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Impact of Integrated Reporting on Information Asymmetry: Evidence from Sri Lanka

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Abstract

Considering the dearth of empirical evidence on the impact of integrated reporting (IR) on information asymmetry in developing countries, this paper investigates the impact of IR on information asymmetry in Sri Lanka. A paired sample *t*-test and a panel regression analysis are employed to draw empirical evidence. Information asymmetry is proxied by earnings forecast error, earnings forecast dispersion, and cost of equity capital, whereas firms' IR level is measured using the IR framework. Findings indicate a significant reduction in information asymmetry upon adopting IR. Further, they reveal that the level of IR has a feeble but statistically significant negative impact on the cost of equity capital. Earnings forecast error and forecast dispersion do not indicate significant associations with IR levels. Given the substantial cross-country differences, this paper offers a better understanding of the impact of IR on information asymmetry from a developing country setting where the adoption of IR is voluntary.

***Keywords*:** Adherence Level of Integrated Reports, Information Asymmetry, Integrated Reporting, Sri Lanka

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Introduction

The relative importance of equity markets around the world is growing with the large investor base and therefore, public disclosure and shareholder value are becoming increasingly important (Choi & Meek, 2011). Hence, corporate reporting and disclosure are evolving from mere financial reporting to both financial and non-financial reporting. Over the last two decades, corporate reporting has undergone a substantial transformation in terms of content, reporting mechanisms, target audience, reporting type, design, etc. (Uyar, 2016). As Ioana and Adriana (2013) document, there are three main stages in the evolution of the corporate reporting journey as the non-financial reporting era (2001-2006), the corporate social/sustainability reporting era (2007-2009), and the revolution of the integrated reporting (IR) era which debuted in 2010 and continues to date. After IR emerged as a corporate reporting mechanism, it became a prevalent topic among business communities and academia. In this backdrop, this study aims to investigate the capability of integrated reporting for reducing information asymmetry in Sri Lanka.

IR is a "new reporting framework that proposes the integration of financial and non-financial information in a single report" (de Villiers et al., 2017, p. 1). It is primarily endorsed by the International Integrated Reporting Council (IIRC), which comprises a global coalition of regulators, investors, companies, standard setters, the accounting profession, academia and NGOs (IIRC, 2021). IR is based on integrated thinking, which leads to integrated decision-making and producing periodic and concise integrated reports about how an organisation creates, preserves and erodes sustainable value in the short, medium and long term (Busco et al., 2017). Consequently, the IIRC introduced a principles-based framework in December 2013, named the 'International Integrated Reporting Framework (IIRF)' to assess the content elements of an integrated report. Further, IIRC in 2021 has issued revisions to the IR framework published in 2013 by clarifying concepts and simplifying guidance for its continuity and the robustness of the IR reporting.

Even though several disclosure methods evolved, those have not sufficiently presented a wide variety of financial and non-financial information on a relevant basis (Uyar, 2016). In this regard, Rowbottom and Locke (2016) identify IR as a shorter, less complicated, but broader reporting mechanism that overcomes problems of existing corporate reporting, such as an overabundance of regulatory initiatives, disclosure overloading, and reporting complexities. Zhou et al. (2017) highlight the strength of IR as a solution to the voluminous and disjointed problems of traditional corporate reporting. As Caruana and Grech (2019) specify, IR enables an entity to perceive, measure, and report its success or failure in a novel way by connecting

economic, environmental, and social issues with its strategy, governance, and risk management processes. While agreeing with the above positive remarks, recent authors have identified IR as a reporting model rather than merely a reporting tool, which combines many aspects into a coherent whole to justify an organisation's value creation process (see Atkins & Maroun, 2015; Caruana & Grech, 2019; Eccles & Krzus, 2010).

