will be associated with a lower weighted average cost of capital.

Zhou et al. (2017) state that "this study provides evidence that analyst forecast error reduces as a company's level of alignment with the <IR> framework increases." (Zhou et al., 2017, p94). Vitolla et al. (2020) and García-Sánchez and Noguera-Gámez (2017) found that IR quality and integrated reporting adoption reduce the cost of capital, confirming the usefulness of the report in decision-making. Many of these studies are performed using panel analysis or a cross-sectional analysis, the difference between the two is the inclusion of a time factor.

Panel analysis provides in-depth information over time whereas cross-sectional analysis allows for the data to be collected at a point in time from all the observations within the population (Zhou et al., 2017, Vitolla et al., 2020).

Following a similar approach to Vitolla et al. (2020) and Zhou et al. (2017), the following hypotheses are formulated:

- H1: an increase in the quality of an integrated report of a company, will be associated with a lower cost of debt.
- H2: an increase in the quality of an integrated report of a company, will be associated with a higher cost of equity.
- H3: an increase in the quality of an integrated report of a company, will be associated with a lower weighted average cost of capital.

Chapter 3: Method

Research Design

This study investigates the relationship between the quality of an organisation's integrated reporting and its effect on the financial risk of the top 100 JSE-listed companies in South Africa.

This study will use a quantitative research approach and risk was proxied using debt and equity ratios. Data was collected from the IRESS database, as well as integrated reports found on the websites of the relevant companies. A bivariate regression will then be performed using the Statistical Package for the Social Sciences (SPSS) software. This form of analysis will allow for the following to be determined (Laerd Statistics, 2022):

1. The strength of the association between IR quality and the financial ratios under consideration, and
2. How much of the variation of the financial ratios can be explained by the IR quality.

Population and study sample size

The study will investigate the top 100 JSE-listed companies over five years from 2017 to 2021. Similar to Barth et al. (2017), a cross-section analysis will be adopted, and not a panel analysis because the main independent variable (EY integrated reporting score) has a low variation over time. Therefore, whilst panel data will be used based on data reflecting the five years, there is no expectation that variations in integrated reporting quality will occur due to time. Instead, panel data regression will only be used as a robustness test to determine if anything changes, and to take a time lag into account.

The top 100 companies constitute over 90% of the market capitalisation of the JSE. The top 100 companies were selected to reduce a self-selection bias as the top 100 entities should have sufficient resources to prepare an integrated report. In addition, these entities are part of the EY Excellence in Integrated Reporting Survey which assesses the integrated reporting quality this reduces researcher bias and subjectivity in the study. The EY Excellence in Integrated Reporting Survey has also been used in prior literature (see, for example, Barth et al., 2017). JSE-listed entities' integrated reports are easily accessible and information is readily available on databases such as IRESS.

Model specification

The relationship between integrated reporting quality and risk will be tested through a regression model following previous studies in the field. In particular, this study will follow researchers who investigated the relationship between disclosure and cost of equity capital (Vitolla et al., 2020), disclosure and cost of debt (Muttakin et al., 2020), corporate governance and cost of equity (Mazzotta and Veltri, 2014), and CSR disclosure and cost of equity (Plumlee et al., 2015, Dhaliwal et al., 2011).

To examine the relationship between IR quality and a firm's risk level, we estimate the following models:

Model 1a:

$Kd = \beta_0 + \beta_1 IRQ + \beta_2 SIZE + \beta_3 B4 + \beta_4 CSR + \beta_5 DIV + \beta_6 CR + \beta_7 EMTBV$

where Kd = Cost of Debt

IRQ = Integrated reporting quality

SIZE = The size of the firm, measured using a natural logarithm of Total Assets

B4 = Whether the company is audited by a Big4 firm or not

CSR = Whether the company produces a standalone CSR report or not

DIV = Whether the company pays an ordinary dividend or not

CR = Current ratio

EMTBV = Equity market-to-book value

Model 1b:

$Ke = \beta_0 + \beta_1 IRQ + \beta_2 SIZE + \beta_3 B4 + \beta_4 CSR + \beta_5 DIV + \beta_6 CR + \beta_7 EMTBV$

where Ke = Cost of Equity

IRQ = Integrated reporting quality

SIZE = The size of the firm, measured using a natural logarithm of Total Assets

B4 = Whether the company is audited by a Big4 firm or not

CSR = Whether the company produces a standalone CSR report or not
DIV = Whether the company pays an ordinary dividend or not
CR = Current ratio
EMTBV = Equity market-to-book value

Model 1c:

$WACC = \beta_0 + \beta_1 IRQ + \beta_2 SIZE + \beta_3 B4 + \beta_4 CSR + \beta_5 DIV + \beta_6 CR + \beta_7 EMTBV$

where WACC = Cost of Equity
IRQ = Integrated reporting quality
SIZE = The size of the firm, measured using a natural logarithm of Total Assets
B4 = Whether the company is audited by a Big4 firm or not
CSR = Whether the company produces a standalone CSR report or not
DIV = Whether the company pays an ordinary dividend or not
CR = Current ratio
EMTBV = Equity market-to-book value

There is a concern for simultaneity, in which IR quality has economic consequences (for example, it affects profitability), and at the same profitability causes management to change IR quality (De Villiers et al., 2017). This is overcome by using a second model (Model 2) which does not control for profitability. Ratios with a profitability aspect will be identified with an asterisk (*), and Model 2 will be carried out for these ratios. More detail on this is provided under 'Validity'

Dependent Variables (Risk)

The debt and equity ratios for 100 companies for 5 years will be calculated using financial information from each company's annual financial report included on the IRESS database. There are many measures of risk available in prior literature, see for example, (Himme and Fischer, 2014, Muttakin et al., 2020, Vitolla et al., 2020). The cost of debt, cost of equity and weighted average cost of capital will be indices for measuring the risk of a company, using various ratios described in Table 1.

Other debt and equity ratios will be used to proxy the cost of debt (see Table 2) and the cost of equity (see Table 3) as robustness tests to ensure no omission or selection bias has occurred. This is discussed in greater detail under the 'Validity: dependent variables' section. The ratios calculated will include the following:

Table 1: Dependent Variables of this study which will be proxies for Risk (R)

Dependent variable	Data collection	Source
Cost of debt	The cost of debt will be collected directly from the IRESS database.	The cost of debt has been selected as a measure of risk because as argued by Sengupta (1998), companies can reduce their financers' perceptions towards their default risk and financial risk, by providing adequate information within an integrated report about the companies' future cash flows. The cost of debt is an indication of the financial risk the company is taking on if it becomes unable to meet its obligations (Muttakin et al., 2020)
Cost of equity	The cost of equity will be collected from the IRESS database.	Vitolla et al. (2020) use the PEG ratio as a proxy for the cost of equity, in line with Botosan and Plumlee (2005) and Botosan et al. (2011) Prior literature suggests the PEG, and ultimately the cost of equity, takes into account the information of a company including its market risk, leverage risk, information risk, residual risk, and growth (Botosan & Plumlee, 2005; (Vitolla et al., 2020).
Weighted Average Cost of Capital (WACC)	The WACC for each company will be collected directly from the IRESS database	The WACC will be considered, in addition to the cost of debt and the cost of equity because the ratio considers the weightings of debt and equity (Himme and Fischer, 2014). WACC is significant because taking the weighting of debt and equity into account allows a company to meet its optimal or target capital structure. As a company increases its debt weighting, the risks that the company faces increase as well because there is a financial risk that the company will not be able to meet its payments to lenders. There is also a greater risk that if loan covenants are not met, the total becomes due and payable,

		threatening the going-concern assumption of the entity (Correia, 2019, Shivdasani and Zenner, 2005) Pham et al. (2012).

Independent Variable

The quality of the various organisations' integrated reports will be sourced from the EY Excellence in Integrated Reporting 2017, 2018, 2019, 2020 and 2021 Reports. These will be accessed via the Integrated Reporting Committee of South Africa Homepage to obtain a list of the top 100 JSE listed companies based on market capitalisation and their quality rankings.

The EY Excellence in Integrated Reporting Reports for the relevant years will first be accessed to determine the 100 companies that are included in the reports each year. Each company will then be assigned an ordinal value based on its ranking by EY:

1. Companies categorised under *Progress to be made* will be assigned a value of 1.
2. Companies categorised under *Average* will be assigned a value of 2.
3. Companies categorised under *Good* will be assigned a value of 3.
4. Companies categorised under *Excellent* will be assigned a value of 4.
5. Companies categorised under the *Top 10* will be assigned a value of 5.

Control Variables

The reliability of the dependent variables as a proxy for risk will be tested using control variables. These are variables that could have an impact on the correlation between IR Quality and the equity and debt ratios. Several variables in the models will be controlled and these include firm size (SIZE), whether the company was audited by a Big4 accounting firm (B4), whether the organisation issues a standalone CSR report (CSR), whether the company pays an ordinary dividend or not (DIV) the current ratio (CR) and the entity's market-to-book value (EMTBV).

Firm size (SIZE) will be calculated using a natural logarithm of the book value of the total assets of the organisation, including intangible assets, in line with the same control variable included in Muttakin et al. (2020) and Vitolla et al. (2020). Firms of a larger size are expected to incur lower costs of debt because there are more assets available as well as a greater opportunity for economies of scale to occur (Muttakin et al., 2020, Carey et al., 1993).

Muttakin et al. (2020) also included whether the firms were audited by a Big4 accounting firm (B4) as a control variable. If the organisation is audited by a Big4 firm, this variable will be assigned a "1" and if the auditors are not part of the Big4, a "0" will be assigned. There is an expectation that having a Big4 accounting firm provide assurance services will have a negative

impact on the organisation's costs of debt. This is because debt providers will place greater reliability on the financial statements if audited by one of the Big4 firms.

Dhaliwal et al. (2011) proved that organisations produce separate CSR reports in an attempt to reduce the cost of capital. This study will include this control variable as (Barth et al., 2017) similarly did. The organisations will be assigned a "1" if they do produce a standalone report or will receive a "0" if a standalone CSR report is not produced. The prediction is that firms that do produce a standalone CSR report, will have a lower cost of capital (Dhaliwal et al., 2011). De Villiers et al. (2017) also asserts that firms with a high cost of equity, are rewarded with a lower cost of equity when they produce standalone CSR reports.

Similarly to the above variables, whether the company pays an ordinary dividend or not (DIV) will also be controlled for within this study. Barth et al. (2017) also consider this variable and this is in line with prior literature pertaining to the relationship between dividend decisions and risk. In terms of dividend policy, corporate finance theory, and other theories, the payment of dividends can signal management's view of a company's condition. A company that does not pay dividends may therefore perceived to hold more risk and may be associated with a higher cost of debt, cost of equity and weighted average cost of capital, compared to a firm that pays an ordinary dividend (Dickens et al., 2002). This variable will be coded as as a "0" if the company does not pay an ordinary dividend, and a "1" if the company does pay an ordinary dividend in the current year.

In line with the study conducted by Muttakin et al. (2020), a firm's current ratio (CR) will also be controlled. This is because a company with a higher current ratio is perceived to be able to meet its obligations that are expected to be settled within 12 months. It is therefore associated with a lower cost of debt. (2022)

For model (1) only, the equity market-to-book value (EMTBV) will be considered as a control variable. This control variable was taken into account by Barth et al. (2017) and Vitolla et al. (2020). This control variable will be measured by creating a ratio of the market value of the equity to the book value of the equity (Muttakin et al., 2020). A negative correlation is expected because shareholders tend to undervalue low market-to-book value that demands a higher rate of return (Vitolla et al., 2020, Fama and French, 1995).

An IR coding framework will not apply equally to all firms. For example, financial institutions will not have the same environmental impact as mining companies. Controlling for industry groupings is significant when conducting an IR study (De Villiers et al., 2017). A Kruskal Wallis test will be run on the different groupings and use descriptive statistics to see if there are any differences in industry groupings.

Data collection, management, and analysis

The dependent variables (the various ratios which are indices of risk), as well as the control variables (firm size, the auditors of the organisation, whether the entity produces a standalone CSR report, whether the firm pays out ordinary dividends, the current ratio and the entity's market-to-book value), will be collected from the IRESS database or the relevant organisation's integrated reports and documented on an Excel spreadsheet. Certain financial ratios will be randomly selected and recalculated to ensure the reliability of the ratios extracted from IRESS. This spreadsheet will be saved regularly and uploaded to the author's Google Drive to protect it from a loss of information.

Once the data capturing is complete, the Excel spreadsheet will be exported to the SPSS package for analysis to be conducted. The first assumption is that financial ratios are a continuous variable because these ratios can take an infinite value of numbers. The second assumption is that the independent variable is also continuous. The IR quality is an ordinal categorical variable because there is a limited value to this variable (The quality is rated on a scale from 1 to 5), however, it will be treated as a continuous variable, by using a specific function to smooth the ordinal variables (Robitzsch, 2020). This is owing to the rules of how ordinal variables should be coded within SPSS. Once all the data is exported, SPSS will be used to create a single scatterplot in order to determine whether there is an association which will confirm the third assumption of linearity, by inspecting that a straight line is produced.

Validity and reliability

Validity: Control Variables

The internal validity of this study is strengthened by considering multiple control variables. All companies are South African organisations which produce integrated reports. Each of the companies is audited and all are required to comply with the Companies Act as well as the KING IV Report on Corporate Governance. The control variables addressed in this study are firm size (SIZE), whether the company has been audited by a Big4 accounting firm (B4), whether the organisation produces a standalone CSR report (CSR), whether a company pays out an ordinary dividend (DIV), the current ratio (CR) and the entity's market-to-book value (EMTBV). Taking these control variables into account ensures that the association between the IR quality and the financial ratios is not influenced by these factors and a reasonable conclusion can be reached based on the hypothesis of this investigation.

Validity: Dependent Variable (Risk)

The use of multiple dependent variables which are common indices for risk will also ensure that the findings of this study are more robust. The validity of the study will be improved since multiple proxies of cost of equity and cost of debt will reinforce the association between IR quality and the various ratios.

Table 2: Ratios to be used as a robustness test for the cost of debt

Dependent variable	Data collection	Source
Debt/Equity*	This ratio will be sourced from the IRESS database.	A company's gearing is a common proxy used by investors and financers when evaluating risk because a greater value of debt to equity exposes the entity to more financial risk (Shivdasani and Zenner, 2005).
Long-term loans percentage to total debt	This ratio will be sourced from the IRESS database.	Long-term loans as a percentage of total debt is a common proxy used by shareholders in evaluating an organisation's cost of debt (Caprio Jr and Demirgü-Kunt, 1998).

Table 3: Ratios to be used as a robustness test for the cost of equity

Dependent variable	Calculation	Source
Return on Capital Employed*	This ratio will be sourced from the IRESS database.	This proxy is used by shareholders to assess the cost of capital (Botosan et al., 2004).
Earnings/Shares*	This ratio will be sourced from the IRESS database.	This proxy is taken into account by Mazzotta and Veltri (2014). Investors consider information related to the future profitability of an entity (De Villiers et al., 2017).
Price/Earnings*	This ratio will be sourced from the IRESS database.	Price/Earnings is taken into account as a proxy of the

		cost of equity by Vitolla et al. (2020).
Earnings Yield percentage*	This ratio will be sourced from the IRESS database.	This is a common proxy used to evaluate the cost of equity (Gordon and Gould, 1978).
Return on Equity percentage*	This ratio will be sourced from the IRESS database.	A proxy is used to evaluate an organisation's cost of equity. (De Wet and Du Toit, 2007)

To reduce the effects of multicollinearity from occurring, a second model will be used, for the ratios which have been ascribed asterisks (*) in Tables 1, 2 and 3. This model, Model 2 removes the Equity-Market-to-Book-value (EMTBV) as a control variable as there will be a profitability component inherent within the dependent variable ratio.

Model 2:

$$\text{Risk (R)} = \beta_0 + \beta_1 IRQ + \beta_2 SIZE + \beta_3 B4 + \beta_4 CSR + \beta_5 DIV + \beta_6 CR$$

where IRQ = Integrated Reporting Quality
SIZE = The size of the firm, measured using a natural logarithm of Total Assets
B4 = Whether the company is audited by a Big4 firm or not
CSR = Whether the company produces a standalone CSR report or not
DIV = Whether the company pays ordinary dividends or not
CR = Current Ratio

<u>Validity: Independent Variable (the EY scores)</u>

The validity of this study will also be addressed by using a substitute for IR quality, namely Environment, Social and Governance (ESG) Refinitiv scores. These scores will be utilised as a sensitivity analysis to enhance the reliability of this investigation, using the environment, social and governance pillars since these pillars are assumed to be subsumed within integrated reporting quality (Apergis et al., 2022, Ramirez et al., 2022).

