



How sustainability reporting affects equity capital costs: Sustainability assurance and assurance providers as moderating variables



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ABSTRACT

Article History

Received: 25 June 2024

Revised: 11 December 2024

Accepted: 1 January 2025

Published: 15 January 2025

Keywords

Assurance provider

Big four

Cost of equity capital

Global reporting initiative

Sustainability assurance

Sustainability reporting.

This research provides empirical evidence on how sustainability reporting is associated with reduced equity capital costs, in particular moderating the role of sustainability assurance and Big Four accounting firms. Drawing from the database of listed companies on the Indonesia Stock Exchange, this research will employ Ordinary Least Square (OLS) regression with robust standard errors in testing the hypotheses. The findings indicate a significant negative relationship between sustainability reporting and the cost of equity capital, with sustainability assurance and Big Four firm involvement amplifying this effect. However, it should be noted that the sample size in this study is quite small, and adoption of the Global Reporting Initiative (GRI) G4 standard has been very recent, so generalizations should not be drawn from this study. The findings indicate that, beyond securing credible assurance, the quality of sustainability reports plays a crucial role in enhancing the credibility of financial reporting. This research is one of the first attempts to examine these relationships within the context of a developing country, Indonesia.

Contribution/Originality: The novelty of this research lies in its examination of the moderating roles of sustainability assurance and Big Four firms in the relationship between sustainability reporting and equity capital costs within the context of a developing country, Indonesia.

1. INTRODUCTION

In essence, a sustainability report serves as a crucial communication tool used by firms to disseminate information to stakeholders. Reports improve the understanding of the status of the company in the stakeholders' minds and the extent of voluntary disclosure, hence enhancing the credibility through extensive information (Nofianti, Fatah, & Tirtasari, 2018). According to Fernandez-Feijoo, Romero, and Ruiz (2014) this enhanced transparency assists investors and creditors in making finer risk assessments of the company; elaborate disclosure in sustainability reports lowers information asymmetry between management and stakeholders. Lower information asymmetry could decrease the cost of equity capital. It can also help attract long-term investors, which further reduces the cost of equity capital. There has been fast-growing interest in sustainability reporting, from 45% of G250 companies reporting sustainability in the KPMG (2022) to 96% in 2022.

Stakeholders value highly the credibility of the sustainability reports, and assurance strengthens this, as it embodies a company's commitment to the environment. Companies that complete social and environmental disclosure and obtain external assurance for their reports can lower their equity costs. The capital market identifies credibility in the report from assurance quality, which will decrease information asymmetry and foster positive feedback

(Martínez-Ferrero, Ruiz-Barbadillo, & Guidi, 2021). A study by Martínez-Ferrero and García-Sánchez (2017) across firms in Europe and Asia reveals that assurance statements could contribute more to reducing capital costs, especially from top-tier accounting firms. Given the Big Four's superior reputation and qualifications, their work significantly contributes to enhancing the impact of sustainability reporting on equity capital costs. This dimension, by virtue of their independence and objectivity, makes them less susceptible to client pressures and will therefore provide very detailed checks into the reliability of the reports and enhance trustworthiness for the stakeholders.

There have been a number of studies carried out on the influence of sustainability reporting in Indonesia. Mandatory sustainability reporting is positively related to sustainable shareholder value and protects the long-term interests of shareholders (Juniarti, 2020). This also affects company value, financial performance, and corporate accountability. Enhanced transparency in CSR disclosure reduces information asymmetry, which might lead to better investment returns. Devie, Liman, Tarigan, and Jie (2020) established a CSR influence on company performance through accounting and market measures, while Isnalita and Narsa (2017) CSR disclosure requires customer assessment in order to have an effect on firm value.

Firms with higher disclosures in the current year will probably have reduced equity capital costs in the following year. Transparency reduces the risk perceptions of investors by giving signals concerning honest and high-quality disclosures, thereby lowering information asymmetry and investor risk expectations. Indeed studies by Hajawiyah, Adhariani, and Djakman (2019) and Prihastiwi and Fatimah (2020) suggest that CSR disclosure can lower equity capital costs. Companies with a greater degree of non-financial disclosure generally have higher levels of public accountability, better governance, improved earnings quality, and a better reputation.

However, some of the studies, such as Dewi and Chandra (2016); Heiriyanthi (2013) and Sunaryo and Saripujiana (2018) show no significant relationship between CSR disclosure levels and equity capital costs in the following year. It infers that investors may not react to voluntary disclosures unless they are comprehensive, timely, and transparent. This present study, therefore, focuses on stand-alone sustainability reports, excluding annual reports, which have not been substantially discussed in Indonesian research. Gunawan and Tin stated that from 2012 to 2016, over 80% of the research about sustainability reporting used annual reports as sources, while only 19.23% were actually based on sustainability reports. It's worth noting that very few studies have addressed the moderating and mediating variables in this context, creating another gap. It tries to fill these gaps, examining whether sustainability reports affect equity capital cost with sustainability assurance and Big Four accounting firms as moderators. Sustainability reports will significantly reduce the cost of equity capital. Further, sustainability assurance will enhance this effect. The Big Four's assurance will be more robust than that of other firms. It also contains GRI G4 Guidelines to minimize bias and samples from the entire diverse sector, not just manufacturing.