IR was initiated under voluntary disclosure, which is used to minimise information asymmetry between managers and investors (Guidry & Pattern, 2012). Therefore, with the purpose of upgrading disclosure mechanisms (Kılıç & Kuzey, 2018), voluntary reporting actors, frameworks, and institutions worldwide were enrolled into the IR projects in diffusing IR (Rowbottom & Locke, 2016). IR is mandatory for a few contexts (i.e. South Africa), whereas it is voluntary in most countries (Australia and Sri Lanka) (Abeywardana, 2016; Fuhrmann et al., 2017; Ioana & Adriana, 2013). In a while, Uyer (2016) indicates that IR has not been emphasised as a rule but to provide the highly desired information by investors. However, the debate on voluntary or mandatory remains an open question for the international corporate reporting environment (Ioana & Adriana, 2013). Researchers further identify that either voluntary or mandatory, IR requires a new set of global standards with a common reporting framework that would improve the diffusion and evolution of IR worldwide (Ioana & Adriana, 2013). The common characteristic among reporting systems is a growing movement toward comparability and accountability (Rupley et al., 2017). Therefore, in 2013, IIRC introduced a principles-based framework that guides IR adopters and in 2021, it introduced revisions to the framework. This directed IR adopters to practice integrated concepts consistently by avoiding diverse IR practices. Listed companies in Sri Lanka tend to follow IR as a voluntary disclosure model from 2011 onwards, and they have gradually increased their compliance level with IIRF (Abeywardana, 2016).

As a recently emerged voluntary disclosure model, IR focuses on the information role of financial reporting for capital markets by addressing information asymmetry (Guidry & Pattern, 2012). Lee and Yeo (2016) and Uyar (2016) have stated that firms that use many external funds also use IR to mitigate information asymmetry between corporate insiders and external suppliers of capital. Despite the gradual development of corporate reporting models worldwide, including IR, numerous studies (see Chung et al., 2017; Iqbal & Santhakumar, 2017; Kim et al., 2019; Stotz, 2016) have revealed that still information asymmetry can be observed among managers and investors. As they further mention that this situation is high in emerging markets/developing countries than in developed countries.

Upon the adoption of IR by companies, few studies have been conducted to examine the impact of IR on information asymmetry and some of these studies (see García-Sánchez & Noguera-Gámez, 2017a; García-Sánchez & Noguera-Gámez, 2017b) have mostly captured developed countries such as the United States of America (USA), Japan, and the United Kingdom (UK), where the publication of integrated reports is voluntary. Other studies (see Barth et al., 2016, 2017; Lee & Yeo, 2016; Zhou et al., 2017) have captured developing countries such as South Africa, where the publication of integrated reports is mandatory. Those studies have identified that information asymmetry is negatively related to IR (see Lee & Yeo, 2016; García-Sánchez & Noguera-Gámez, 2017a, 2017b; Zhou et al., 2017); however, several authors such as Barth et al. (2017), Hsiao et al. (2021) and Sriani and Agustia (2020) have failed to find a relationship between IR quality and information asymmetry variables (i.e., cost of equity capital). The above results cannot be applied to developing countries due to substantial differences in each country since the cultural, legal, corporate governance, and institutional factors significantly influence the disclosure levels of integrated reports (Frias-Aceituno et al., 2013; García-Sánchez & Noguera-Gámez, 2017a). As a developing country, Sri Lankan companies show an increasing adoption level of IR in line with the IIRF (Cooray et al., 2021; Jayasiri, 2021), resulting in the number of companies adopting IR to increase from 32 companies in 2015 to 85 companies by 2018 (Herath et al., 2019). Even though Sri Lanka is evolving with much more corporate reporting and disclosure mechanisms, evidence indicates the existence of information asymmetry in Sri Lanka before adopting IR. As Kristoufek and Vosvrda (2013) found, Colombo Stock Exchange (CSE) in Sri Lanka is a less efficient market – the efficiency index for world stock indices in Sri Lanka was positioned at 0.35 from 2000 to 2011 (Efficiency Index is '0' for the most efficient markets). Similarly, other studies (e.g., Jegajeevan, 2010; Pathirawasam & Idirisinghe, 2011; Perera & Nimal, 2015) found predictability issues, information asymmetric volatility problems, insider trading practices, and non-linear behaviour of stock returns in Sri Lanka. Even though several scholars (see Cooray et al., 2020) have examined the impact of IR on firm value in Sri Lanka, to the best of the authors' knowledge, there are no Sri Lankan studies conducted to examine the effect of IR on information asymmetry after adopting IR in Sri Lanka. Therefore, this is an appropriate time to test whether the diffusion of IR adoption has really impacted the information asymmetry in Sri Lanka and, if so, what that impact is. Further, to address this gap, Sri Lanka would be an ideal research site because it has been adopting IR as a voluntary disclosure model from 2011 onwards, and currently, more than 10 years have elapsed since its adoption. Thus, the present study attempts to address the following two research questions: Is there a significant

change in information asymmetry in Sri Lanka after adopting IR? and what is the impact of companies' adherence level of IR on information asymmetry in Sri Lanka? The remainder of the paper is organised as follows. The next section reviews relevant past studies, presents theoretical composition and develops hypotheses. This is followed by an explanation of the methodological approaches of the study. Then empirical results are presented, and the paper concludes with implications of findings.