The external validity of the investigation provides that the findings can be applied to a broader context to an extent. The EY Excellence in Integrated Reporting Survey measures the quality of integrated reports in terms of the International Integrated Reporting Council's (IIRC) seven

guiding principles, and these are strategic focus and future orientation, connectivity of information, stakeholder relationships, consistency and comparability, and the conciseness, reliability and completeness, and materiality of the information. This indicates that all aspects of the IIRC's principles are considered when assessing the quality, enhancing the validity of the conclusions reached within the EY survey (De Laan et al., 2017). The scope of the EY survey only encompasses assessing the integrated reporting quality of companies listed on the JSE. The correlation between the quality of the integrated reports and the debt and equity ratios may not be an accurate depiction of companies which produce integrated reports but are not listed on the JSE or smaller listed companies.

Reliability

The investigation considers reliability using a test-retest approach. The financial ratios will be calculated for companies over five years and this period allows for comparisons to be made for companies included in the investigation for multiple years.

There is an expectation for the ratios and values to increase over time owing to the effects of inflation which may negatively impact the correlation to be derived. However, since all the companies investigated will be South African companies, this is overcome because a meaningful comparison can still be conducted as all entities will have taken the same South African value of inflation into account each year.

Chapter 4: Results

Summary of descriptive statistics results

The investigation aimed to determine the relationship between the risk of an entity and its integrated reporting quality. The risk of the entity was measured using three key financial ratios namely: the weighted average cost of capital (WACC), the cost of debt (Kd) and the cost of equity (Ke). Integrated reporting quality scores were assigned to the sample, based on the scoring of the EY Excellence in Integrated Reporting Survey. Multiple linear regression was run three times for the financial ratios mentioned above, to address the three hypotheses.

Whilst there was a sample of 500 observations based on the top 100 JSE-listed companies for 5 years, some data was not available and thus those observations were excluded from the results. The reasons for the unavailability of some of the data from IRESS are as follows:

Company Name	Year(s)	Reason

EPP N.V	2021	A takeover of EPP N.V occurred by Redefine properties resulting in a delisting from the JSE in March 2021.
Assore Ltd	2020	Delisted from the JSE during May 2020.
Cartrack Holdings	2021	Cartrack delists in 2021 and plans to list on the Nasdaq.
Distell Group	2018	In the process of being acquired by Heineken.
Imperial Holdings Limited	2017 and 2018	The CEO resigned on 30 April 2018 after a court case took place between him an ex-employee, in which he was accused of discriminating based on the employee's gender.
Sibanye Gold	2019 and 2020	A merger occurred with Stillwater in December2016.
Intu Properties plc	2019	It was delisted from the JSE and London Stock Exchange.

Table 4: Companies with unavailable data

Model 1a

For the first hypothesis, the cost of debt is addressed. Descriptive statistics reflect that on average, based on the sample of 430 observations, the mean integrated reporting quality (IRQ) score was 2.66, and the mean cost of debt (Kd) was 5,962, as shown in Table 5 below.

9 outliers were identified, the majority of which are observations which occurred in 2020 or 2021. This may be a result of the global pandemic, affecting the reasonable cost of debt that would have been expected. These items were removed from the original sample of 439 and the model was re-run on the 430 observations.

On assessment of the control variables it was determined that the average size of the firm (SIZE) based on a natural logarithm of the firm's total assets was 4,352, the average equity market-to-book-value (EMTBV) was 2,512 and the mean current ratio was 1,899. 97% of the observations were audited by a Big4 audit firm (B4) and 56% produced standalone CSR reports in addition to their integrated reports. This is the case for all three models which relied on the same sample items. Lastly, 93% of the 430 items paid an ordinary dividend (DIV).

The independence of the 430 observations included produced a Durbin-Watson statistic of 1,896, which is very close to 2 and this confirmed that there is no correlation between

residuals. The extent of the threat of multicollinearity was assessed and since all correlations were less than 0,7, the threat of multicollinearity is negligible. For more detail, refer to Table 11.

Furthermore, upon inspection of the Tolerance values being greater than 0,1, it can be confirmed that collinearity is not a problem.

Descriptive Statistics			
	Mean	Std. Deviation	N
Kd	5.962	5.421	430
IRQ	2.66	1.261	430
SIZE	4.352	1.552	430
B4	.97	.165	430
CSR	.56	.497	430
EMTBV	2.512	2.546	430
Dividend	.93	.247	430
Current Ratio	1.899	4.141	430

Table 5: Descriptive statistics of key variables for Hypothesis 1 (Kd)

Model 1b

The second hypothesis addresses the cost of equity. The mean integrated reporting quality (IRQ) for the 434 observations was 2,68 and the cost of equity (Ke) is 9,601. Upon comparison, this is rational as the cost of equity is more than the cost of debt and thus one would expect the cost of equity to be higher, with a fairly similar IRQ.

The average size of the firm based on a natural logarithm (SIZE) was 4,357 with an equity market-to-book value (EMTBV) of 2,514 and a mean current ratio (CR) of 1,875. Like Model 1 above, 97% of the observations were audited by a Big4 firm (B4) and 56% produced standalone CSR reports (CSR). Finally, 94% of the companies paid out an ordinary dividend (DIV).

The Durbin-Watson statistic has remained at 1,915 which is still near to 2 and therefore the test for independence of observations is met. Similarly to the cost of debt model, there were 2 outliers that were removed. These related to Quilter Plc for 2020 and 2021, and these anamoly cost of equity rates could have occurred as a result of the uncertainties created by the Covid-19 Pandemic. **SSS**

Descriptive Statistics

	Mean	Std. Deviation	N
Ke	9.601	5.842	434
IRQ	2.68	1.275	434
SIZE	4.357	1.543	434
B4	.97	.164	434
CSR	.56	.496	434
EMTBV	2.514	2.540	434
Dividend	.94	.246	434
Current Ratio	1.875	3.989	434

Table 6: Descriptive statistics of key variables for Hypothesis 2 (Ke)

Model 1c

The third hypothesis encompasses investigating the relationship between integrated reporting quality (IRQ) and the weighted average cost of capital (WACC). The average for these two variables is 2,67 and 8,143 respectively. It is expected that the WACC should lie between the cost of debt and cost of equity given that it includes these variables at proportionate values, based on each firm's capital structure and therefore this average value is reasonable.

The main firm size of the 438 firms based on a natural logarithm was 4,352, the mean equity market-to-book value was 2,504 and the average current ratio was 1,924. Similarly to Kd and Ke above, 97% of the firms were audited by a Big4 accounting firm (B4). 56% of the firms produced standalone CSR reports (CSR) and 93% paid out an ordinary dividend (DIV).

Similarly to the cost of debt and the cost of equity, the 2 leverage points were Quilter Plc during 2020 and 2021. This may be a result of the global pandemic, affecting the reasonable cost of equity that would have been expected. The impact of Covid-19 would need to be minimised to investigate the relationship between integrated reporting quality and its effect on risk of the top 100 JSE-listed companies in South Africa.

The outliers from 2020 and 2021 were removed and the regression analysis re-performed which decreased the sample size by 3 observations from 441 samples, to 438 observations.

Descriptive Statistics			
	Mean	Std. Deviation	N
WACC	8.143	4.728	438
IRQ	2.67	1.268	438
SIZE	4.352	1.539	438
B4	.97	.163	438
CSR	.56	.497	438
EMTBV	2.504	2.528	438

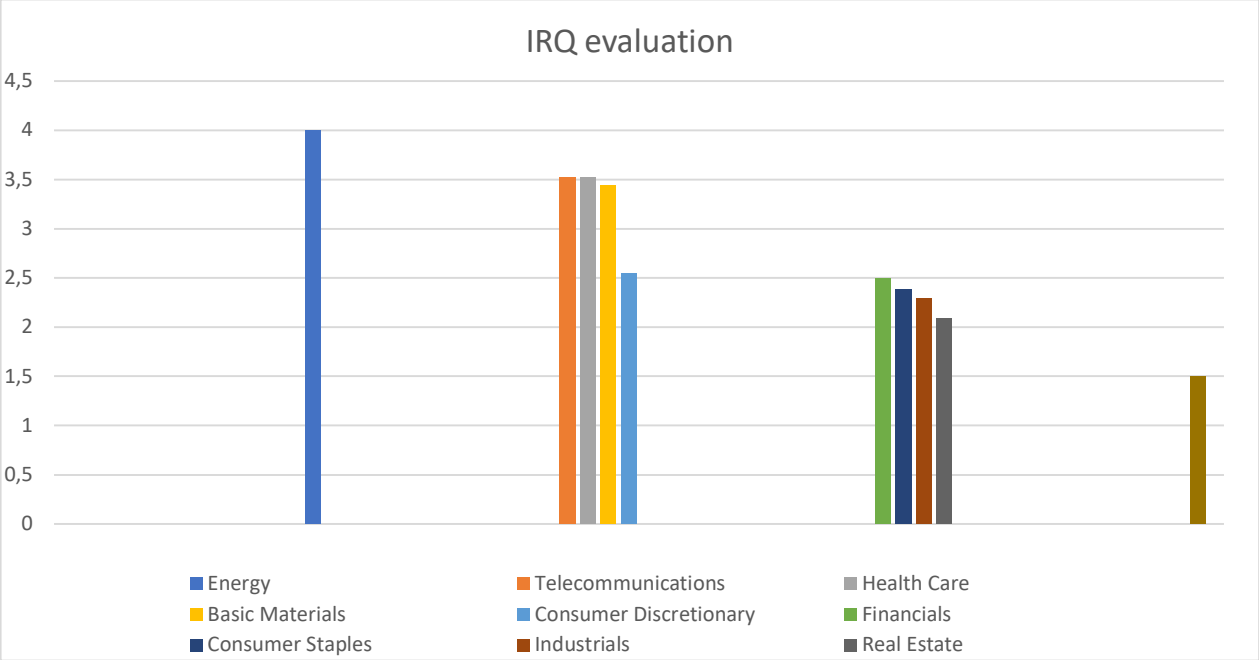
Dividend	.93	.249	438
Current Ratio	1.924	4.114	438

Table 7: Descriptive statistics of key variables for Hypothesis 3 (WACC)

Based on the above considerations, it is evident that the probability of the firm being audited by a Big4 accounting firm and the possibility of the observations paying an ordinary dividend is highly probable, probing the question as to whether these variables have an impact on the determination of integrated reporting quality. This will be further investigated within correlation analysis and evaluation of the variable coefficients.

In addition, 56% of the firms produced stand-alone CSR reports and these companies had an average IRQ score of 3,041 compared to firms that did not produce stand-alone CSR reports and whose IRQ score averaged at 2,156. This is an indication that firms which produce standalone reports, may be better equipped to report on non-financial information, and as a result, can produce higher-quality integrated reports in terms of the rating granted within the EY Excellence in Integrated Reporting Awards. This poses the question as to whether this variable is a significant determinant of integrated reporting quality and will thus be analysed further.

The IRQ rating differs amongst the various JSE economic groups, as shown in Table 8 below, with the Energy industry having the highest average IRQ score of 4, and the technology industry having the lowest average IRQ score of 1,5. A deviation amongst various economic groups is expected owing to sector-specific disclosure requirements as well as competitor practices that then influence the type and extent of disclosure (Piesiewicz et al., 2021, Herbert and Graham, 2019).



	Average IRQ Rating
Energy	4
Telecommunications	3,526315789
Health Care	3,52173913
Basic Materials	3,441558442
Consumer Discretionary	2,545454545
Financials	2,494949495
Consumer Staples	2,378787879
Industrials	2,290322581
Real Estate	2,092307692
Technology	1,5

Table 8: The average IRQ rating across the 10 JSE Economic Groups

Piesiewicz et al. (2021) confirm the hypothesis in their study, that the quality of integrated reports of the energy sector is much higher than those of non-energy sector entities because energy companies operate within a regulated market and are surrounded by large market players which requires them to successfully disclose specific quantitative as well as qualitative factors. The energy sector also requires disclosure regarding ethics and energy companies need to comprehensively assess their key risks and how these are managed to create value in light of its identified strategic objectives.

The weighted average cost of capital (WACC), the cost of debt (Kd) and the cost of equity (Ke) also differed depending on the JSE economic group.

Industry/Economic Group	WACC	Kd	Ke
Energy	7,56	5,57	8,03
Telecommunications	8,80	6,32	9,99
Health Care	7,42	4,92	9,38
Basic Materials	8,98	7,51	9,74
Consumer Discretionary	8,60	5,20	9,95
Financials	8,40	6,99	11,27
Consumer Staples	7,42	5,95	8,49
Industrials	7,61	5,85	9,02
Real Estate	6,96	2,67	7,84
Technology	10,41	5,00	11,86

Key	
	Lowest Economic Group identified
	Highest Economic Group identified

Table 9: The average WACC, Kd and Ke across the 10 JSE Economic Groups

A high Cost of Debt (Kd) within the Basic Materials sector is expected owing to the nature of operations required for the sectors within this economic group such as mining, gold mining, iron and steel, paper and platinum and precious metals. The characteristics prevalent within this industry, like the volatility of prices for raw materials necessary for production, large capital outlays required for new projects and the reporting on ESG no longer being a firm differentiator but rather an expectation of this industry, all play a role in increasing the risk which in turn affects the cost firms would need to pay to acquire funding from banks who want to be sure the firms will not default on capital and interest payments.

The technology economic group rated the highest for both the cost of equity and the weighted average cost of capital. This is expected owing to the fact that investors need to be compensated for the risk they are taking in providing capital to fund emerging technologies

that are yet to prove successful. This is further exacerbated by the nature of technology – if firms are not able to keep up with innovations based on competitive key players, shareholders stand to lose out on their existing investments (Amihud and Mendelson, 2000).

Whilst meaningful comparisons have been drawn across the various JSE Economic Groups, it should be reiterated that as a result of selecting the Top100 JSE listed companies per year, based on market capitalisation, some economic groups are more heavily weighted within the sample than others (See, Table 16 below).

Presentation of Core Findings

The parameters entered within SPSS included all of the relevant independent variables for Kd, Ke and WACC to test the hypotheses on whether an increase in the quality of an integrated report of a company, will be associated with a lower financial risk. The dependent variable was the financial risk, using the three proxies and there were various independent variables namely, integrated reposting quality (IRQ), whether the firm is audited by one of the Big4, whether the firm prepares a standalone CSR Reports (CSR), The size of the firm (SIZE), whether the firm pays out an ordinary dividend (DIV), the current ratio (CR) as well as the equity market-to-book value (EMTBV). An example of the variables included within the SPSS software is shown below:

Variables Entered/Removed		
Variables Entered	Variables Removed	Method
Current Ratio, B4, Dividend, EMTBV, IRQ, SIZE, CSR[b]	.	Enter
a. Dependent Variable: WACC		
b. All requested variables entered.		

Table 10: Variables included when the weighted average cost of capital is regarded the proxy for risk

Analysis of correlations

Cost of debt (Kd) has a positive, small, significant correlation with IRQ (see Table 11) however Ke and WACC are not correlated at all (-0,022 and -0,06 respectively). This raises the question as to the relevance of prior literature in investigating the associations between the cost of equity and integrated reporting quality (Vitolla et al., 2020, Barth et al., 2017).

As the risk of debt increases so does the perceived quality in integrated reporting. This is similar to the findings of Muttakin et al. (2020) who concluded that firms providing integrated reports incur a lower cost of debt. This may indicate that companies are using the integrated report to mitigate agency costs pertaining to debt providers (Sriani and Agustia, 2020). In addition, creditors may rely on the combination of financial and non-financial information to relay the narrative of the company during that period, thus reducing information asymmetry and allowing debt providers to make informed decisions (Atkins and Maroun, 2015, Linsley and Shrives, 2006).

As identified by Atkins and Maroun (2015), organisations may be using the integrated report to obtain further financing. Information asymmetry is reduced by the improvement of disclosures within these reports which include information about the company's organisational model, its risks and opportunities, details about its strategic goals and corporate governance, as well as its remuneration policy, value creation and future outlook. This reduces the advantage that only informed financers may have, ultimately reducing information asymmetry (García-Sánchez and Noguera-Gámez, 2018). Whether the better reporting results in more financing, or more financing results in better reporting requires further investigation ((Vitolla et al., 2020).

The cost of equity and weighted average cost of capital were highly correlated (0,881), followed by the cost of debt and weighted average cost of capital (0,295) and lastly the cost of equity and the cost of debt (0,067). A correlation across the three proxies of risk is expected, owing to the cost of debt and cost of equity being input into the calculation of a firm's weighted average cost of capital. The low correlation between the cost of debt and the cost of equity is reasonable as each proxy focuses on a separate source of financing.