This is the first study in Indonesia to analyze the impact of sustainability reporting on equity capital cost, using two moderating variables: assurance for sustainability and Big Four accounting firms. This study also measures the quality of sustainability reports using Global Reporting Initiative (GRI) G4 Guidelines and draws samples from diverse sectors. It contributes to the growing literature on corporate sustainability reporting by providing insights into how sustainability influences cost of equity capital, specifically with the role of Big Four assurance. The results indicate that sustainability reporting can effectively lower the cost of equity, especially when assured by Big Four firms. This underscores the strategic benefit of leveraging third-party assured reports to obtain lower costs of equity.

2. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

2.1. Literature Review

Signaling theory revolves around the transmission of signals and a response to those signals, with feedback to the source. It involves interaction between the sender of the signals and the receiver, usually represented by the capital market. In this context, the capital market recognizes the quality of the assurance in sustainability reporting

as a credibility signal. This reduces information asymmetry, enhances the credibility of the reports, and stimulates positive feedback. Basically, companies engage in sustainability assurance as a way to signal positive performance.

An increase in the quality of assurance increases market confidence, which in turn decreases the cost of capital. Assurance services are an indication of a company's commitment to corporate social responsibility since they expose the management to increased scrutiny (KPMG, 2017). Adequate procedures for assurance over the sustainability reports enhance stakeholder trust.

Organizations must be more transparent to avoid stakeholder conflict and reduce information asymmetry. It has been found in several studies that the disclosure of sustainability reports may lower the information asymmetry among its stakeholders and eventually lower the cost of equity capital (Gonçalves, Dei, Meideiros, Dei Niyama, & Weiffort, 2013; Kuo, Kuo, & Chen, 2021; Martínez-Ferrero & García-Sánchez, 2017; Nofianti, Anita, Anugerah, Abdillah, & Zakaria, 2018; Richardson & Welker, 2001). This reduction in capital costs is further enhanced when an assurance provider, particularly a Big Four auditing firm, is involved.

2.2. Hypothesis Development

2.2.1. Sustainability Report's Impact on the Cost of Equity Capital

In such a context, sustainability reporting would be expected to bear a crucial influence on the cost of equity capital. Some studies provide available evidence that sustainability reporting can significantly reduce the COE. Indeed, by making some disclosures about sustainability practices, companies may be able to mitigate the uncertainty and associated risks stemming from information asymmetry or controversial reputations, thereby reducing their COE (Bhuiyan & Nguyen, 2020). High-quality sustainability disclosure also decreases the information asymmetry between firms and stakeholders, hence decreasing the cost of capital (Garcia-Sanchez, Isabel-Maria, & Al, 2019; Nofianti et al., 2018).

Signaling theory and findings from Friske, Hoelscher, and Nikolov (2023) emphasize that firms use sustainability reports to signal positive news about their ability to run their operations in a sustainable manner over the long term. Investors receive signals indicating the company's lower investment risk, resulting in a lower cost of equity. This reduction occurs because sustainability disclosures reduce information asymmetry between a company and its stakeholders, which reduces COE. But on the basis of the above reasoning, the first hypothesis for the study is:

H₁: Sustainability reports decrease the cost of equity capital.

2.2.2. Sustainability Assurance Moderates the Relationship between Sustainability Report and the Cost of Equity Capital

One of the major factors influencing the cost of equity capital is sustainability reporting, and this may be quite proven to tremendously reduce COE. More specifically, by disclosing sustainability practices, companies reduce uncertainty and risks related to information asymmetry or controversial reputation and, correspondingly, have a reduced COE. High-quality sustainability disclosures also reduce the information asymmetry between companies and stakeholders, which in turn reduces the cost of capital (Garcia-Sanchez et al., 2019; Nofianti et al., 2018).

Insights from signaling theory and Friske et al. (2023) also confirm that firms communicate positively to investors about their sustainable operations by releasing sustainability reports. These signals inform investors that the company is a lower-risk investment, hence helping to decrease the cost of equity capital. This will be elaborated on in Chapter 2. The decrease in COE occurs as a result of sustainability disclosure, which reduces the information asymmetry between the firm and its stakeholders. Baseline the argument on that perspective. The second hypothesis of this study is:

H₂: Sustainability assurance strengthens the effect of sustainability report on cost of equity capital.

2.2.3. Big Four Public Accounting Firm Moderates the Relationship Between Sustainability Report and the Cost of Equity Capital

Moreover, the cost of equity is negatively affected by audit quality, and assurance from Big Four firms provides greater reliability compared to other accounting firms. Big Four firms—PricewaterhouseCoopers, Ernst & Young, Deloitte, and KPMG—possess experience stretching over a hundred years in addition to superior training and education as well as stiff ethical standards, which would enable them to detect errors, omissions, or misstatements in company reports. Their high standards and reputations further enhance public trust in their assurance services. Having made a choice to disclose sustainability reports, companies convey a signal of information to the stakeholders.