Review of the Literature and Hypotheses Development

Empirical Review

Despite the successful standardisation of financial reporting, such as the world corporate practice of International Financial Reporting Standards (IFRSs), such reporting tools were less informative and did not provide all valuable data to make decisions (Usenko & Zenkina, 2016). On this basis, traditional financial reporting was no longer sufficient, and many firms began adopting emerging reporting practices. Therefore, numerous recent studies conducted upon the emergence of IR mention insightful critiques on traditional corporate reporting tools and provide reasons for the contemporary development of corporate communication models such as IR (see for example, Bal & Dhal, 2019; Banghøj & Plenborg, 2008; Bhasin, 2017; Camilleri, 2018; Humphrey et al., 2017; Knoll & Feigenbutz, 2014; Rowbottom & Locke, 2016; Serafeim, 2015; Usenko & Zenkina, 2016; Uyar, 2016; Velte & Stawinoga, 2017; Zhou et al., 2017). As noted in these studies, in the early days, corporate reporting was over-weighed by financial reporting, and there was insufficient disclosure of information to identify the financial and non-financial factors of value creation such as intellectual, human, social, and natural capital. Further, the absence of forward-looking information, the strategic goals, and the company's risk exposure have weakened reliable forecasts due to a lack of accounting data. By addressing these problems, IR is recognised by many parties as a way to achieve a more coherent corporate reporting system that provides a complete picture of organisations' ability to create value over time using a single report (International Federation of Accountants (IFA) (2017), (as cited in Bhasin, 2017). Thus, Humphrey et al. (2017) predict that IR would ultimately replace all other reporting forms.

"The quality of corporate disclosure influences to a great extent the quality of investment decisions made by investors" (Singhvi & Desai, 1971, p. 129). Imhoff (1992, p. 101) defines the quality of disclosure as "the overall subjective assessment of the relevance, reliability, and comparability of the accounting data produced by the reporting entity with the essence of the relative usefulness and the analytical

capability of such data." To promote consistency, flexibility, and comparability of integrated reports among organisations, worldwide organisations such as the IIRC promote a principles-based framework to prepare integrated reports. As IIRC (2013, 2021) indicates, IR promotes a more cohesive and efficient approach to corporate reporting and aims to improve the quality of information available to providers of financial capital to enable a more efficient and productive allocation of capital.

Studies conducted to measure the quality or level of integrated reports evidence that researchers have used self-constructed frameworks despite the principles-based framework introduced by the IIRC in 2013 (see Barth et al., 2017; García-Sánchez & Noguera-Gámez, 2017a; Zhou et al., 2017). As Zhou et al. (2017) mention, the reason behind this selection is that investors and firms were unfamiliar with the principles-based framework and, therefore, a self-constructed framework was selected to evaluate the integrated reports during 2009-2013. Studies carried out after 2013 show that companies in both developed and developing countries are progressively following the principles-based framework issued by the IIRC to enhance the level of integrated reports (Abeywardana, 2016; Cooray et al., 2021; Gunarathne & Senaratne, 2017; Jayasiri, 2021; Wen et al., 2017). As Oprişor (2014) reveals, 78% of stakeholders had recommended the principles-based framework for IR instead of self-constructed frameworks. As Haji and Anifowose (2016) and Kilic and Kuzey (2018) document, even though companies are widely adopting IR, there is still limited research to examine the compliance level of current IR practices of companies in line with the IIRF. With an increasing number of companies adopting IR in Sri Lanka, it has become a key consideration to assess whether, and to what extent these companies have complied with the framework introduced by the IIRC in preparing integrated reports (Gunarathne & Senaratne, 2017).

Even though several studies have been conducted to test the impact of IR on information asymmetry, recent studies (see for example, Frias-Aceituno et al., 2013; Francis et al., 2005; García-Sánchez & Noguera-Gámez, 2017a; Zhou et al., 2017) document the impracticability of generalising those findings to different countries due to cultural, legal, accounting and corporate governance systems disparities between countries. Hence, García-Sánchez and Noguera-Gámez (2017a) and Zhou et al. (2017) call for studies to examine the impact of IR on information asymmetry in different countries. With the growing adoption rate of IR framework by companies (Abeywardana, 2016; Cooray et al., 2021; Jayasiri, 2021) and impracticability of generalising findings of past IR studies, Sri Lanka, as a developing country, is an ideal context to investigate the impact of IR on information asymmetry.