Other independent variables had a significantly stronger relationship with the cost of debt, cost of equity and weighted average cost of capital. This may not necessarily mean that the three proxies of risk have a limited association with the quality of integrated reports, but rather, given that this study sample size only to assess the top 100 JSE-listed companies, well-managed financial risk, proxied by Kd, Ke and WACC, is no longer seen to be a differentiating factor among the top listed companies in South Africa.

Model 1c

Firm size was strongly correlated with the cost of debt (0,130) followed by integrated reporting quality (0,120). This is in line with the research of Muttakin et al. (2020) who suggest that more assets in place minimises the risk a company faces and provides greater opportunities for economies of scale to occur. This suggests that debt providers may rely on the size of

companies when evaluating financing opportunities. The weakest correlation was with the equity market-to-book value variable (0,003). Based on prior research a greater correlation was expected because companies with higher growth opportunities are less likely to default (Muttakin et al., 2020). There was a weak correlation with the variable as to whether dividends were paid out (0,033) and this is reasonable as a distribution would be paid out to the equity providers and debt providers and creditors would be impartial to this decision made by management.

Model 1b

Whether the company was audited by a Big4 firm correlated with the cost of equity (0,132). This highlights the reliance equity providers place on the credibility of audits performed by EY, KPMG, Deloitte or PwC as opposed to other auditing firms (Vitolla et al., 2020). Whether a company pays a dividend or not is also a factor that influences shareholders and investors (0,133), and this is reasonable as they would want to make a profit from their investments. Integrated reporting quality was the independent variable which had the lowest correlation with the cost of equity. This highlights a limited association between the two variables and indicates that the quality of integrated reports may be less relevant to equity providers than to debt providers.

Model 3

The weighted average cost of capital had correlations with firm size (0,231), followed by the current ratio (0,180), whether the company produced a standalone CSR report (0,129) and whether an ordinary dividend was paid (0,113). This is reasonable as this proxy encompasses both equity and debt financing and variables correlated with Kd and Ke will affect the correlations of WACC.

Overall, the correlations for the three models were below 0,7. This proves that there is limited multicollinearity within the cost of debt, cost of equity and weighted average cost of capital models and thus the data can be relied upon (See Appendix 2, 3 and 4).

Correlations										
		Kd	Ke	WACC	IRQ	SIZE	B4	CSR	EMTBV	Dividend	Current Ratio
Pearson Correlation	Kd	1.000	.067	.295	.120*	-.130	-.022	-.017	.003	-.033	.022
	Ke		1.000	.881	-.022	-.084**	-.132*	-.079	.073	-.133**	.184*
	WACC			1.000	-.006	-.231**	-.101	-.129	.050	-.113*	.180
	IRQ				1.000	.128**	. 133**	.344**	-.036	-.061	-.049
	SIZE					1.000	.142**	.316**	-.223**	.058	-.106
	B4						1.000	.131**	.044	.012	.016
	CSR							1.000	-.116	.077	-.078*
	EMTBV								1.000	.043	-.082
	Dividend									1.000	-.088
	Current Ratio										1.000

* significant at the 5% level

** significant at the 1% level

Table 11: The correlation between cost of debt (Kd), cost of equity (Ke) and weighted cost of capital (WACC) and the independent variables

Multicollinearity

The VIF statistics show that multicollinearity does not pose a threat in this investigation as all values are less than or equal to 1.254 (See Table 12) and the highest correlation between the independent variables is 0,344 (between integrated reporting quality (IRQ) and whether a firm produces a standalone CSR report (CSR)) which is well below the threshold applied of 0,7 that indicates potential multicollinearity.

A natural logarithm of capital expenditure of each firm was initially included as a regression variable, however, as it is expected that capital expenditure would increase market capitalisation resulting in multicollinearity with firm size (SIZE), and therefore, the decision was made to exclude this variable.

Table 12 confirms that all independent variables are moderately correlated and this can be seen as the Variance Inflation Factor (VIF) values across the three models are between 1 and 5. This was confirmed by Table 11 which explored the strength of the relationships between the independent variables.

Interpretation of the coefficients

The coefficients of each model are interpreted extensively because these values are substituted within the model which can be used to predict the risk of the company based on any values inputted in terms of the various independent variables. The constant represents the intercept of the study model, that is the value of the proxies for risk (the Kd, Ke and WACC) when all the independent variables are 0.

All three models have a statistically significant constant (<0,001), which probes the possibility of other variables that may not have been explored in the current or previous studies.

Coefficients - Kd													
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95,0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	7.523	1.967		3.824	<,001	3.656	11.390					
	IRQ	.634	.221	.148	2.873	.004	.200	1.068	.120	.139	.137	.865	1.156
	SIZE	-.499	.181	-.143	-2.749	.006	-.855	-.142	-.130	-.133	-.131	.846	1.182
	B4	-.579	1.608	-.018	-.360	.719	-3.740	2.581	-.022	-.018	-.017	.953	1.049
	CSR	-.252	.583	-.023	-.432	.666	-1.399	.895	-.017	-.021	-.021	.797	1.254
	EMTBV	-.048	.106	-.023	-.455	.650	-.256	.160	.003	-.022	-.022	.924	1.083
	Dividend	-.301	1.060	-.014	-.284	.776	-2.385	1.782	-.033	-.014	-.014	.977	1.023
	Current Ratio	.015	.064	.011	.234	.815	-.110	.140	.022	.011	.011	.964	1.037
Coefficient - Ke													
1	(Constant)	15.981	2.074		7.706	<,001	11.905	20.057					
	IRQ	.059	.229	.013	.256	.798	-.391	.508	-.022	.012	.012	.869	1.150
	SIZE	-.057	.192	-.015	-.298	.766	-.434	.320	-.084	-.014	-.014	.847	1.180
	B4	-4.727	1.698	-.133	-2.783	.006	-8.065	-1.389	-.132	-.134	-.130	.953	1.049
	CSR	-.323	.614	-.027	-.525	.600	-1.529	.884	-.079	-.025	-.024	.798	1.254
	EMTBV	.209	.111	.091	1.874	.062	-.010	.427	.073	.090	.087	.928	1.078
	Dividend	-2.699	1.122	-.114	-2.404	.017	-4.905	-.493	-.133	-.116	-.112	.972	1.028
	Current Ratio	.262	.069	.179	3.782	<,001	.126	.398	.184	.180	.176	.971	1.029
Coefficient - WACC													
	(Constant)	13.515	1.653		8.176	<,001	10.266	16.764					
	IRQ	.192	.184	.051	1.041	.298	-.170	.553	-.006	.050	.048	.865	1.156
	SIZE	-.559	.154	-.182	-3.638	<,001	-.861	-.257	-.231	-.173	-.167	.840	1.190
	B4	-2.216	1.358	-.077	-1.631	.104	-4.886	.454	-.101	-.078	-.075	.954	1.048
	CSR	-.553	.489	-.058	-1.130	.259	-1.515	.409	-.129	-.054	-.052	.794	1.260
	EMTBV	.044	.089	.024	.495	.621	-.131	.219	.050	.024	.023	.926	1.079
	Dividend	-1.543	.882	-.081	-1.749	.081	-3.278	.191	-.113	-.084	-.080	.975	1.026
	Current Ratio	.178	.054	.155	3.322	<,001	.073	.284	.180	.158	.152	.966	1.035

Table 12: Interpreting the coefficients for the three proxies of risk

Model 1a

The statistical significance of a firm's integrated reporting quality (0,04) and its size (0,06) are prevalent in predicting the cost of debt. Integrated reporting of higher quality can decrease information asymmetry because by providing a larger amount of financial and non-financial information to the public domain, transparency of company information is encouraged (Zhou et al., 2017). In addition, by articulating the organisation's allegiance to the norms of society, the entity can legitimise its operations and reporting strategy (Al-Shaer, 2018, Atkins and Maroun, 2015).

Model 1b

Upon analysis of the cost of equity model, the current ratio (<0,001), whether the company was audited by a Big4 firm (0,006) and whether ordinary dividends paid (0,017), are determined to be statistically significant.

Integrated reporting quality is not statistically significant in terms of the cost of equity model. According to Stratling (2007), firms which are able to engage in CSR initiatives and successfully convey this to investors may benefit if their shares have been considered in the portfolios of ethical investors as well as socially responsible mutual funds or unit trusts (Stratling, 2007). This research looks solely at the Top 100 JSE-listed companies and does not represent all investors operating within the South African landscape.

Model 1c

The size of the firm (0,017) and its current ratio are statistically significant in terms of the weighted average cost of debt.

The analysis of results has shown that integrated reporting quality is associated with a firm's cost of debt however, statistical significance on the cost of equity and the weighted average cost of capital, is limited. The quality of integrated reports of firms is important to financial institutions and other financers that are the providers of debt financing. Integrated reporting quality was not correlated with the cost of equity model and the weighted average cost of capital and this proves that the quality of such reports may hold less value for shareholders who offer equity financing to firms in the form of a purchase of its shares, as they seem to rely on other factors in order to evaluate their investment decisions.

Similarly to the findings of Muttakin et al. (2020), this study suggests that the provision of extra-financial information, decreases the firm's cost of debt, by reducing the processing costs lenders would ordinarily take into account when assessing the prospects of a potential investment. This is confirmed by Barth (2017) which assesses the impact of information

asymmetry resulting in lowered liquidity, and a decrease in the share price and in cost of capital as investors expect a premium based on the risk they are incurring.

Robustness Checks

In order to enhance the reliability of the study, the following robustness checks are performed:

1. The ESG pillars as an IR Quality substitute: This check utilises a one-way ANOVA test to determine whether the MSCI ESG Scores could be used as a substitute for the integrated reporting quality scores as assigned by the EY Awards. This enhances reliability over the main independent variable.
2. Kruskal Wallis performed over industry groupings: This robustness test aims to identify whether there are differences based on the industry grouping for the three indices.
3. Debt and equity ratios to enhance the proxy of risk. Financial ratios are used in place of the cost of debt and the cost of equity to enhance the reliability of the Kd and Ke values sourced from IRESS.
4. A correlation between integrated reporting quality and the year: This check is performed to confirm that the main independent variable has a low variation over time.

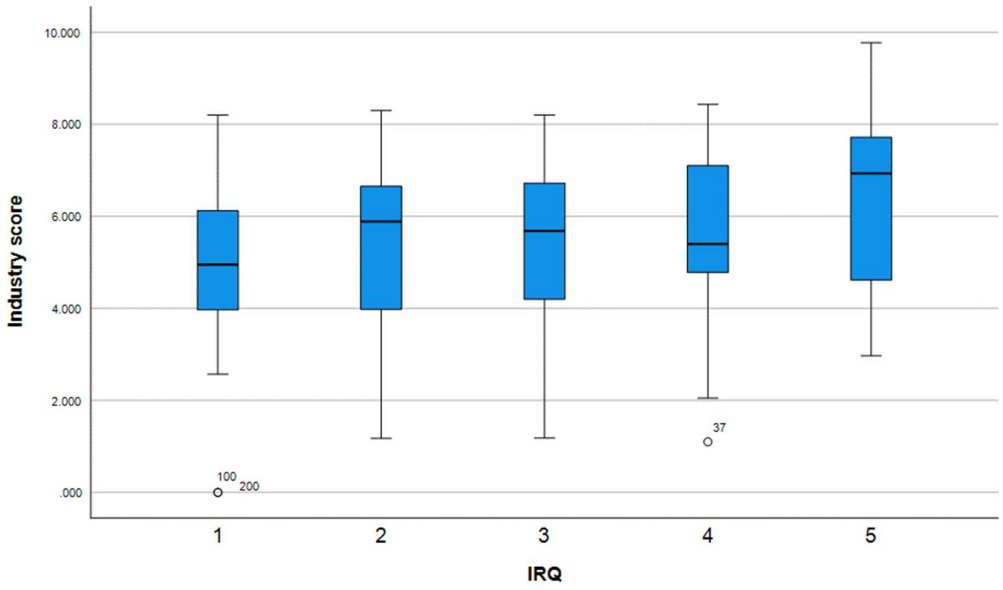
ESG pillars as an IR Quality substitute

The MSCI ESG scores will be tested against the Integrated Reporting Quality scores as a robustness check for the independent variable tested within this report. A one-way ANOVA test is used to determine whether there are any statistically significant differences between the means of two or more independent groups and this test was run using the two types of scores for the period 2017 to 2020.

The independent groups were the five types of integrated reporting quality scores namely: Progress to be made, average, good, excellent and top 10 and these were coded as an ordinal variable. This meets Assumption 2 of the test which requires there to be one independent variable with two or more categorical, independent groups. The dependent variable was the industry-adjusted Leeds MSCI ESG scores, and this was coded within SPSS as a continuous variable and this meets Assumption 1 of the test: a dependent variable that is measured on a continuous level. Assumption 3 is also easily met because observations are independent as no company is placed into more than one integrated reporting quality group.

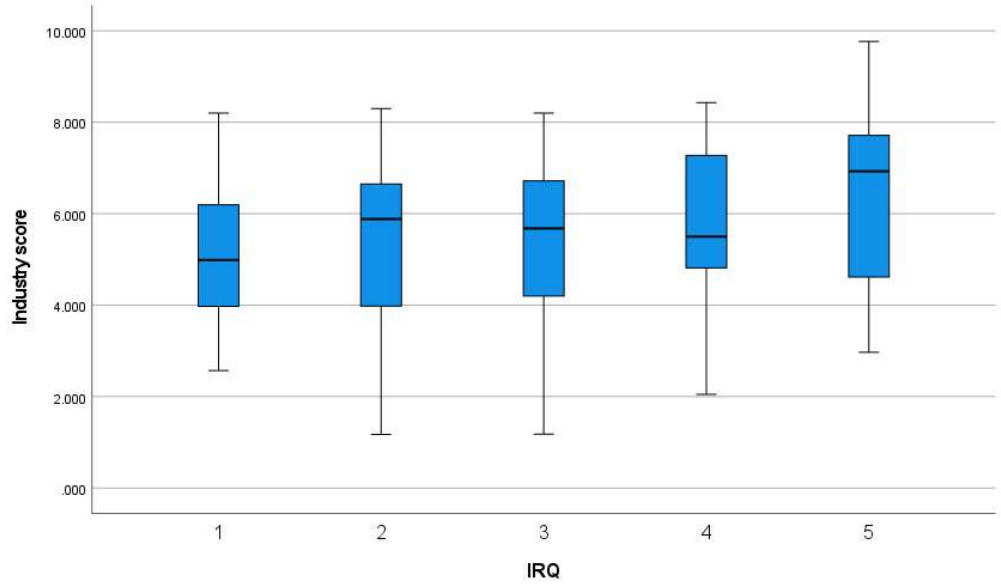
To test the 4th Assumption, a boxplot was generated to inspect for any outliers. 3 outliers were noted, however, no extreme outliers were present. The following outliers were noted:

1) Harmony Gold Mining Company Ltd in 2017 had an unusually low ESG Score of 1,1 when its IRQ score was 4.
2) Zeder Investments in 2017 also had an unusually low ESG Score of 0,0 when the IRQ score was 1.
3) Zeder Investments in 2018 exhibited a similar pattern of a low ESG Score of 0,0 when the IRQ score was 1.



Graph 1: A boxplot of the IRQ scores against the ESG scores, with three outliers identified

These outliers were removed and the assumption re-run which generated the following result:



Graph 2: A boxplot of the IRQ scores against the ESG scores, after removing the three outliers

The 5th Assumption tested was determining whether the data is normally distributed using the Shapiro-Wilk test of normality. The significance level (p-value) for each integrated reporting quality group was considered in the table below. The results showed that the data was not necessarily normally distributed since all p-values were not greater than 0,05. For IRQ score 1 (Progress to be made) and 5 (Top 10), the p-values were greater than 0,05, however for IRQ scores 2 (average), 3 (good), 4 (excellent) and 5 (Top 10)the significance level was below 0,05.