The creation of transparency in such reports could decrease information asymmetry and, therefore, decrease the cost of equity capital. Assured reports also communicate to stakeholders their responsibility and serious concern for sustainability issues (Simoni, Bini, & Bellucci, 2020). Studies by Garzon Jimenez and Zorio-Grima (2021); Kuo et al. (2021) and Casey and Grenier (2015) assert that the negative impact of Sustainability Reporting (SR) on the cost of equity capital is more significant when the reports are assured by an accounting firm. Also, cost of capital can be expected to be lower if the assurance is provided by one of the Big Four firms. Baseline the argument on that perspective. The third hypothesis of this study is:

H₃: Big Four public accounting firms strengthen the effect of sustainability report on cost of equity capital.

3. RESEARCH DESIGN

3.1. Sample and Data Sources

These companies were taken from the Indonesia Stock Exchange for the period of 2013–2017. This time span was chosen to trace back the tendencies in sustainability reporting and their impacts during a time of change regarding corporate transparency and different regulations. The sample was confined to companies that were not only listed on the Exchange but also issued sustainability reports in line with the GRI G4 Guidelines, doing so separately from their annual reports. This is a very critical timeframe for studying increased attention to sustainability practices and enables an overall review of the impact this has on the cost of equity capital.

The final sample consisted of 151 observations of companies from ten different sectors: agriculture, mining, basic and chemical industries, miscellaneous industries, consumer goods, property, real estate, construction, infrastructure, utilities, transportation, trade, services, and investment. The companies' annual reports provided the financial data, while the Indonesia Stock Exchange (IDX) and Yahoo! Finance provided the stock information. The sample consisted of a representative selection of 151 sustainability reports, providing a robust dataset for an evaluation of how sustainability reporting affects capital costs.

3.2. Definition and Measurement

3.2.1. Cost Of Equity

In this study, equity costs served as the dependent variable. The very term "equity capital costs" was conceptualized for the first time by Modigliani and Miller (1958) as returns required by investors to invest in equity or finance a project. This study is specifically going to take as its basis Ohlson's modified model of measurements of the cost of equity, Ohlson (2006) since this model is particularly appropriate to capture, most precisely, the nuances of sustainability reporting. One of the advantages of Ohlson's model is that it considers all the available information, such as detailed disclosures in annual reports and data on earnings from financial statements, which gives a full view of the cost of equity. This model better relates the levels of disclosure to the cost of equity than any other model for measuring disclosure (Botosan, 1997; Utami, 2006). The choice of the model will allow subtle analysis of the sustainability disclosure on the cost of equity capital, which very well aligns with the study's focus on the role of transparency and reporting in financial evaluations. Then, the formula to calculate is:

$$CEC = (B_t + X_{t+1} - P_t) / P_t$$

Where:

B_t = Book value of share in current year.

X_{t+1} = Earnings per share in next year.

P_t = Price per share in current year (closing price per share at the end of year).

3.2.2. Sustainability Report

The sustainability report serves as the independent variable. Sustainability report is when a company reports information about its activities without the financial factor. The independent variables that were chosen purposefully include sustainability reports and indicators. The choice is important because, using a broad scope, it shows how committed a company is about being sustainable in areas other than financial performance review. Sustainability disclosures include 91 items specifically listed in the GRI G4 Guidelines. Each disclosed item received a score of 1, while nondisclosed items received a score of 0. The individual scores in terms of each dimension were then summed to come up with a total score. The latter allows for the detailed analysis of just how comprehensive and transparent a company's sustainability reporting is, a prerequisite for carrying out an analysis of its impact on the cost of equity. The formula for calculating the index score for each dimension was as follows:

$$SRID = \frac{n}{k}$$

Where:

n = The number of items the company discloses for each dimension.

k = Number of items expected per dimension.

3.2.3. Sustainability Report Assurance

The process of verifying the accuracy and reliability of information in a company's sustainability report is known as sustainability assurance. Verification is important in enhancing the degree of confidence that stakeholders, especially investors, have in the information contained in the report to guarantee that it is a true representation of the activities of a company. In this study, sustainability assurance acts as a moderating variable. It was measured with a score of 1 if the firm provided sustainability assurance, regardless of who was the provider, which may be professional accountants, third-party consultants, or environmental engineers. Companies that did not seek assurance for the sustainability report received a score of 0. It is an important variable in testing how the presence or absence of assurance affects the relationship between sustainability reporting and the cost of equity capital.

3.2.4. Assurance Provider

The assurance provider is the person or entity responsible for checking a company's sustainability report for accuracy and must be competent in doing so. Assurance providers can be professional accountants, third-party consultants, or even environmental engineers. This paper distinguishes assurance providers into two groups: accountants and non-accountants. The "Accountants" variable is a dummy variable set to 1 if the sustainability report includes an assurance statement from a professional accountant affiliated with one of the Big Four firms: PricewaterhouseCoopers, Ernst & Young, Deloitte, and KPMG. If an environmental consulting firm or any other third-party entity provides the assurance, the value is 0. This classification distinguishes the quality of assurance with respect to its impact on the cost of equity capital, based on professional background.