Theoretical Background

This study mainly uses the voluntary disclosure theory to conceptualise the impact of IR on information asymmetry. Voluntary disclosure theory is primarily based on agency theory and information asymmetry theory. Since the general problem associated with the separation of ownership and control of a business (Jensen & Meckling, 1976) primarily causes information asymmetry between managers and investors, agency theory provides the basis and rationale for information disclosures (An et al., 2011; Chow & Wong-Boren, 1987). As per the information asymmetry theory, Akerlof (1970) indicates that the absence or low-quality information could potentially lead to uncertainty and therefore, the demise of an entire market. Based on the development of the content of corporate reports, the reduction of information asymmetry between managers and investors has been a driving force (Uyar, 2016). As a voluntary disclosure method, IR also aims to reduce the information asymmetry between managers and investors by promoting a rich information environment (Oh & Shin, 2019). With the development of capital markets, ownership tends to spread among many shareholders (Choi & Meek, 2011). Therefore, companies are forced to disclose more reliable information to investors (Zhang & Zhang, 2014). Hence, mandatory accounting disclosures alone no longer fulfil the diverse needs of investors, and voluntary disclosure such as IR is essential to improve the quality of corporate information and attract investors.

As per the voluntary disclosure theory, managers provide voluntary disclosure if they can get more benefits than costs (Demartini & Trucco, 2017). Thus, voluntary disclosure theory indicates that voluntary disclosures help to improve the information environment and minimise the information asymmetry between managers and investors (Guidry & Pattern, 2012). Further, IR is recognised as a powerful way to overcome the problems of other corporate reporting methods, and it outperforms existing reporting methods (Bal & Dhal, 2019; Bhasin, 2017; Camilleri, 2018; Humphrey et al., 2017; Knoll & Feigenbutz, 2014; Rowbottom & Locke, 2016; Uyar, 2016; Velte & Stawinoga, 2017; Zhou et al., 2017). Since the IR is practised in Sri Lanka as a voluntary disclosure model, voluntary disclosure theory is meaningful in theorising the impact of IR on information asymmetry.

Hypotheses Development

As per the voluntary disclosure theory, companies can explain their potential to investors using voluntary disclosure and ensure the effective allocation of capital. Finally, such practices cause to increase capital market efficiency by expanding information disclosure while reducing information asymmetry (Tian & Chen, 2009;

Zhang & Zhang, 2014). As Petersen and Plenborg (2006) state, although information asymmetry problems have received considerable attention in the corporate finance literature, the degree of information asymmetry is not directly observable. Hence, empiricists have relied on proxy variables for information asymmetry. As Shroff et al. (2013) state, an analyst's ability to forecast a firm's earnings is a function of a firm's information environment; therefore, average earnings forecast accuracy/error can be used as a proxy for information asymmetry. Further, analysts use the quality of disclosures to interpret the disclosures in an informed and similar manner. This leads to improved forecast accuracy as well as a lower forecast dispersion (Hope, 2003; Lang & Lundholm, 1996). In the same vein, Barron and Stuerke (1998) state that a higher level of dispersions in analysts' earnings forecasts is associated with low-quality financial disclosures. Thus, from the analysts'/investors' earnings forecast accuracy perspective, earnings forecast error and earnings forecast dispersion could be used as important proxy variables for information asymmetry which are negatively related to disclosures (Barron & Stuerke, 1998). Apart from this, Francis et al. (2005) found that the expanded disclosure policy of firms also leads to a lower cost of capital by reducing information risk. Further, García-Sánchez and Noguera-Gámez (2017b) mention that cost of equity capital is vital when making management and investment decisions, reflecting asymmetric information problems. Thus, from the investors' information risk perspective, the cost of equity capital could be used as a proxy variable to represent information asymmetry negatively related to disclosures. However, to measure the cost of equity capital, still there is a significant debate on which measure is the most appropriate in different contexts (Botosan & Plumlee, 2005; Botosan et al., 2011; Easton & Monahan, 2005). Empirical studies (e.g., Easley & O'hara, 2004; Lambert et al., 2012; Leuz & Verrecchia, 2005; Rathnasekara, 2017) indicate that still there is a popularity and an extensive use of Capital Asset Pricing Model (CAPM) to estimate the cost of equity capital in many contexts. As Rathnasekara (2017) mentions, especially in Sri Lanka, there is a greater emphasis on the CAPM in predicting stock returns. On the other hand, more recently developed models such as Price Earnings to Growth (PEG) Model is also widely used to measure the cost of equity capital in the disclosure quality literature (see, for example, Botosan & Plumlee, 2005; Easton, 2004; Zhou et al., 2017). Therefore, the present study has used two methods to measure the cost of equity capital: CAPM and PEG.