Tests of Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	IRQ	Statistic	df	Sig.	Statistic	df	Sig.
Industry score	1	.096	52	.200*	.971	52	.239
	2	.136	62	.006	.955	62	.023
	3	.152	85	<,001	.934	85	<,001
	4	.122	48	.071	.951	48	.044
	5	.153	40	.019	.948	40	.063

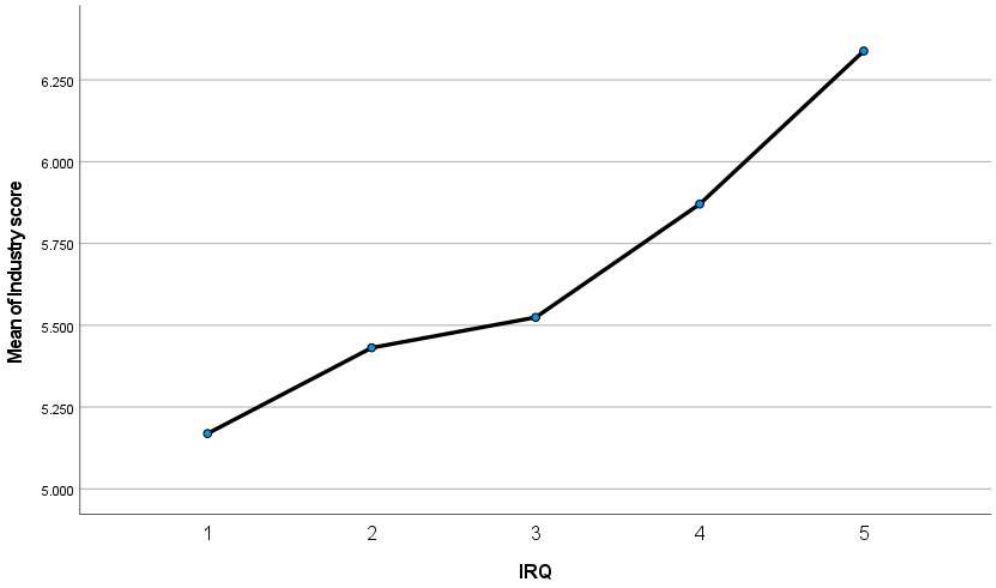
*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Table 1: Results of the Shapiro-Wilk test performed

The violation of this assumption was, however, accepted and this is owing to the sample sizes in each group being unequal (They range from 41 to 86). In addition to this 80% of the sample sizes are greater than 50 and since the Shapiro-Wilk test flags very minor deviations from normality as being not normally distributed therefore it is recommended to assess the Normal Q-Q Plots.

Lastly, the following graph was considered, which plotted the mean of ESG scores against the IRQ scores and this showed a positive relationship between the two types of scores, indicating that ESG scores could be used as a substitute for the IRQ scores.



Graph 3: Graph to show the positive relationship between the mean of the ESG score and the EY IR quality score

Kruskal Wallace performed over industry groupings

The Kruskal-Wallis H test was used to determine if there were any statistically significant differences between industry groupings, where two or more of the independent variables have an impact on the dependent variable.

Four assumptions need to be met to perform the Kruskal-Wallis test:

Assumption 1: There is one dependent variable measured at a continuous or ordinal level.

Risk is the dependent variable and it is a continuous variable as it is measured using three financial ratios: weighted average cost of capital, cost of debt and cost of equity.

Assumption 2: There is one independent variable that consists of two or more categorical, independent groups

The independent variable is in this instance is the industry groupings consisting of the following:

Industry/Economic Group	Number assigned	Number of samples within each group
Basic Materials	1	77
Consumer Discretionary	2	44
Consumer Staples	3	66

Energy	4	5
Financials	5	99
Health Care	6	23
Industrials	7	31
Real Estate	8	65
Technology	9	8
Telecommunications	10	19

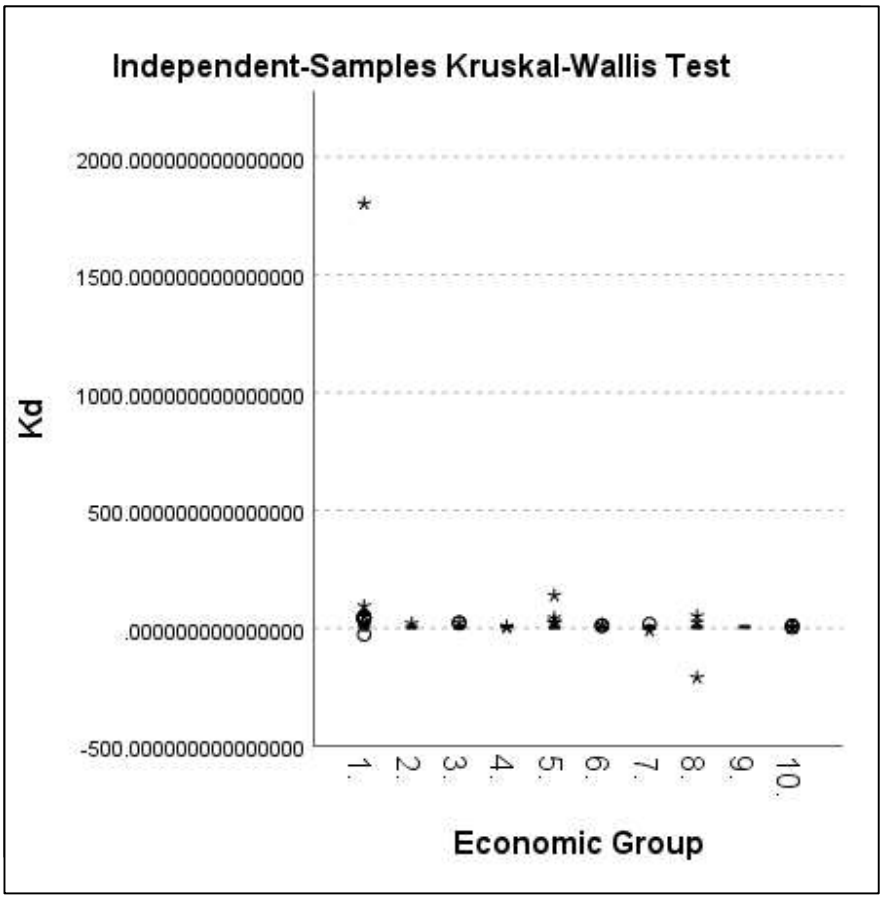
Table 2: A list of the ten industry groupings within the sample

Assumption 3: There is an independence of observations

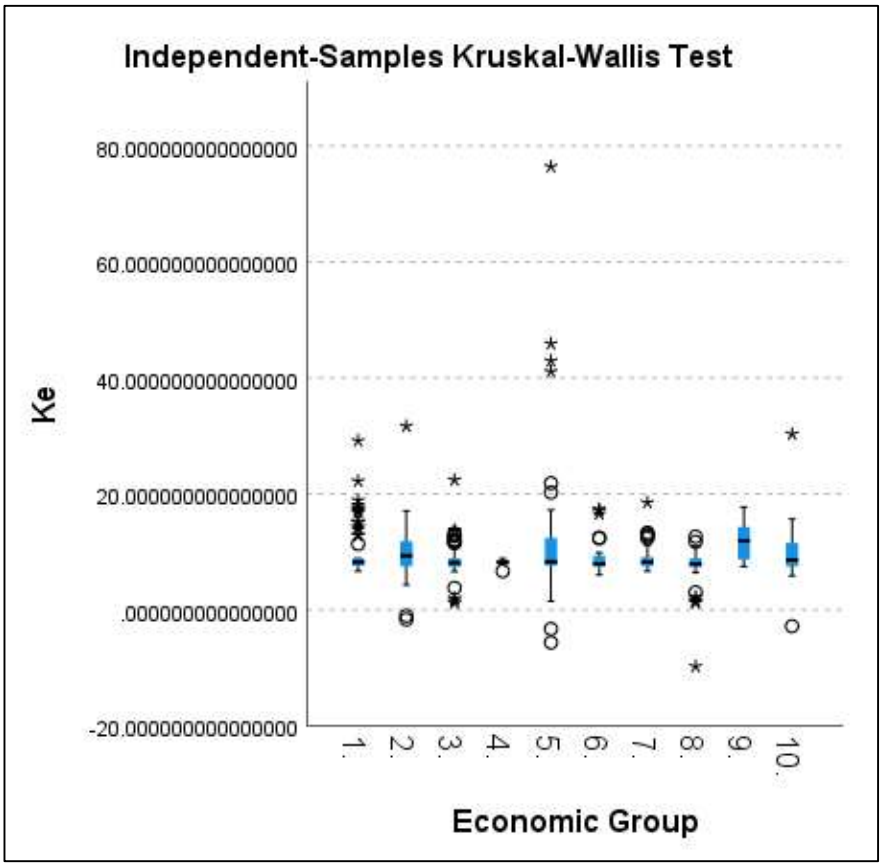
There is no relationship between the observations of each group and this is confirmed by the fact that no item within the sample is included in more than one group (Laerd Statistics, 2022).

Assumption 4: To determine whether the distribution of scores for each group of the independent variable has the same shape or a different shape

If the distributions have a different shape, the Kruskal-Wallis H test is used to determine whether there are differences in the distributions of the five groups. If the distributions are the same shape, the Kruskal-Wallis H test can be used to determine whether there are differences in the medians of the groups (Laerd Statistics, 2022).



Graph 4: A boxplot between Kd and the different industry groups



Graph 5: A boxplot between Ke and the different industry groups

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.[a,b]	Decision
1	The distribution of WACC is the same across categories of Economic Group .	Independent-Samples Kruskal-Wallis Test	.003	Reject the null hypothesis.
2	The distribution of Kd is the same across categories of Economic Group .	Independent-Samples Kruskal-Wallis Test	.032	Reject the null hypothesis.
3	The distribution of Ke is the same across categories of Economic Group .	Independent-Samples Kruskal-Wallis Test	.062	Retain the null hypothesis.

a. The significance level is .050.

b. Asymptotic significance is displayed.

Table 3: Hypothesis Test summary for the Kruskal Wallis test performed over the ten groupings, for WACC, Kd and Ke

Distributions are fairly similar by a visual assessment of the boxplots in Tables 15, 16 and 17 above. A comparison of medians will therefore be performed.

H0: the distributions of the groups are equal

H1: the medians of the groups are not equal

It can be confirmed that this is not a statistically significant result as the decision has been shaded in grey, by SPSS to communicate this. In addition the p-values, shown as 'Sig' are not <0,02. Based on the results, the conclusion is as follows:

The Kruskal-Wallis H test performed to determine if there were differences in the WACC among ten industry groupings. Distributions of WACC values were similar for all groups, as assessed by visual inspection of a boxplot. Median WACC values were different between groups, H (9) = 25.092, p = .003, however this was assessed as not statistically significant.

The Kruskal-Wallis H test performed to determine if there were differences in the Kd among ten industry groupings. Distributions of Kd values were similar for all groups, as assessed by visual inspection of a boxplot. Median Kd values were different between groups, H (9) = 18.306, p = .032, however, this was not assessed as statistically significant.

The Kruskal-Wallis H test performed to determine if there were differences in the Ke among ten industry groupings. Distributions of Ke values were similar for all groups, as assessed by visual inspection of a boxplot. Median Ke values were the same between groups, H (9) = 25.092, p = .003, however, this is not statistically significant.

Therefore, for the cost of equity proxy, it cannot be confirmed that differences exist within the ten industry groupings. Whereas for the cost of debt and weighted average cost of capital

proxies, the null hypothesis is rejected and there are deviations based on industry groupings. This is in line with the research conducted by Herbert and Graham (2019) and Piesiewicz et al. (2021) owing to sector-specific disclosure requirements as well as competitor practices that then influence the type and extent of disclosures within integrated reports.

Debt and Equity ratios to enhance the proxy of risk

As mentioned in Chapter 3, other financial ratios will be used as proxies of risk in assessing its relationship with integrated reporting quality. This will be tested using linear regression.

	Durbin-Watson	Outliers	Normally Distributed	R	R^2	Adj. R^2	Statistical significance
Debt/Equity	2,115	7 outliers	Yes	0,051	0,03	0,00	0,0273
Long-term loans % to total debt	1,849	0 outliers	Yes	0,104	0,011	0,009	0.031
Return on Capital Employed	2,009	4 outliers	Yes	0,04	0,00	-0,02	0,925
Return on Equity %	1,985	3 outliers	Yes	0,027	0,001	-0,001	0,567
Earnings/Shares	1,661	9 outliers	Yes	0,128	0,016	0,014	0,006
Price/Earnings	1,996	8 outliers	Yes	0,058	0,003	0,001	0,229
Earnings Yield %	1,975	6 outliers	Yes	0,103	0,011	0,008	0,032

Table 4: Summary of results for various financial ratios

The statistically significant financial ratios are Debt/Equity, Long-term loans% to total debt as well as Earnings/Shares and Earnings Yield %. Since the cost of debt and weighted average cost of capital proxies were statistically significant, there is an expectation the Debt/Equity ratio would also be statistically significant given that it is the aspect that weighs the cost of capital.

Chapter 5: Conclusion and Areas for Future Research

The IIRC's Framework (Framework) identifies two goals for integrated reporting namely, improved information for providers of financial capital and better internal decision-making. The reduction in information asymmetry and improved decision-making should improve access to

financing, in terms of a company's cost of debt, cost of equity, and liquidity position, according to the agency theory (Sriani and Agustia, 2020, Atkins and Maroun, 2015) however this benefit is seldom researched (see, for example Muttakin et al., 2020). This report aimed to explore whether or not there is a relationship between an entity's key financial ratios which are measures of risk, and the quality of integrated reports it produces. A sample of the Top100 JSE-listed South African companies were examined over five years to investigate the relationship between integrated reporting quality and risk.

The Hypotheses developed within the research are as follows:

- H1: an increase in the quality of an integrated report of a company, will be associated with a lower cost of debt.
- H2: an increase in the quality of an integrated report of a company, will be associated with a higher cost of equity.
- H3: an increase in the quality of an integrated report of a company, will be associated with a lower weighted average cost of capital.

The results suggest a significant relationship between the costs of debt and integrated reporting quality when compared to the cost of equity and the weighted average cost of capital. This confirms that H1 had a stronger association compared to H2 and H3. In addition, other variables held a stronger relationship with integrated reporting quality, such as the ability of a firm to produce a standalone CSR report, as well as the firm's equity market-to-book ratio and a firm's size.

The findings of this investigation have numerous implications for management, regulators, as well as shareholders and lenders. If management is aware that risk could improve the firm's lending and shareholding opportunities, they will be inclined to produce integrated reports of enhanced quality.

In addition, the risk that management takes on, in terms of their cost of debt, cost of equity and the ratio of their debt to equity (which WACC considers) could also be strategically selected by management thus impacting a firm's financing decisions. In terms of regulators, this study highlights the importance of integrated reporting and the value of adopting this reporting system. Shareholders and lenders would also be interested in this study as it provides a relationship between risk and integrated reporting, giving greater insight into making investment decisions in listed firms.

Future Areas of Research

This study is based on single-country data and recommends that similar investigations be conducted taking into account other regions, in order to enhance the generalizability of the findings. In addition to this, this study was based on a sample of the Top100 JSE listed companies and thus recommends future areas of study to assess all listed firms in order to perform a more in-depth analysis of the deviations within Economic Groups represented on the stock exchange.

The study encourages further exploration into the differentiation between the users of integrated reports, as being creditors and shareholders and whether it is a single group or the combination of a multitude of stakeholders that shapes the quality of integrated reports.

Finally, this research calls for a greater investigation of financial risk and its impact on integrated reporting quality, by considering other proxies for risk in order to extend the current understanding of the relationship between risk and integrated reporting quality of various firms.

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Appendix 1: Variable Definitions

Variable	Definitions
Dependent Variables	
WACC	*This is the weighted average cost of capital.*
Kd	*The Kd variable represents the cost of debt.*
Ke	*This variable is the cost of equity.*
Independent Variables	
IRQ	*IRQ stands for integrated reporting quality and the scores are based on the EY Excellence in integrated Reporting Awards.*
SIZE	*This variable represents the size of the firm measured using a natural logarithm of the total assets.*
CSR	*The CSR variable encapsulates corporate social responsibility and represents whether a standalone CSR report has been produced by the firm. This variable is coded as follows:* *0: is assigned if no standalone report is produced* *1: is assigned if a standalone report has been produced*
B4	*This variable represents whether the entity has been audited by one of the Big4 accounting firms. It is coded as follows:* *0: assigned if it has not been audited by one of the Big4,* *1: is assigned if the firm has been audited by one of the Big4 companies.*
DIV	*DIV is whether a company has paid out an ordinary dividend or not. It is coded as follows:* *0: If no ordinary dividend pay out has been made* *1: If an ordinary dividend pay out has been made*
CR	*This is the current ratio of the comapany*
EMTBV	*EMTBV is the equity market-to-book value of the firm.*

Table 1.1: Definition of variables

Appendix 2: Testing the assumptions of Multiple Linear Regression for the cost of debt

Assumption 1: There is one dependent variable and it is measured at a continuous level

Assumption 1 is met as Kd is the dependent variable in this instance and it is continuous as the value can be an infinite number and not merely an integer.