3.2.5. Control Variables

This study uses three control variables while considering sustainability reporting and the cost of equity capital to control for other factors that have a potential impact-area. The first control variable is size of company (SIZE). This variable denotes the dimensionality, which is determined by the natural logarithm of total assets at year-end. We follow [Nimtrakoon \(2015\)](#) and use the natural logarithm of total assets to scale our data, which also addresses potential concerns with financial metric comparisons when firm size is at issue.

$$SIZE = \ln \text{ total assets}$$

Leverage, also known as LEV, is the second control variable. Leverage refers to the ability of a firm to settle all its financial obligations, assessing the proportion of the debt in relation to the equity. This ratio is important for showing the financial risk of the firm and its potential impact on the cost of the equity capital.

$$LEV = \frac{\text{Total debt}}{\text{Total asset}}$$

The third is the growth opportunity control variable. It measures future growth and profitability potential by relating the market value of the firm with the book value. Growth opportunities are examined to shed light on how the future prospects bear on the company's financial performance and its cost of equity capital.

$$GROWTH = \frac{\text{Market value}}{\text{Book Value}}$$

3.3. Data Analysis Techniques

Based on the theoretical underpinning for the interpretation of these results on stock returns, this study uses different data analysis techniques, including descriptive statistical analysis, normality testing, multicollinearity testing, the Pearson Correlation Coefficient, the independent t-test, and linear regression, which are chosen among others for the comprehensive study of data and testing hypothesis effectively. The inferential statistical analysis will gain foundational insights on the distribution and characteristics of the data, while tests for normality and multicollinearity are the litmus test for ensuring that the regression models are valid and data assumption proof. The Pearson correlation coefficient examines the magnitude and direction of the relationship between variables, and the independent t-test compares group means to evaluate distinctions that are statistically significant. Linear regression models were considered appropriate because they are fairly robust in terms of testing relationships between independent variables and dependent variables, elaborate hypothesis testing, and giving insights on effects of sustainability reporting on equity costs. The following proceed to be used in each hypothesis of this study:

Model 1.

$$CEC_{it} = \beta_1 SRID_{it} + \beta_2 Assurance_{it} + \beta_3 SRID * Assurance_{it} + \gamma_4 SIZE_{it} + \gamma_5 LEV_{it} + \gamma_6 GROWTH_{it} + \varepsilon \quad (1)$$

Model 2

$$CEC_{it} = \alpha_1 SRID_{it} + \alpha_2 BIG4_{it} + \alpha_3 SRID * BIG4_{it} + \gamma_4 SIZE_{it} + \gamma_5 LEV + \gamma_6 GROWTH_{it} + \varepsilon \quad (2)$$

4. RESULTS AND DISCUSSIONS

4.1. Descriptive Statistics

Table 1 presents a statistical summary of the variables used. Equity costs ranged from -4.365 to 16.585, with an average of 0.138 and a median of -0.264. The Sustainability Report Disclosure Index (SRDI) ranged from 0.033 (PT. Bank BCA, 2016) to 0.956 (PT. Bukit Asam, 2015), with an average of 0.338 and a median of 0.297.

The study used BIG4 assurance involvement as the moderating variable. The assurance variable was binary: 1 if the SR was audited and 0 if not. Again, another binary variable was BIG4, with 0 for no involvement of Big Four audit firms and 1 for involvement. The values of both variables ranged from a minimum of 0 to a maximum value of 1. Descriptively, the average score on the assurance variable was 0.265, while that for BIG4 was 0.026.

Control variables used were SIZE, LEV, and GROWTH. Their minimum values were 28.373, 0.133, and -1.191, while the maximum values for the respective variables were 34.577, 1.898, and 1.615. The mean scores for the variables were 31.32, 0.618, and 14.03 for SIZE, LEV, and GROWTH in that order. The median values were 31.065, 0.626, and 1.501 for the variables in that order.

4.2. Normality Test

Table 2 shows the results of normality test. From Table 3, prob > chi2 is less than 0.05 for variables CEC, SRID, Assure, BIG4, LEV, and GROWTH; hence, the variables were not normally distributed. As a result of non-normality

of variables, the study adopted the robust regression technique. Robust regression is a proper choice when the residuals are severely non-normally distributed and when outliers exist that may too strongly impact model (Ryan, 2008).

Table 1. Descriptive statistics result.

Variables	Mean	Median	Minimum	Maximum
CEC	0.138	-0.264	-4.365	16.858
SRID	0.338	0.297	0.033	0.956
Assure	0.265	0.000	0.000	1.000
BIG4	0.026	0.000	0.000	1.000
SIZE	31.325	31.065	28.373	34.577
Lev	0.618	0.626	0.133	1.898
Growth	14.031	1.501	-1.191	1615.452

Source: Processed data, 2019.

Table 2. Normality test result.

Variables	Skewness test	Kurtosis test	Prob > chi2
CEC	0.0000	0.0000	0.0000
SRID	0.0000	0.0972	0.0003
Assure	0.0000	0.0003	0.0000
BIG4	0.0000	0.0000	0.0000
SIZE	0.1227	0.5573	0.2503
Lev	0.0002	0.0000	0.0000
Growth	0.0000	0.0000	0.0000

Source: Processed data, 2019.

4.3. Pearson Correlation

Using the Pearson correlation coefficients presented in Table 3, the following relationships can be established between the variables. First, the correlation coefficient between SRID and CEC is -0.231. Therefore, there is a significant negative correlation between these two variables. In this case, one would conclude that there is a relationship between higher SRID scores and reduced costs of equity capital. On the other hand, the moderation effect of assurance (Assure) on CEC indicates an opposite relationship; however, the said relationship is not statistically significant with a coefficient of -0.090. Similarly, the interaction between Big Four audit firms involvement and CEC also indicates an inverse relationship, but it is not significant with a coefficient of -0.056.