Assumption 2: There are two or more variables, each measured at the continuous or nominal level

This test includes more than one independent variable and these are measured as follows:

Independent Variable	Measurement
IRQ (main independent variable)	Nominal
SIZE	Continuous
B4	Nominal
CSR	Nominal
DIV	Nominal
CR	Continuous
EMTBV	Continuous

Table 2.1: List of independent variables

Assumption 3: Independence of observations

Assumption 3 requires an independence of observations. The independence of the 430 observations included produced a Durbin-Watson statistic of 1,896, which is very close to 2 and this confirmed that there is no correlation between residuals.

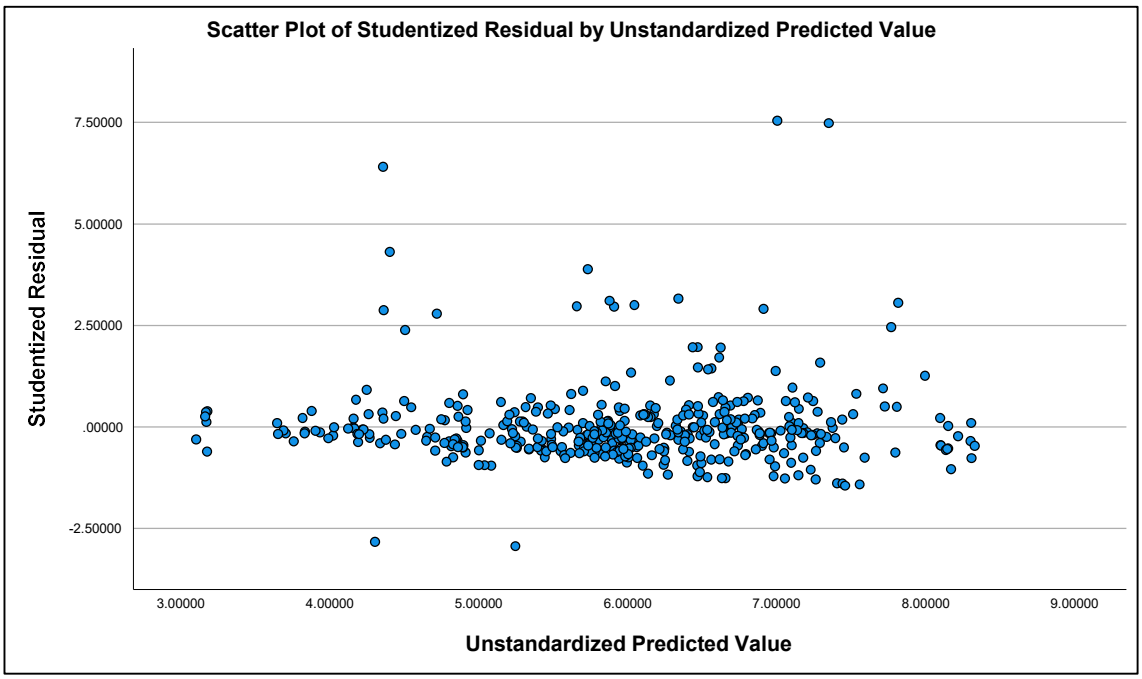
Model Summary[b]					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.194[a]	.038	.022	5.3619454	1.896
a. Predictors: (Constant), Current Ratio, B4, Dividend, EMTBV, IRQ, SIZE, CSR					
b. Dependent Variable: Kd					

Table 2.2: Durbin-Watson statistic when Kd is the dependent variable

Assumption 4: Testing for linearity

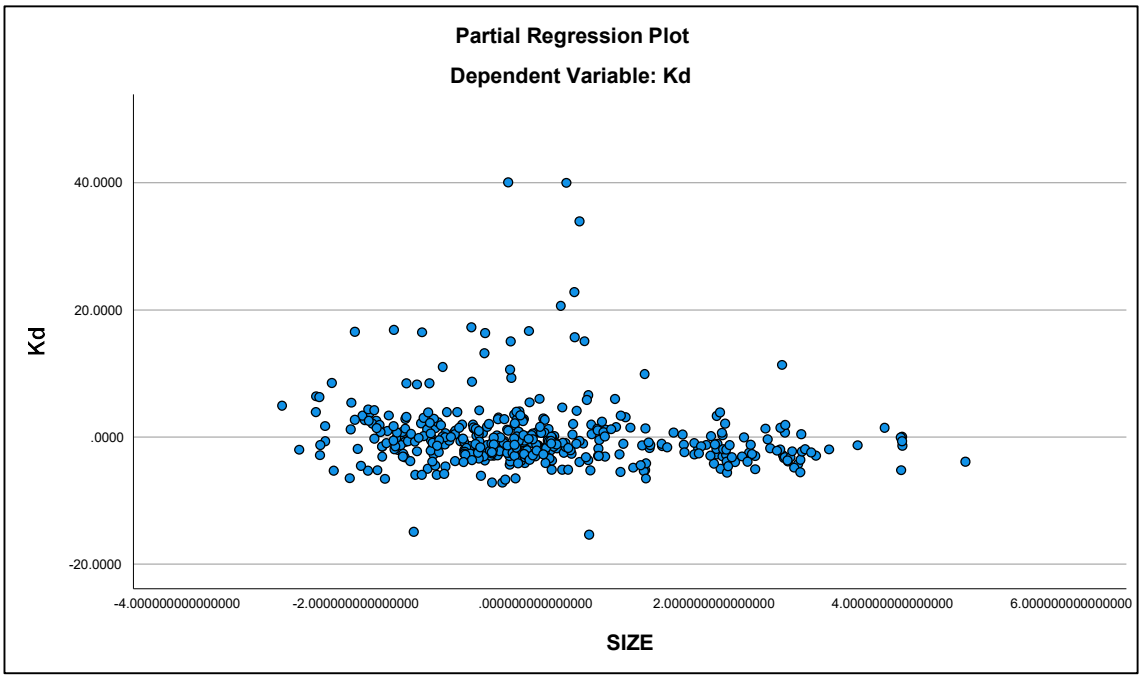
The fourth Assumption of multiple linear regression is that the continuous independent variables (Integrated Reporting Quality (IRQ), firm size (SIZE), equity market-to-book value (EMTBV) and the current ratio (CR)) collectively are linearly related to the dependent variable (Risk proxied by Kd) within this study and that each independent variable is linearly related to the dependent variable.

The scatterplot drawn shows a horizontal band signifying that the relationship is linear:

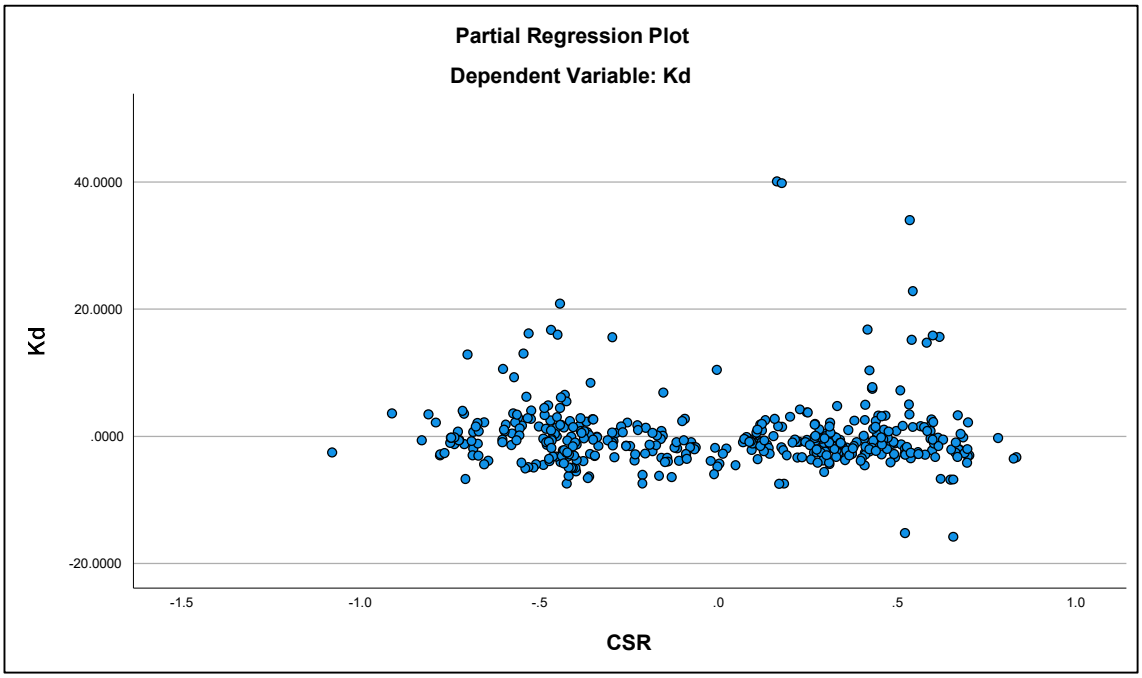


Graph 2.1: Testing the linearity of the independent variables

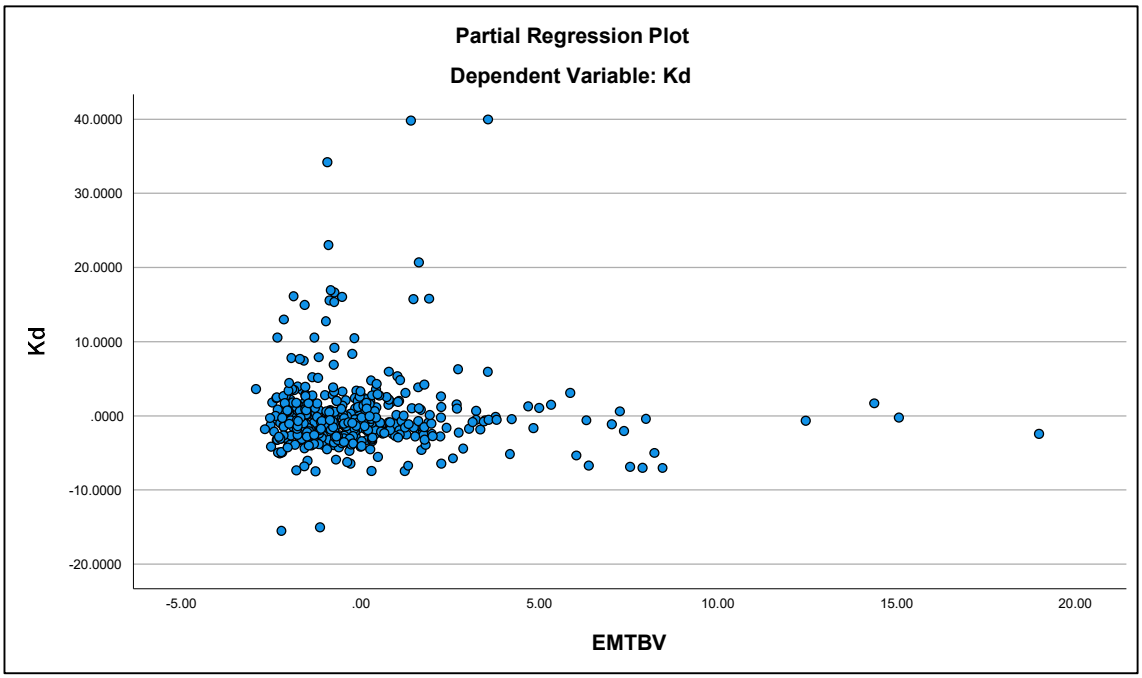
A partial regression plot was also run between each independent variable (excluding categorical independent variables) and the dependent variable (Kd as a proxy for risk) to confirm linearity.



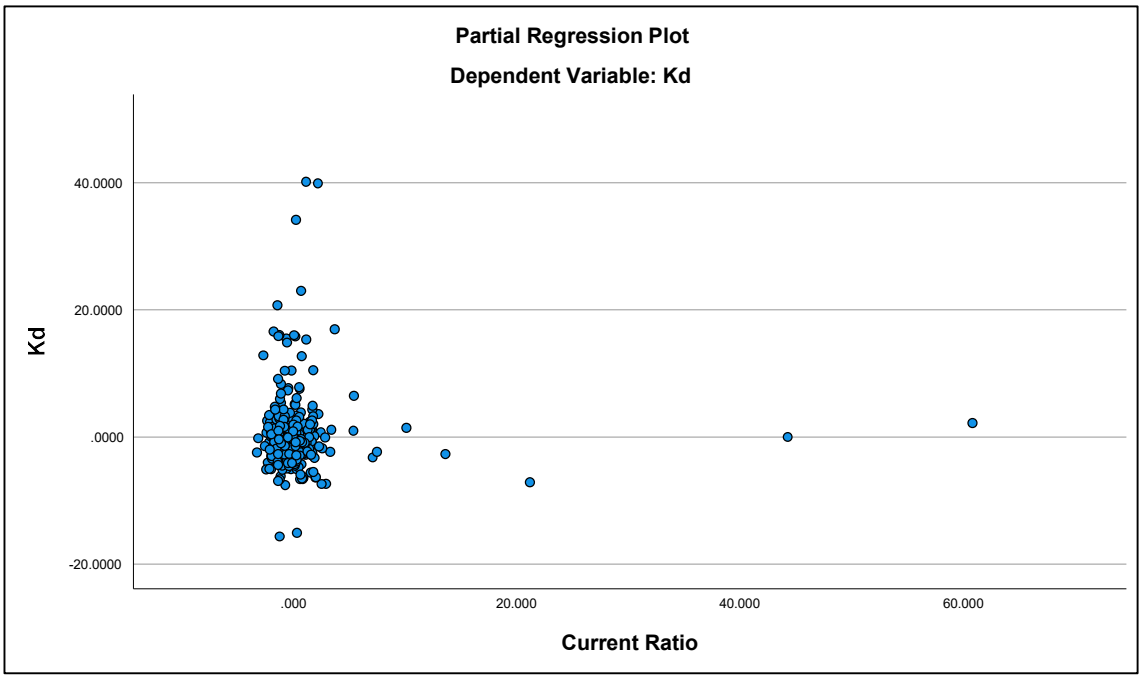
Graph 2.2: A partial regression plot between firm size (SIZE) and cost of debt (Kd)



Graph 2.3: A partial regression plot between firm size (SIZE) and cost of debt (Kd)



Graph 2.4: A partial regression plot between equity market-to-book value (EMTBV) and cost of debt (Kd)



Graph 2.5: A partial regression plot between the current ratio (CR) and cost of debt (Kd)

Assumption 5: Testing for homoscedasticity

According to Graph 2.1, the points appear to be randomly scattered and display an approximately constant spread, and therefore it would appear that the residuals have met the assumption of homoscedasticity.

Assumption 6: Checking for multicollinearity

For more detail, refer to Table 12.

Assumption 7: Checking for unusual points

Various outliers appeared when Kd is used as a proxy for risk. This table highlights any observations that do not follow a similar pattern of points (the below items are far from the predicted values).

Casewise Diagnostics[a]				
Case Number	Std. Residual	Kd	Predicted Value	Residual
84	3.215	27.3820	4.412707	22.9692932
204	5.420	47.1210	8.397434	38.7235664
244	5.384	47.2101	8.747346	38.4627538
283	4.777	38.4940	4.364656	34.1293445
304	4.378	39.5388	8.260159	31.2786408
344	3.864	36.2405	8.634260	27.6062405
433	5.930	49.8645	7.501700	42.3628000
439	5.677	49.2150	8.656245	40.5587546
460	5.051	45.8556	9.769031	36.0865692
468	5.103	42.5749	6.118789	36.4561115
482	5.869	46.3419	4.412029	41.9298707
a. Dependent Variable: Kd				

Table 2.3: Assessing the Casewise Diagnostics table to identify potential outliers

Studentized Deleted Residuals

The following observations were highlighted as being potential outliers, based on inspection of the studentized deleted residual. These residuals are greater than +/-3 standard deviations:

Case Name	Year	Kd	IRQ	Studentized residual value
Impala Platinum Holdings Ltd	2021	27.3820	4	
South32 Ltd	2021	47.1210	1	
Kumba Iron Ore Ltd	2021	47.2101	5	
Anglo American Platinum Ltd	2019	38.4940	5	
Kumba Iron Ore Ltd	2019	39.5388	5	
Omnia Holdings Ltd	2021	36.2405	4	
Rand Merchant Investment Holdings Limited	2021	49.8645	2	
South32 Ltd	2020	49.2150	1	

Anglo American Platinum Ltd	2020	45.8556	5	
Kumba Iron Ore Ltd	2020	42.5749	5	

Table 2.4: Identifying potential outliers using studentized deleted residuals

Leverage points

A vital step to identifying the outliers for this model was interpreting any leverage points. Any leverage points above 0,2 were identified.

Case Name	Year	Kd	IRQ	Leverage point
Quilter Plc	2021	27.3820	2	
Quilter Plc	2020	47.1210	2	

Table 2.5: Identifying potential outliers using leverage points

Influential points

The final step in identifying potential outliers was assessing influential points using Cook's Distance. Based on this measure, if a Cook's Distance value is greater than 1, it should be investigated.

Case Name	Year	Kd	IRQ	Leverage point
Omnia Holdings Ltd	2021	27.3820	4	

Table 2.6: Identifying potential outliers using influential points

Based on the above, it can be seen that the majority of the outliers are observations which occurred in 2020 or 2021. This may be a result of the global pandemic, affecting the reasonable cost of debt that would have been expected. The impact of COVID-19 would need to be minimised in order to investigate the relationship between integrated reporting quality and its effect on the risk of the top 100 JSE-listed companies in South Africa.

These outliers from 2020 and 2021 were removed and the regression analysis was re-run which had the following impact:

The sample size decreased by 9 observations from 439 samples, to 430 observations

Descriptive Statistics			
	Mean	Std. Deviation	N
Kd	6.57	7.229	439
IRQ	2.67	1.270	439
SIZE	4.363	1.548	439
B4	.97	.163	439
CSR	.56	.497	439
EMTBV	2.509	2.527	439
Dividend	.93	.249	439

Current Ratio	2.291	7.060	439

Table 2.7: Original descriptive statistics test prior to removing the outliers

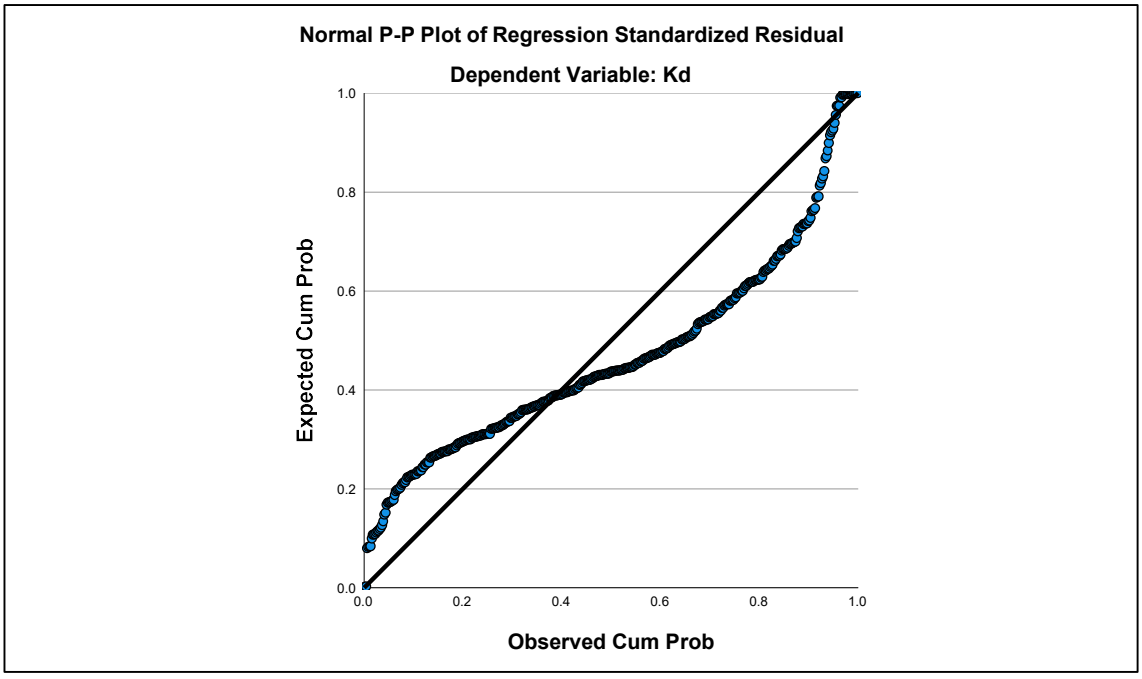
The Durbin-Watson statistic changed to 1.896 (See table 2.2), compared to 2.033 which is still near to 2 and therefore the test for independence of observations is met.

Model Summary[b]					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.198[a]	.039	.023	7.1439733	2.033
a. Predictors: (Constant), Current Ratio, B4, Dividend, EMTBV, IRQ, SIZE, CSR					
b. Dependent Variable: Kd					

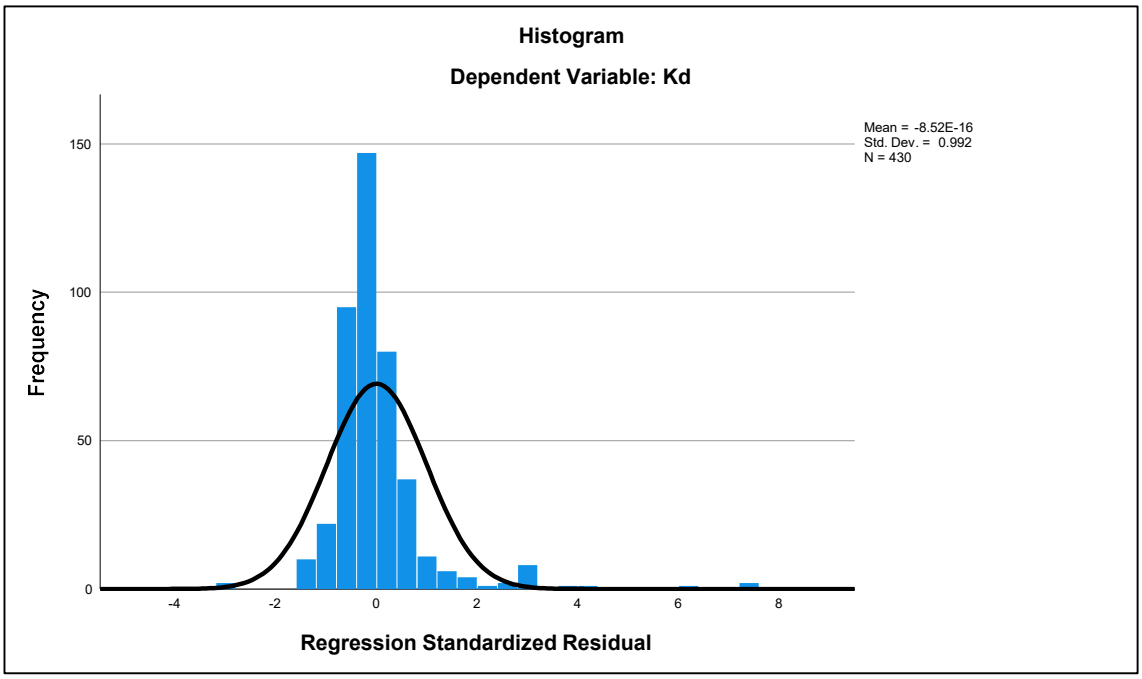
Table 2.8: Original Durbin-Watson test prior to removing the outliers

Assumption 8: Checking for normality

Upon visual inspection of the P-P Plot as well as the normal distribution curve produced, it can be confirmed that the residuals are normal.



Graph 2.6: P-P Plot detailing the normality of the residuals



Graph 2.7: Histogram detailing the normality of the residuals

Appendix 3: Testing the assumptions of Multiple Linear Regression for the cost of equity

Assumption 1: There is one dependent variable and it is measured at a continuous level

Assumption 1 is met as Ke is the dependent variable in this instance and it is continuous as the value can be an infinite number and not merely an integer.

Assumption 2: There are two or more variables, each measured at the continuous or nominal level

This test includes more than one independent variable and these are measured as follows:

Independent Variable	Measurement
IRQ (main independent variable)	Nominal
SIZE	Continuous
B4	Nominal
CSR	Nominal
DIV	Nominal
CR	Continuous
EMTBV	Continuous

Table 3.1: List of independent variables

Assumption 3: Independence of observations

Assumption 3 requires an independence of observations. The independence of the 434 observations included produced a Durbin-Watson statistic of 1,915, which is very close to 2 and this confirmed that there is no correlation between residuals.

Model Summary[b]					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.274[a]	.075	.060	5.6642442	1.915
a. Predictors: (Constant), Current Ratio , B4, EMTBV, Dividend, IRQ, SIZE, CSR					
b. Dependent Variable: Ke					

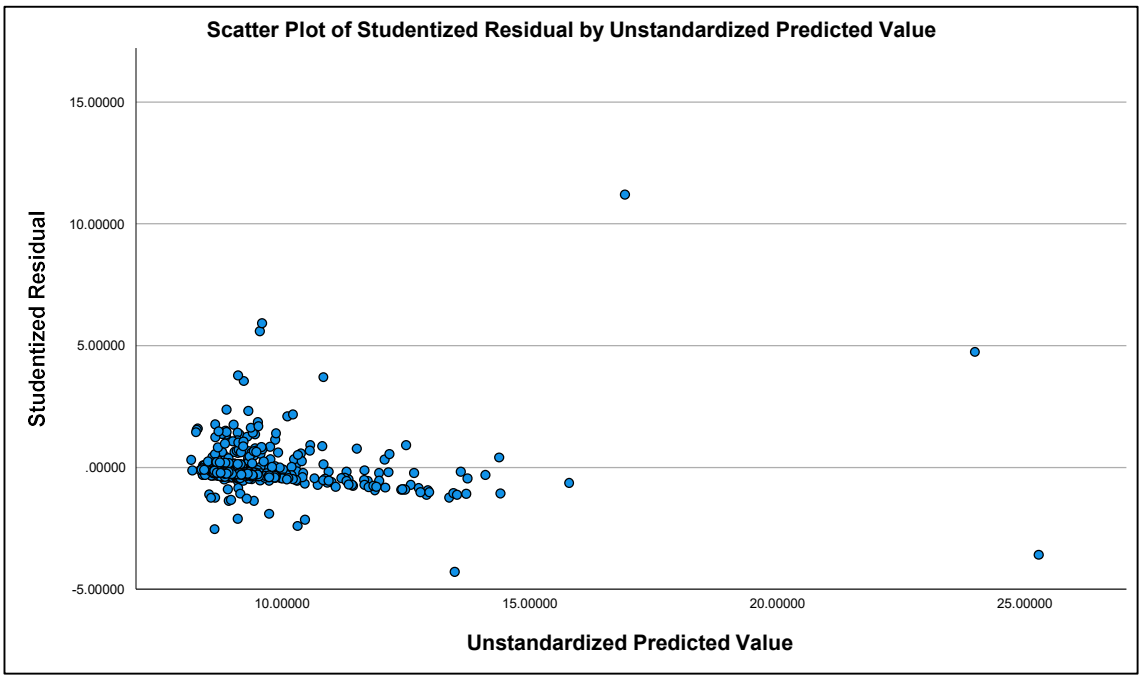
Table 3.2: Durbin-Watson statistic when Kd is the dependent variable

Assumption 4: Testing for linearity

The fourth Assumption of multiple linear regression is that the continuous independent variables (Integrated Reporting Quality (IRQ), firm size (SIZE), equity market-to-book value

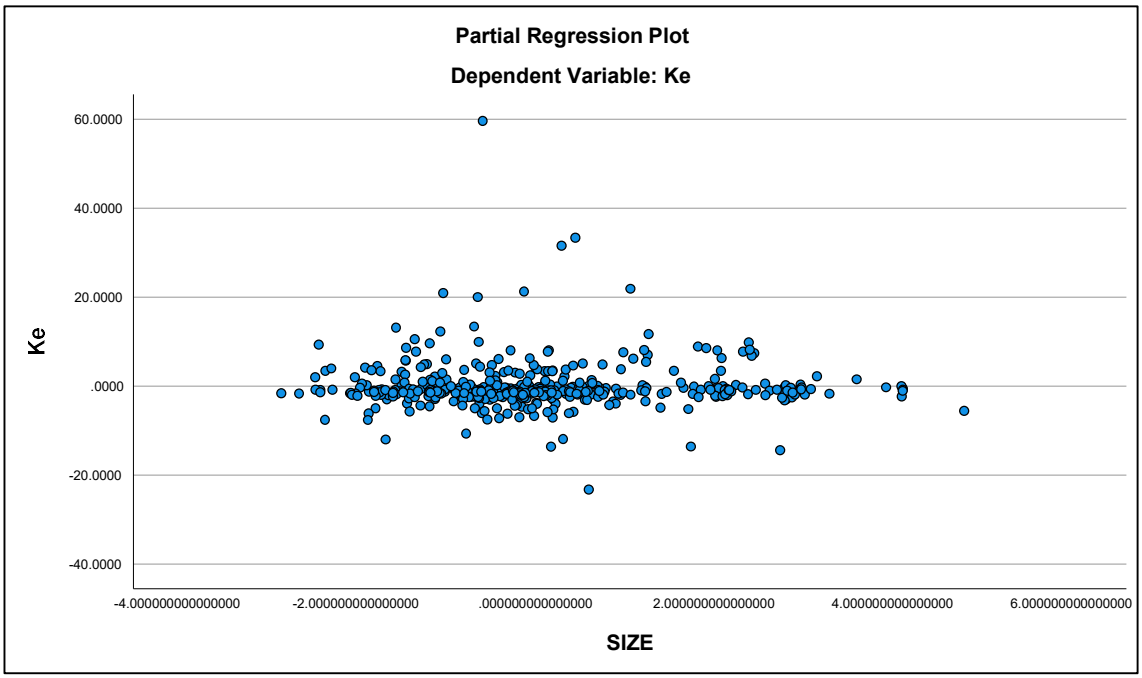
(EMTBV) and the current ratio (CR)) collectively are linearly related to the dependent variable (Risk proxied by Ke) within this study and that each independent variable is linearly related to the dependent variable.

The scatterplot drawn shows a horizontal band signifying that the relationship is fairly linear:

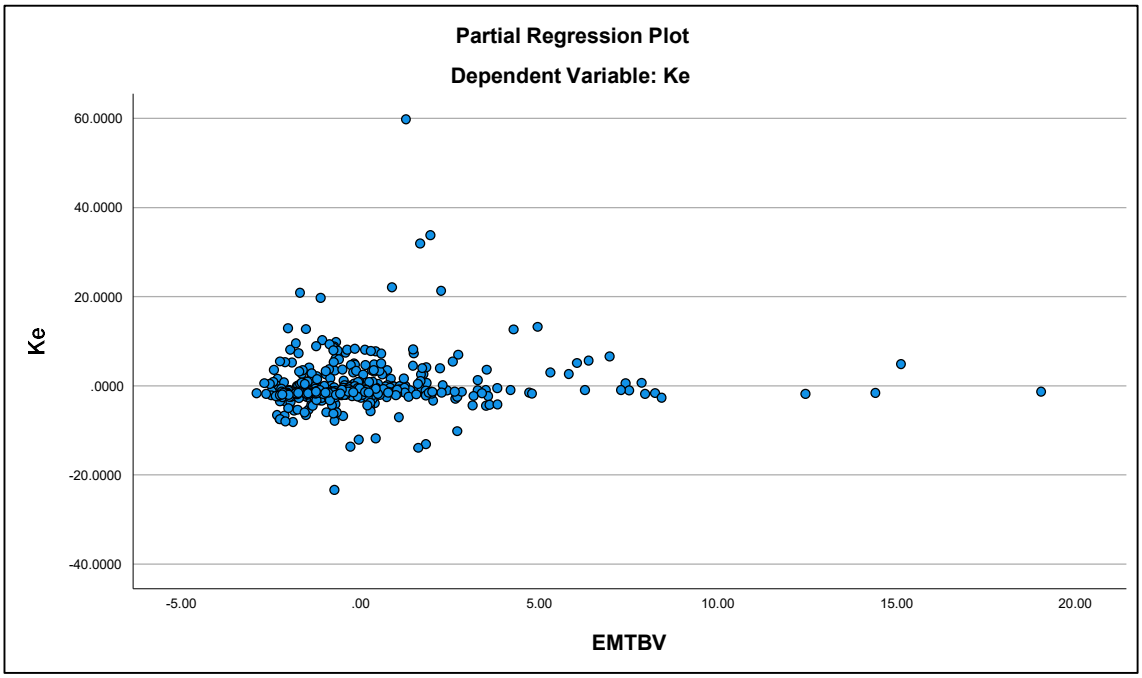


Graph 3.1: Testing the linearity of the independent variables

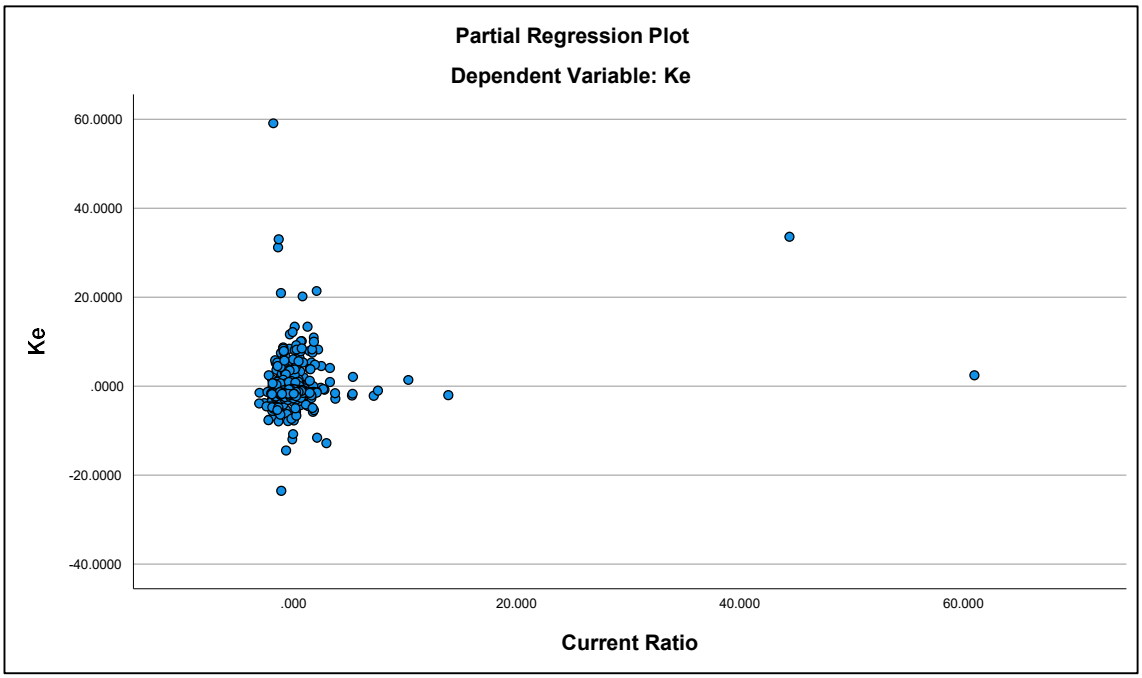
A partial regression plot was also run between each independent variable (excluding categorical independent variables) and the dependent variable (Ke as a proxy for risk) to confirm linearity.