Second, the relationship between Assure and SRID has a positive coefficient, despite not being statistically significant. On the other hand, BIG4 and SRID have a significantly positive relationship with a coefficient of 0.155 at the 10 percent level. Therefore, companies audited by Big Four firms tend to have higher SRID scoring.

Third, for the control variables, the relationship of SIZE, LEV, and GROWTH toward CEC all remain negative but are not significant. While the relationship between SIZE and SRID is significantly negative with a coefficient of -0.147 at 10%, there is also a very robust negative relationship between LEV and SRID with a coefficient of -0.267 and a significance of 1%. The relationship between SIZE and BIG4 is also significantly negative, with a coefficient of -0.206 at a 5% significance level.

Fourth, there is a significant positive relationship between BIG4 and Assure with a coefficient of 0.275 at 1% significance, thereby proving that companies whose audit committee is composed of Big Four firms are more likely to have their sustainability reports assured. Other important relationships are LEV and SIZE, with a coefficient of 0.327 at same significance level, between GROWTH and BIG4, also significantly positive with a coefficient of 0.499, and lastly, GROWTH and Assure, significant and positive with a significance level of 10%.

Table 3. Pearson correlation result.

Variables	CEC	SRID	Assure	BIG4	SIZE	Lev	Growth
CEC	1.000						
SRID	-0.231*** (0.004)	1.000					
Assure	-0.090 (0.273)	0.061 (0.453)	1.000				
BIG4	-0.056 (0.491)	0.155* (0.058)	0.275*** (0.001)	1.000			
SIZE	-0.077 (0.348)	-0.147* (0.071)	0.079 (0.336)	-0.206** (0.011)	1.000		
Lev	-0.089 (0.279)	-0.267*** (0.001)	-0.040 (0.626)	0.008 (0.923)	0.327*** (0.000)	1.000	
Growth	-0.061 (0.455)	0.004 (0.960)	0.156* (0.056)	0.499*** (0.000)	-0.173** (0.034)	0.044 (0.593)	1.000

Note: p-values in parentheses.
* p < 0.1, ** p < 0.05, *** p < 0.01.
Source: Processed data, 2019.

4.4. Independent T Test

Table 4 presents the research findings. The result reveals that companies providing assurance for their sustainability reports indicate a clear distinction in the cost of equity capital compared to those that don't. As such, the average cost of equity capital for companies that assured their sustainability reports was lower compared to that of companies that didn't assure their report. This is evidenced by a -0.138 coefficient for the companies that have assurance of sustainability reports, in contrast to 0.237 for companies without such assurance. Despite this difference, the result was not statistically significant since the overall coefficient score is only 0.375.

Table 5 presents the comparison of the cost of the equity between companies with sustainability reports assured by non-Big Four auditors and those with reports assured by Big Four auditors. The cost of equity capital was found to be -0.493 at an average for companies assured by a Big Four firm, while for companies assured by non-Big Four firms, it was 0.155. The coefficient differential value was 0.648 across the two groups. This shows that, generally, firms whose sustainability reports were assured by a Big Four firm face a lower cost of equity capital as compared to those assured by non-Big Four accounting firms.

4.5. Linear Regression

As shown in Table 6, the results of the multiple linear regression tests express a negative and significant relationship between SRID and CEC with a coefficient of -3.436 at the 1 percent level of significance. This indicates a strong negative effect of SRID on the CEC in Indonesia, implying that a firm's cost of equity capital decreases as SRID increases.

In the study, all control variables showed different effects on CEC. The relationship between SIZE and CEC was negative with a coefficient of -0.043. Evidence was also found regarding the negative effect of LEV on CEC, with a coefficient of 1.139. However, both relationships were statistically non-significant. Furthermore, the coefficient between growth and CEC was 0.001, thereby showing that growth does not have any significant positive influence on CEC; the effect is statistically insignificant.

The analysis also assessed how the moderating variables interacted with the independent and dependent variables. One of the hypotheses was that assurance would moderate the influence of SRID on CEC. This was supported by the moderating effect of assurance, SRID_As, on the relationship of SRID to CEC with a coefficient of 2.015 and a significance level of 10 percent. The finding could, therefore, be taken to imply that assurance strengthens the link between SRID and CEC.

The second model's multiple linear regression revealed a positive relationship between SRID and Big Four at 5 percent significant level. This coefficient was 3.192, showing that the presence of a Big Four auditor prevails in strengthening the bond between SRID and CEC.

Table 4. Independent T-test (Assurance).

Variable	Assurance			
	No assure	Assure	Coef.	t-value
CEC	0.237	-0.138	0.375	1.100
SRID	0.331	0.356	-0.025	-0.752
SIZE	31.257	31.515	-0.258	-0.965
Lev	0.624	0.601	0.023	0.488
Growth	1.781	48.024	-46.243*	-1.924

Note: p-values in parentheses.

* p < 0.1.

Source: Processed data, 2019.

Table 5. Independent T-test (Big 4).