Graph 3.2: A partial regression plot between firm size (SIZE) and cost of equity (Ke)



Graph 3.3: A partial regression plot between equity market-to-book value (EMTBV) and cost of equity (Ke)



Graph 3.4: A partial regression plot between the current ratio (CR) and cost of equity (Ke)

Assumption 5: Testing for homoscedasticity

According to Graph 3.1, the points appear to be fairly scattered and display an approximately constant spread, and therefore it would appear that the residuals have met the assumption of homoscedasticity.

Assumption 6: Checking for multicollinearity

It was assessed whether any of the independent variables had correlations greater than 0,7 to determine the extent of the threat of multicollinearity and since all correlations were less than 0,7, the threat of multicollinearity is negligible. For more detail, refer to Table 11.

Furthermore, upon inspection of the Tolerance values being greater than 0,1, it can be confirmed that collinearity is not a problem. For more detail, refer to Table 12.

Assumption 7: Checking for unusual points

Various outliers appeared when Kd is used as a proxy for risk. This table highlights any observations that do not follow a similar pattern of points (the below items are far from the predicted values).

Casewise Diagnostics[a]				
Case Number	Std. Residual	Ke	Predicted Value	Residual
169	5.575	41.0790	9.500995	31.5780052

216	3.876	45.8934	23.940518	21.9528824
239	3.528	29.1582	9.175689	19.9825115
255	3.686	31.6596	10.783641	20.8759594
268	5.895	42.9364	9.543904	33.3924958
275	-4.098	-9.7746	13.436753	-23.2113532
288	3.751	30.3060	9.060420	21.2455800
294	10.517	76.4412	16.872550	59.5686501
a. Dependent Variable: Ke				

Table 3.3: Assessing the Casewise Diagnostics table to identify potential outliers

Studentized Deleted Residuals

The following observations were highlighted as being potential outliers, based on inspection of the studentized deleted residual. These residuals are greater than +/-3 standard deviations:

Case Name	Year	Ke	IRQ	Studentized residual value
Trustco Group Holdings Ltd	2019	76,4412	1	12,97192
PSG Konsult Ltd	2019	42,9364	2	6,06227
Braite SE	2019	45,8934	2	5,92940
PSG Konsult Ltd	2018	41,0790	2	5,70011
Mr Price Group Ltd	2019	31,6597	3	3,79193
Telkom SA SOC Ltd	2019	30,3060	4	3,76466
Impala Platinum Holdings Ltd	2019	29,1582	5	3,57642

Table 3.4: Identifying potential outliers using studentized deleted residuals

Leverage points

A vital step to identifying the outliers for this model was interpreting any leverage points. Any leverage points above 0,2 were identified.

Case Name	Year	Ke	IRQ	Leverage point
Quilter Plc	2021	7,8350	2	0,46152
Quilter Plc	2020	6,6550	2	0,22344

Table 3.5: Identifying potential outliers using leverage points

Influential points

The final step in identifying potential outliers was assessing influential points using Cook's Distance. Based on this measure, if a Cook's Distance value is greater than 1, it should be investigated.

Case Name	Year	Ke	IRQ	Leverage point

Trustco Group Holdings Ltd	2019	76,4412	1	2,02724

Table 3.6: Identifying potential outliers using influential points

Based on the above, it can be seen that the majority of the outliers are observations which occurred in 2019. Similarly to the cost of debt, the 2 leverage points were Quilter Plc during 2020 and 2021. This may be a result of the global pandemic, affecting the reasonable cost of equity that would have been expected. The impact of COVID-19 would need to be minimised in order to investigate the relationship between integrated reporting quality and its effect on the risk of the top 100 JSE-listed companies in South Africa.

These outliers from 2020 and 2021 were removed and the regression analysis was re-run which had the following impact:

The sample size decreased by 2 observations from 436 samples, to 434 observations.

Descriptive Statistics			
	Mean	Std. Deviation	N
Ke	9.589786	5.8313444	436
IRQ	2.68	1.273	436
SIZE	4.368008993167889	1.548529713767912	436
B4	.97	.164	436
CSR	.56	.497	436
EMTBV	2.5090	2.53552	436
Dividend	.94	.245	436
Current Ratio	2.25967	7.008001	436

Table 3.7: Original descriptive statistics test prior to removing the outliers

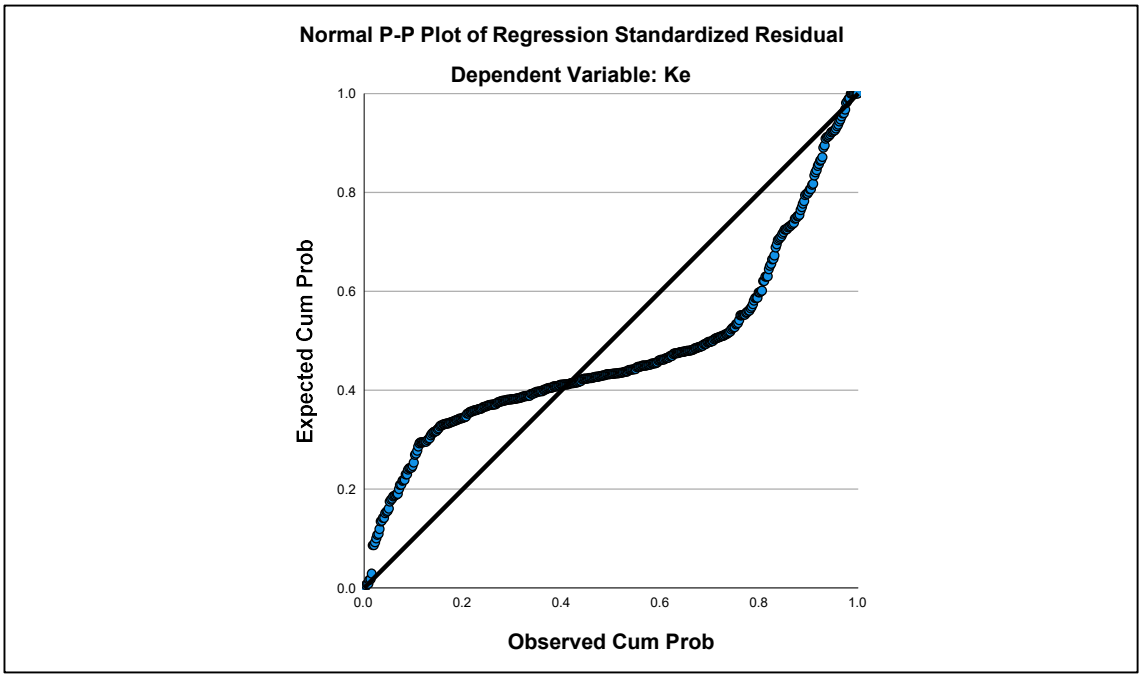
The Durbin-Watson statistic has remained at 1,915 (See table 3.2), which is still near to 2 and therefore the test for independence of observations is met.

Model Summary[b]					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.227[a]	.052	.036	5.7250111	1.915
a. Predictors: (Constant), Current Ratio, B4, Dividend, EMTBV, IRQ, SIZE, CSR					
b. Dependent Variable: Ke					

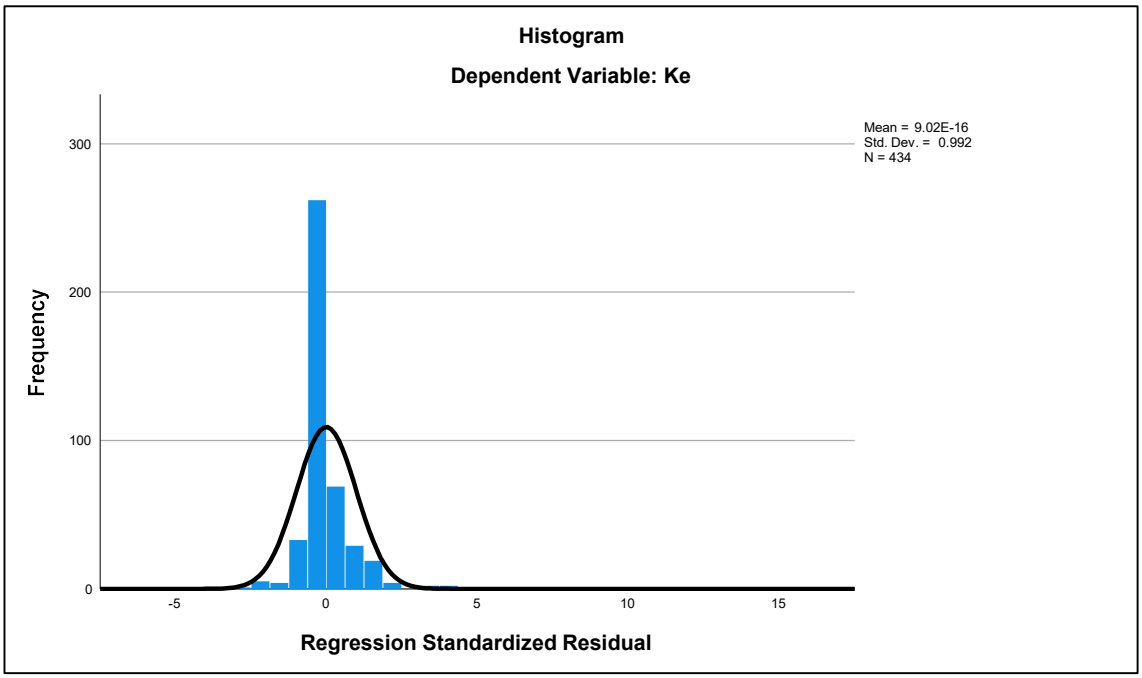
Table 3.8: Original Durbin-Watson test prior to removing the outliers

Assumption 8: Checking for normality

Upon visual inspection of the P-P Plot as well as the normal distribution curve produced, it can be confirmed that there is normality of the residuals.



Graph 3.5: P-P Plot detailing the normality of the residuals



Graph 3.6: Histogram detailing the normality of the residuals

Appendix 4: Testing the assumptions of Multiple Linear Regression for the weighted average cost of capital

Assumption 1: There is one dependent variable and it is measured at a continuous level

Assumption 1 is met as WACC is the dependent variable in this instance and it is continuous as the value can be an infinite number and not merely an integer.

Assumption 2: There are two or more variables, each measured at the continuous or nominal level

This test includes more than one independent variable and these are measured as follows:

Independent Variable	Measurement
IRQ (main independent variable)	Nominal
SIZE	Continuous
B4	Nominal
CSR	Nominal
DIV	Nominal
CR	Continuous
EMTBV	Continuous

Table 4.1: List of independent variables

Assumption 3: Independence of observations

Assumption 3 requires an independence of observations. The independence of the 438 observations included produced a Durbin-Watson statistic of 1,797, which is fairly close to 2 and this confirmed that there is no correlation between residuals.

Model Summary[b]					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.309[a]	.095	.081	4.53319243	1.797
a. Predictors: (Constant), Current Ratio, B4, Dividend, EMTBV, IRQ, SIZE, CSR					
b. Dependent Variable: WACC					

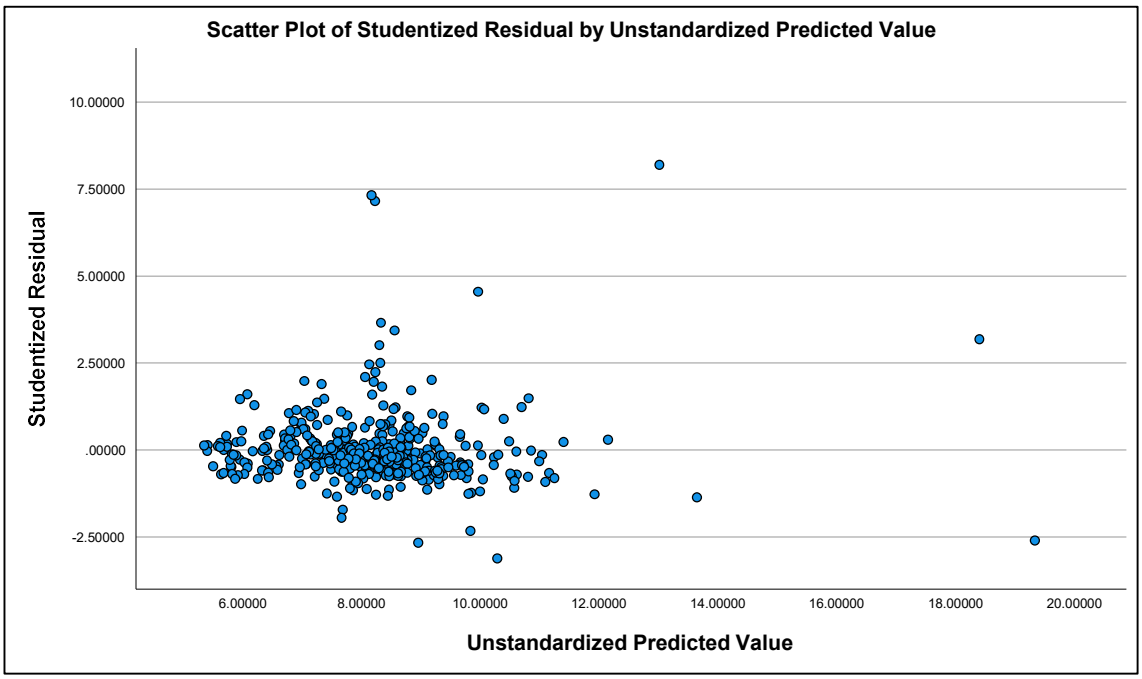
Table 4.2: Durbin-Watson statistic when Kd is the dependent variable

Assumption 4: Testing for linearity

The fourth Assumption of multiple linear regression is that the continuous independent variables (Integrated Reporting Quality (IRQ), firm size (SIZE), equity market-to-book value

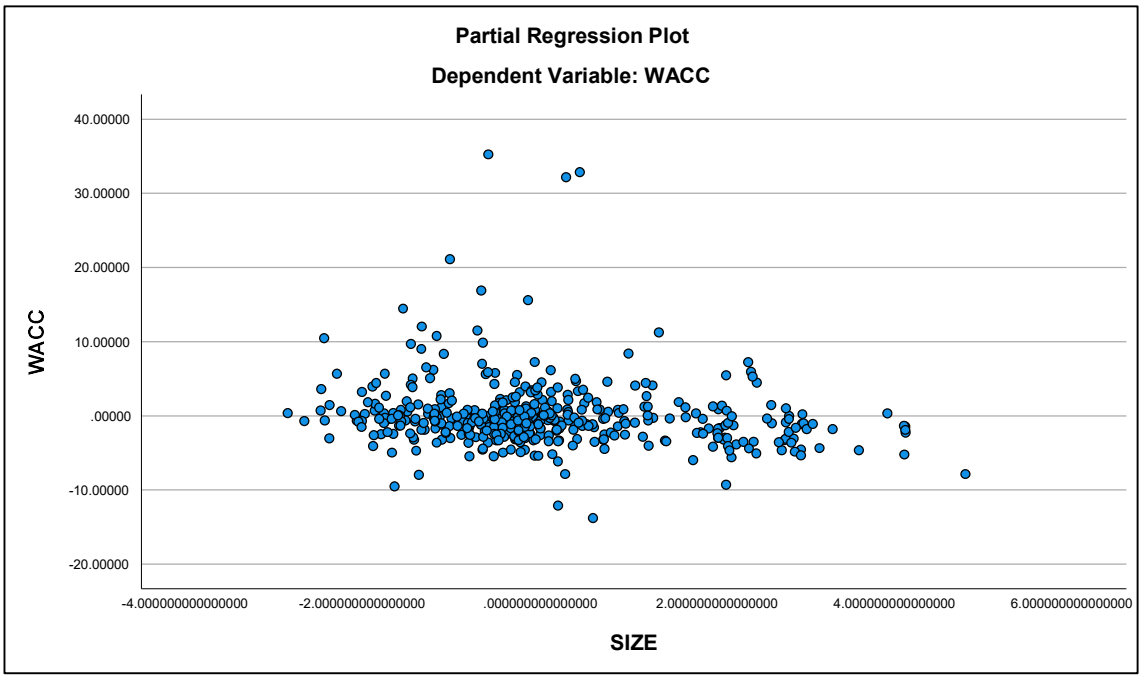
(EMTBV) and the current ratio (CR)) collectively are linearly related to the dependent variable (Risk proxied by WACC) within this study and that each independent variable is linearly related to the dependent variable.