Variable	Accountant			
	No big4	Big4	Coef.	t-value
CEC	0.155	-0.493	0.648	0.69
SRID	0.333	0.503	-0.169*	-1.91
SIZE	31.374	29.518	1.856**	2.572
Lev	0.617	0.63	-0.013	-0.096
Growth	3.243	410.484	-407.241***	-7.029

Note: p-values in parentheses.

* p < 0.1, ** p < 0.05, *** p < 0.01.

Source: Processed data, 2019.

Table 6. Linear regression analysis result.

Variables	Model 1		Model 2	
	(1)	(2)	(3)	(4)
	CEC	CEC	CEC	CEC
SRID	-3.436*** (-2.85)	-4.030*** (-2.98)	-3.436*** (-2.85)	-3.615*** (-2.94)
Assure	-0.390 (-1.12)	-1.035* (-1.84)	-0.390 (-1.12)	-0.379 (-1.09)
BIG4	-0.421*** (-2.57)	-0.748** (-2.15)	-0.421*** (-2.57)	-2.198* (-1.90)
SIZE	-0.043 (-0.50)	-0.035 (-0.39)	-0.043 (-0.50)	-0.048 (-0.55)
Lev	-1.139 (-1.29)	-1.031 (-1.16)	-1.139 (-1.29)	-1.122 (-1.28)
Growth	0.001 (1.17)	0.001 (1.56)	0.001 (1.17)	0.001* (1.75)
SRID_As	-	2.015* (1.66)	-	-
SRID_Big	-	-	-	3.192** (2.33)
_cons	4.759* (1.72)	4.734* (1.67)	4.759* (1.72)	5.051* (1.79)
r ²	0.258	0.264	0.258	0.262
N.	151	151	151	151

Note: t statistics in parentheses.

* p < 0.1, ** p < 0.05, *** p < 0.01.

4.5.1. The Effect of Sustainability Report on the Cost of Equity Capital

The results of the study showed that the disclosure of sustainability reports had a significantly negative effect on the cost of equity capital, which subsequently provided evidence for accepting H1. Increased disclosure reduces the firm's cost of equity capital by providing more detailed sustainability reports, both financially and non-financially. This happens as detailed disclosure sparks enhanced understanding among investors concerning the firm's general condition, hence reducing the perceived risk and consequently the return rate.

Looking at these results in light of other research, it's clear that the connection between sustainability reporting and the cost of equity capital fits with the idea that comprehensive sustainability reporting can help a company make money by reducing information gaps. Prior studies by Breiueir, Mülleir, Roseinbach, and Salzmänn (2018); Ng and Reizaeiei (2015) and Yan, Jia, Chein, and Yan (2022) have confirmed that reducing information asymmetry between the firm and the investors truly leads to a decrease in the cost of equity. In a further attempt to explain this idea, by having adequate sustainability disclosures, a firm becomes more attractive to long-term investors, hence reducing its cost of equity, the study by Raimo, de Nuccio, Giakoumelou, Petruzzella, and Vitolla (2020) observed.

The signaling theory, which suggests that investors can receive positive signals about firms through disclosures, can also explain the negative impact of sustainability reports on the cost of the equity capital. Aksak, Ferguson, and Duman (2016) argued that this hypothesis is founded by the underpinning information asymmetry literature by Spence (2002) who stated that sustainability reporting signals to show the investors that a given company is developing its competitive advantage and capability. Accordingly, according to Yu, Kuo, and Kao (2017) investors should reduce the risk attached to this signal, which is associated with a reduction in the cost of equity. Furthermore, Dhaliwal, Li, Tsang, and Yang (2014) support the view that the mere presence of sustainability reporting signals to investors that the company is seriously committed to enhancing the quality of its earnings and reputation, thus further reducing information asymmetry and attracting more investors.

The comparison with signaling theory and existing research underlines the broader implications of sustainability reporting. This includes the fact that such disclosure does not only decrease the cost of equity but can also act as a strategic means for companies to create a better market position and investor relations. By reducing financial burden with sustainability reports via the depreciation in the perception of risk and increased transparency, companies can now attract more investors and reduce the general cost of capital for such companies. This illustrates that sustainability reporting is not merely a compliance activity, but rather a recent addition to a company's financial strategy, ensuring long-term stability and growth.

4.5.2. Sustainability Assurance Moderates the Effect of Sustainability Report on the Cost of Equity Capital

Table 6 displays the results of the hypothesis testing on the moderating role of sustainability assurance in the relationship between sustainability reporting and the cost of equity capital. Hypothesis H2: Sustainability assurance enhances the positive effect of sustainability reporting by reducing the cost of equity capital. The findings indicate that companies that provide assurance for their sustainability reports experience a decrease in their cost of equity capital, leading to the acceptance of H2. This interprets to mean that if the sustainability reports of companies are assured, it will have a lower cost of equity capital compared to companies that issue sustainability reports without an assurance on the same.

These findings are consistent with earlier studies by Nofianti et al. (2018); Kuo et al. (2021); Garcia-Sancheiz et al. (2019) and Martínez-Ferrero and García-Sánchez (2017) which all indicated that assurance on sustainability reports is one of the drivers for decreasing the cost of equity capital for companies. Third-party independent providers provide assurance to a large group of stakeholders, adding credibility to the reports and enhancing stakeholder confidence. According to Garzón-Jiménez and Zorio-Grima (2021) and Simoni et al. (2020) this boost in credibility is very important because it reduces information asymmetry within the market, hence fostering greater trust among investors.

The role of assurance in strengthening the effect of sustainability reporting on equity costs could be further developed in a juxtaposition of the implications of assured versus non-assured reports. Third parties verify assured reports, enhancing their reliability and trust, thereby enhancing market transparency. In turn, the latter raises company liquidity and reduces the perceived investment risk associated with these companies (Li & Liu, 2018). By reducing information asymmetry between firms and investors, assured sustainability reports have the advantage of becoming more attractive to any investor who may demand lower returns due to the reduced exposure to risk.

Investors may view companies without assurance in their sustainability reports with caution, as they may perceive a higher level of risk due to less reliable or incomplete disclosure.

Such skepticism may finally be reflected in a higher cost of equity capital, as investors would demand compensation for the additional risk as perceived. Assurance of sustainability reports thus not only fulfills the regulatory and stakeholder expectation but is also a strategic financial decision with very tangible economic benefits in reduced capital costs.

Said differently, acceptance of H2 underlines how sustainability assurance can turn out to be a moderating variable in the link between sustainability reporting and the cost of equity capital. Specifically, by enhancing the credibility of reports and reducing information asymmetry, assurance mechanisms significantly contribute to the reduction of equity capital costs.

This, in turn, enhances the attractiveness of firms to investors and bolsters their financial health. It is an analysis of the larger financial implications of sustainability assurance and how important it would be in increasing corporate transparency and investor confidence.

4.5.3. Big Four Public Accounting Firms Moderate the Effect of Sustainability Report on the Cost of Equity Capital

The statistical analysis conducted for this study reveals that assurance from a Big Four accounting firm significantly heightens this effect of sustainability reporting in reducing the cost of equity capital, leading to the acceptance of hypothesis H3. Therefore, companies whose sustainability reports receive assurance from a Big Four firm face a lower cost of equity capital than those whose reports lack such assurance. The findings corroborate the results of Martínez-Ferrero and García-Sánchez (2017) in that the effect of reducing the cost of equity capital is more significant if assurance was provided by a Big Four auditor.

The difference between companies that engage Big Four firms to secure their reports on sustainability and those that do not underscores the importance of the Big Four in securing investor confidence. According to Kuo et al. (2021) if an investor has trust in the corporate sustainability assurance of the public accounting firms, more long-term investment can be induced and a decrease in the cost of equity capital. If one of the Big Four, rather than consultants or smaller firms, delivers the assurance, the effect is more profound.

The Big Four are better placed to make such assurances because they are exceptionally qualified, experienced, and bound by the strictest ethical standards. Thus, their reputation for independence, objectivity, and professional care makes their assurances more valid and trustworthy. This credibility is important in reducing information asymmetry between companies and investors; it lowers the perceived risk and hence the required rate of return for investors.

Investors are more likely to trust Big Four assurances than non-Big Four assurances, leading to a greater reduction in the cost of equity capital. This would be because Big Four firms have international coverage, rich resources, and historical experience in high-quality audit and assurance services that smaller firms are unlikely to have. Investors will likely perceive the involvement of one of the Big Four as a strong signal of the company's commitment to transparency and good governance.

On another level of analysis, the ethical framework within which the Big Four firms operate—in particular, having very strict rules about independence and objectivity—contributes to the trustworthiness of their assurances. By adhering high ethical standards, these Big Four firms reduce the likelihood of encountering potential conflicts of

interest, thereby enhancing the credibility of the assurance process. Hence, for companies engaging Big Four firms for the assurance of their sustainability reports, this may translate to a lower cost of equity capital as they are perceived by the market to be less risky and more reliable.

The companies that do not use Big Four firms for assurance may have to bear higher costs of equity capital due to perceptions of higher risk and lower credibility in their reports. The market perceives such disclosures, whether from smaller firms or consultants, as less reliable, which can erode investor confidence and ultimately lead to higher capital costs.

These results highlight the significant financial advantages of Big Four involvement in sustainability report assurance. This Big Four assurance, if successful in increasing the credibility and transparency of sustainability reports, then provides companies with the potential for a tangible reduction in their cost of equity capital—in fact, making a business more competitively financially advantageous.

This analysis underscores the importance of selecting a reputable assurance provider and further implications for corporate financial strategy and investor relations.

4.6. Robustness and Endogeneity Test

The study may face endogeneity issues due to systematic differences in observable characteristics among firms with varying levels of SR disclosure. More specifically, the current study is concerned about the self-selection problem: firms self-selecting to disclose more information may systematically be different from those that disclose less. In this regard, we tried to overcome the endogeneity problems—more specifically, the self-selection bias—with the use of the CEM (Coarsened Exact Matching) method. In the current study, CEM was used primarily to create a matched sample that focuses on SR disclosure in order to reduce any biases that may be generated by differences in firm characteristics.

By matching firms with similar observable characteristics *ex ante*, the CEM method allows for a more accurate comparison before assessing the impact of SR disclosure.