The scatterplot drawn shows a horizontal band signifying that the relationship is fairly linear:

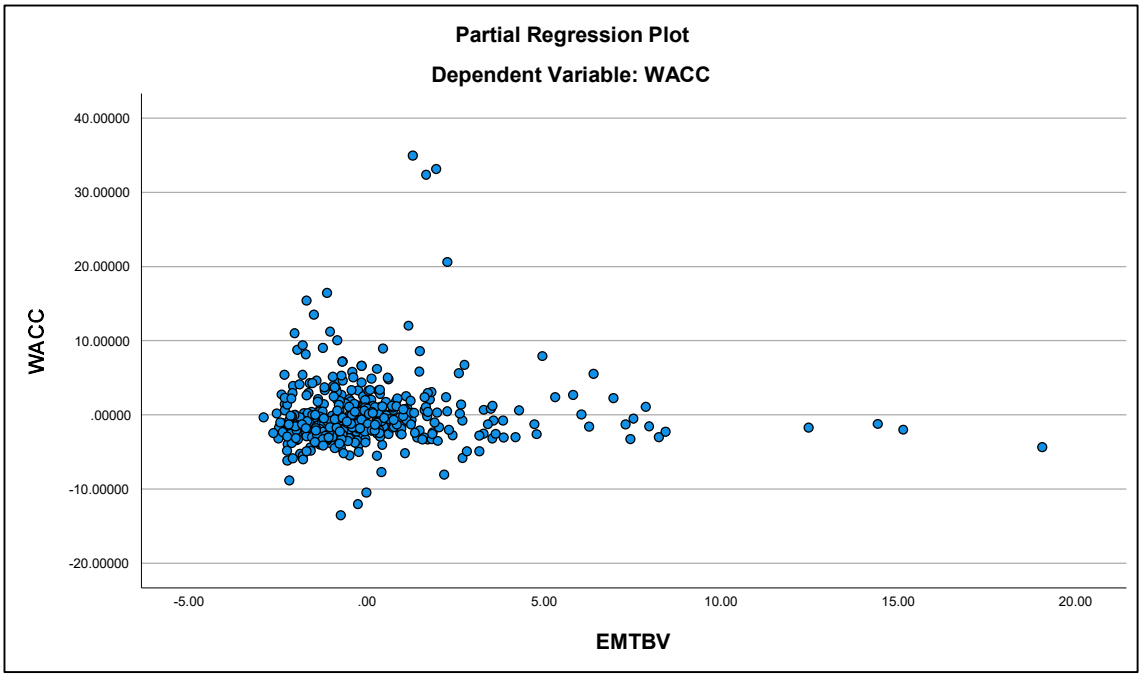


Graph 4.1: Testing the linearity of the independent variables

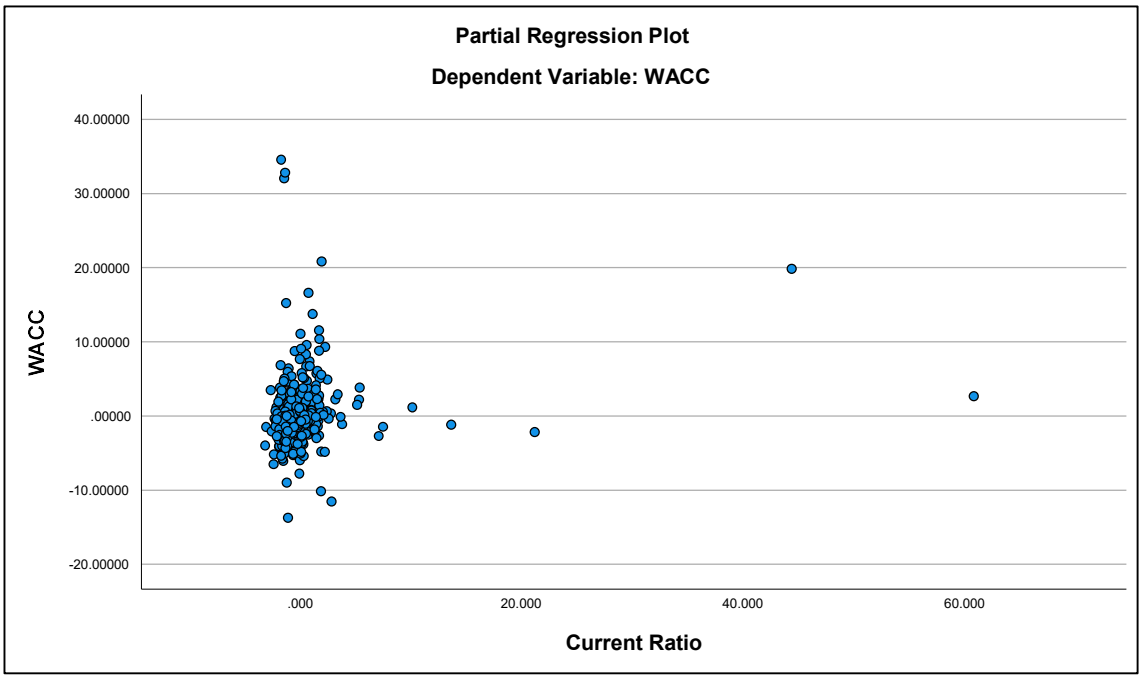
A partial regression plot was also run between each independent variable (excluding categorical independent variables) and the dependent variable (WACC as a proxy for risk) to confirm linearity.



Graph 4.2: A partial regression plot between firm size (SIZE) and wighted average cost of capital (WACC)



Graph 4.3: A partial regression plot between equity market-to-book value (EMTBV) and weighted average cost of capital (WACC)



Graph 4.4: A partial regression plot between the current ratio (CR) and weighted average cost of capital (WACC)

Assumption 5: Testing for homoscedasticity

According to Graph 4.1, the points appear to be fairly scattered and display an approximately constant spread, and therefore it would appear that the residuals have met the assumption of homoscedasticity.

Assumption 6: Checking for multicollinearity

It was assessed whether any of the independent variables had correlations greater than 0,7 to determine the extent of the threat of multicollinearity and since all correlations were less than 0,7, the threat of multicollinearity is negligible. For more detail, refer to Table 11.

Furthermore, upon inspection of the Tolerance values being greater than 0,1, it can be confirmed that collinearity is not a problem. For more detail, refer to Table 12.

Assumption 7: Checking for unusual points

Various outliers appeared when Kd is used as a proxy for risk. This table highlights any observations that do not follow a similar pattern of points (the below items are far from the predicted values).

Casewise Diagnostics[a]

Case Number	Std. Residual	WACC	Predicted Value	Residual
169	4.659	40.49920	7.8448926	32.65430739
255	3.009	30.43440	9.3429304	21.09146959
268	4.764	41.19760	7.8074837	33.39011631
294	4.897	47.86740	13.5409838	34.32641616
399	-15.749	-102.95360	7.4313683	-110.38496825
a. Dependent Variable: WACC				

Table 4.3: Assessing the Casewise Diagnostics table to identify potential outliers

Studentized Deleted Residuals

The following observations were highlighted as being potential outliers, based on inspection of the studentized deleted residual. These residuals are greater than +/-3 standard deviations:

Case Name	Year	WACC	IRQ	Studentized residual value
Trustco Group Holdings Ltd	2019	47,86740	1	5,37795
PSG Konsult Ltd	2019	41,19760	2	4,90783
PSG Konsult Ltd	2018	40,49920	2	4,79272
Mr Price Group Ltd	2019	30,43440	3	3,05490
Vukile Property fund	2020	102,95360	2	24,31532

Table 4.4: Identifying potential outliers using studentized deleted residuals

Leverage points

A vital step to identifying the outliers for this model was interpreting any leverage points. Any leverage points above 0,2 were identified.

Case Name	Year	Ke	IRQ	Leverage point
Quilter Plc	2021	6,86110	2	0,45216
Quilter Plc	2020	7,14750	2	0,21892

Table 4.5: Identifying potential outliers using leverage points

Influential points

The final step in identifying potential outliers was assessing influential points using Cook's Distance. Based on this measure, if a Cook's Distance value is greater than 1, it should be investigated. There were no influential points identified.

Based on the above, it can be seen that the majority of the outliers are observations which occurred in 2019. Similarly to the cost of debt and the cost of equity, the 2 leverage points were Quilter Plc during 2020 and 2021. This may be a result of the global pandemic, affecting the reasonable cost of equity that would have been expected. The impact of

COVID-19 would need to be minimised to investigate the relationship between integrated reporting quality and its effect on the risk of the top 100 JSE-listed companies in South Africa.

The outliers from 2020 and 2021 were removed and the regression analysis was re-run which had the following impact:

The sample size decreased by 3 observations from 441 samples, to 438 observations

Descriptive Statistics			
	Mean	Std. Deviation	N
WACC	7.8858037	7.08442565	441
IRQ	2.67	1.265	441
SIZE	4.361742060871341	1.543364922235838	441
B4	.97	.163	441
CSR	.55	.498	441
EMTBV	2.4946	2.52268	441
Dividend	.93	.248	441
Current Ratio	2.30106	7.048264	441

Table 4.6: Original descriptive statistics test prior to removing the outliers

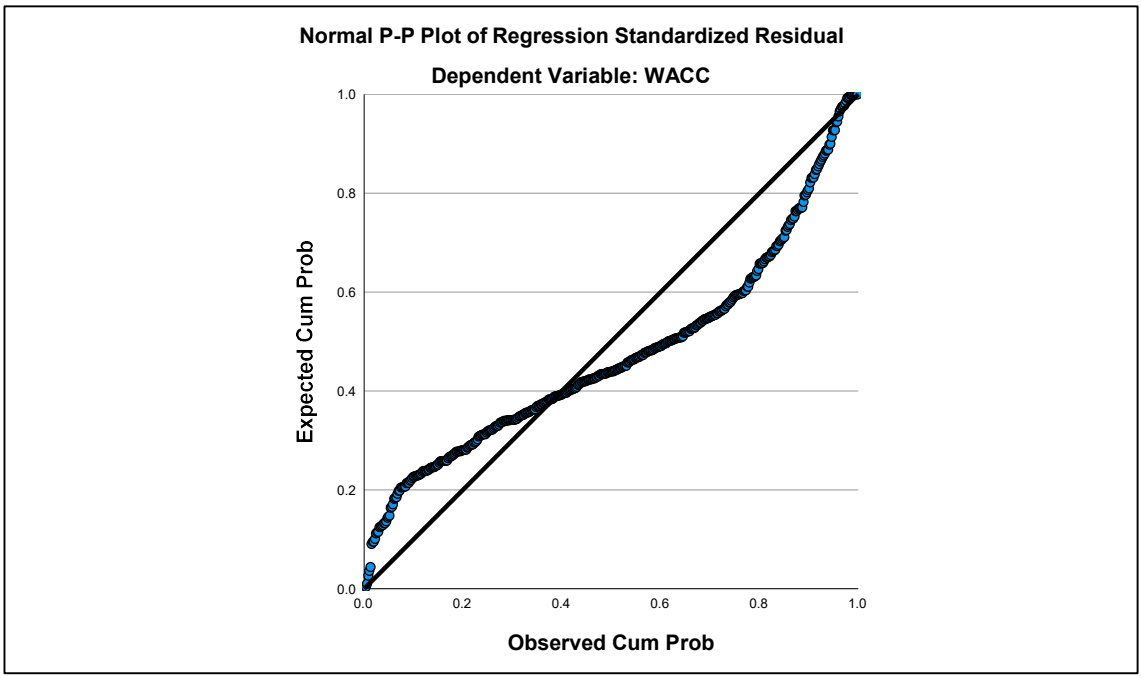
The Durbin-Watson statistic has changed from 1.867 to 1,797 (See table 4.2), which is still near to 2 and therefore the test for independence of observations is met.

Model Summary[b]					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.192[a]	.037	.021	7.00906372	1.867
a. Predictors: (Constant), Current Ratio, B4, Dividend, EMTBV, IRQ, SIZE, CSR					
b. Dependent Variable: WACC					

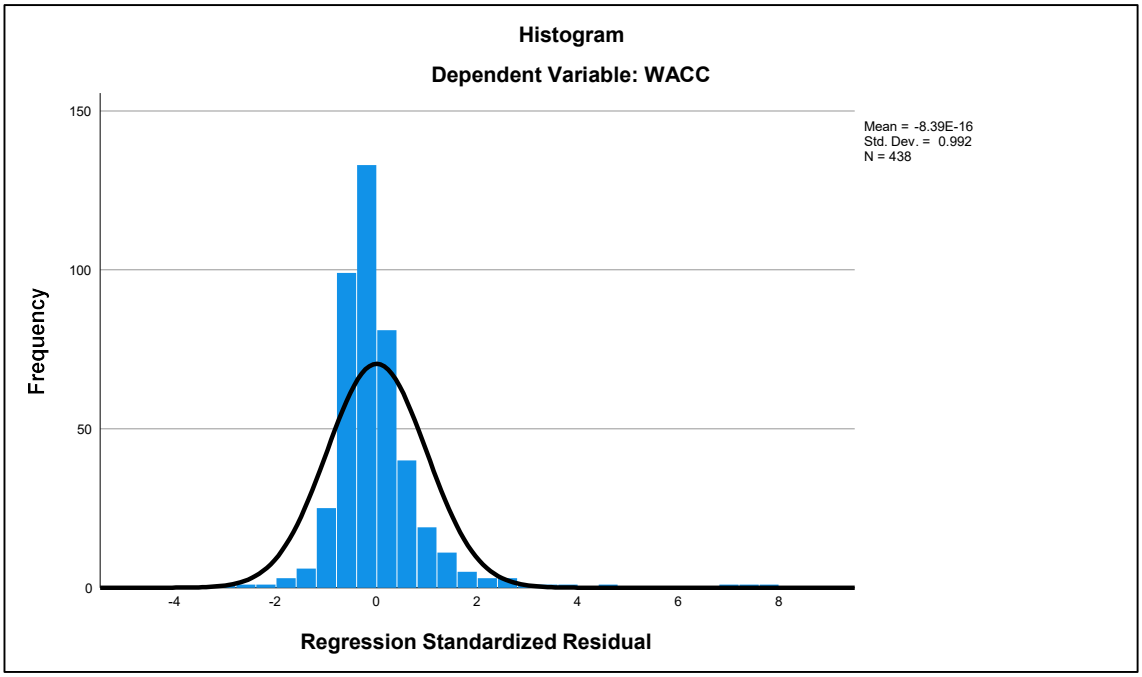
Table 4.7: Original Durbin-Watson test prior to removing the outliers

Assumption 8: Checking for normality

Upon visual inspection of the P-P Plot as well as the normal distribution curve produced, it can be confirmed that the residuals are normal.



Graph 4.4: P-P Plot detailing the normality of the residuals



Graph 4.5: Histogram detailing the normality of the residuals