In this paper, we conducted the CEM analysis at a detailed level for each indicator related to the level of SR disclosure. We matched seven covariates across the three strata, and thus the matched firms were comparably matched by their key characteristics.

The results of the CEM analysis are presented in [Table 7](#), Panel A. The number of matched samples represents a good basis for testing our initial hypothesis. If we scan the results, as reported in [Table 7](#) Panel B, that are based on the application of the CEM criteria, using the data, we constantly find support for our first hypothesis, stating the relationship between SR disclosure and cost of equity capital.

The results validate the significance of this relationship, and the CEM method demonstrates its significance across all SR disclosure variables.

By using the CEM, this study efficiently controls for the endogeneity problem and provides a more accurate explanation of how sustainability reporting disclosure specifically impacts the cost of equity capital. Rigid matching suggests that underlying differences in firm characteristics are less likely to affect the observed relationships, thereby providing stronger evidence for the research's conclusions.

Compared to traditional methods that might not pick up these biases, the use of CEM adds significant credibility to the results. A matching process considerably reduces the possibility of the events occurring because of unaccounted-for factors and hence makes the findings more robust and reliable. The approach underlines the problem of endogeneity in studies of the impact of voluntary disclosure practices and enables drawing conclusions closer to reality.

It further corroborates the fact that all the SR disclosure variables are of equal significance, and hence, the results of the study reflect a meaningful and significant relationship between SR disclosure and cost of equity. Such an

approach will add more strength to the empirical evidence and also provide insights into the role of SR disclosure in the financial markets.

Table 7. Coarsened exact matching result.

Panel A. Matching summary				
Variable	SR=0			SR=1
All	71			80
Matched	52			59
Unmatched	19			21
Panel B. Regression result				
Variables	Model 1		Model 2	
	(1)	(2)	(3)	(4)
	CEC	CEC	CEC	CEC
SRID	0.189** (2.30)	0.138** (2.29)	0.219*** (2.53)	0.060** (2.45)
Assure	-0.084*** (-2.63)	-0.058** (-2.47)	-0.098*** (-3.11)	0.025 (1.20)
BIG4	-0.013 (-1.10)	-0.011 (-1.18)	-0.000 (-0.00)	-0.011 (-0.15)
SIZE	0.058** (2.00)	0.026 (0.94)	0.121 (1.54)	-0.078* (-1.81)
Lev	0.031*** (3.78)	0.022*** (3.55)	0.025*** (3.25)	0.035** (2.01)
Growth	-0.005 (-1.06)	-0.003 (-0.76)	-0.004 (-0.84)	0.001* (1.75)
SRID_As	-0.072	-0.056 (1.66)	-0.050	-
	(1.34)		(1.78)	
SRID_Big	-	-	-	-0.748** (-2.15)
_cons	4.045*** (3.42)	3.031*** (3.19)	4.023* (1.96)	3.027** (-2.02)
r2	0.243	0.272	0.224	0.258
N.	151	151	151	151

Note: t statistics in parentheses.
* p < 0.1, ** p < 0.05, *** p < 0.01.

5. CONCLUSION

It sought to provide empirical evidence on the relationship between sustainability reports and the cost of equity capital. The findings indicated a significant negative relationship between the two variables, which suggests that companies with more comprehensive sustainability reporting tend to have a lower cost of equity capital. At the very least, this is probably a result of the enhanced transparency and less information asymmetry that detailed disclosures in terms of sustainability initiatives can bring.

It was further found that the relationship is strengthened in the presence of sustainability assurance. In cases where the Big Four accounting firm has assured the sustainability report, a more pronounced reduction in cost of equity capital is observed. This demonstrates the correlation between the quality and credibility of the assurance provider, with Big Four firms offering a greater boost to confidence, leading to larger reductions in equity costs.

Despite these insights, there are some limitations to this study. One major limiting factor of this study is the small sample size of Big Four assurance cases, which might affect its generalizability. The infrequent issuance of this type of assurance limits its applicability in wider contexts. The next series of research should work on expanding the study period to have a better view of any trends or impacts that unfold over a longer period.

Samples from other countries, particularly those within the Association of Southeast Asian Nations (ASEAN) region, could be included to facilitate comparisons and assess if the impacts described for the chosen area are applicable to other geographical and regulatory environments. The broadening of the view by doing this enables the revealing

of more nuanced understanding of how sustainability reporting and assurance practices impact the cost of equity capital in different contexts.

In the future, hopefully, more companies will be able to achieve fuller sustainability reporting that is clear and transparent. Better disclosure of company activities enhances transparency and lowers the information asymmetry between stakeholders and companies. It could even lower the cost of equity capital. Hence, more frequent, more detailed, and finer reporting in sustainability could help link companies closer to expectations from stakeholders, supporting more enlightened choices in investment.

Funding: This research is supported by University of Airlangga (Grant number: 360/UN3.15/PT/2021).

Institutional Review Board Statement: Not applicable.

Transparency: The authors state that the manuscript is honest, truthful, and transparent, that no key aspects of the investigation have been omitted, and that any differences from the study as planned have been clarified. This study followed all writing ethics.

Competing Interests: The authors declare that they have no competing interests.

Authors' Contributions: All authors contributed equally to the conception and design of the study. All authors have read and agreed to the published version of the manuscript.

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