Based on the above theoretical relationships, empirical findings, and gaps in the literature, this study first examines the change in information asymmetry after adopting IR in Sri Lanka. In previous studies, Ferreira and Martins (2020), Martinez (2016), and Vena et al. (2020) have examined the change of information asymmetry

with the adoption of IR using several proxy variables such as cost of capital, earnings predictability and bid-ask spread. The present study examines the change of information asymmetry using earnings forecast error, earnings forecast dispersion and the cost of equity capital. In addressing the first research question, the authors formulate the following main hypothesis (H_1) and its sub-hypotheses (H_{1a}, H_{1b} and H_{1c}).

H_1: There is a significant change in information asymmetry after adopting IR in Sri Lanka.

H_{1a}: There is a significant change in earnings forecast error of firms after adopting IR in Sri Lanka.

H_{1b}: There is a significant change in earnings forecast dispersion of firms after adopting IR in Sri Lanka.

H_{1c}: There is a significant change in the cost of equity capital of firms after adopting IR in Sri Lanka.

Petersen and Plenborg (2006) report that the quality of voluntary disclosure is negatively associated with proxies for information asymmetry. Accordingly, a negative association between the quality of voluntary disclosure and earnings forecast error, earnings forecast dispersion, and cost of capital has been identified in numerous empirical studies (see Armstrong et al., 2011; Barron & Stuerke, 1998; Barry & Brown, 1984, 1985; Dhaliwal et al., 2012; Diamond & Verrecchia, 1991; Easley & O'hara, 2004; Hope, 2003; Hughes et al., 2007; Lang & Lundholm, 1996; Lambert et al., 2012; Lemma et al., 2019; Leuz & Verrecchia, 2005; Merton, 1987). Since IR was initiated under voluntary disclosure methods and the corporate community widely accepted IR with its ability to overcome limitations of other reporting mechanisms, studies such as Barth et al. (2016), García-Sánchez and Noguera-Gámez (2017a), Lee and Yeo (2016) and Zhou et al. (2017) have mentioned that IR can be used to test the voluntary disclosure theory. Thus, this study's second research question investigates the impact of companies' adherence level of IR on information asymmetry in Sri Lanka. The adherence level of integrated reports is measured using the content elements of the IR framework issued by the IIRC in 2013, which was initially used by Abeywardana (2016) in her study conducted in Sri Lanka. The use of the IR framework would better address the limitations of past studies, such as subjectivity, inconsistency and noncomparability problems that occurred due to the use of other frameworks. Information asymmetry is proxied by the earnings forecast error, earnings forecast dispersion and cost of equity capital. Accordingly, the authors propose the following main hypothesis (H_2) and sub-hypotheses (H_{2a}, H_{2b} and H_{2c}) to investigate the impact of IR on information asymmetry in Sri Lanka.

H_2: The alignment of integrated reports with the IR framework has a negative impact on information asymmetry in Sri Lanka.

H_{2a}: Firms producing integrated reports more aligned with the IR framework have lower analyst forecast error.

H_{2b}: Firms producing integrated reports more aligned with the IR framework have lower analyst forecast dispersion.

H_{2c}: Firms producing integrated reports more aligned with the IR framework have lower cost of equity capital.

As Barth et al. (2016) and Zhou et al. (2017) indicate, stand-alone sustainability/CSR reports issued by companies in addition to integrated reports can negatively impact on information asymmetry. Therefore, a dummy variable is added to the model to eliminate the sustainability/CSR effect on information asymmetry. Furthermore, as García-Sánchez and Noguera-Gámez (2017b) state, large companies tend to disclose more information to fund providers with the purpose of market image and the transparency. Thereby, the companies with relatively high leverage tend to disclose more information due to pressures from lenders (García-Sánchez & Noguera-Gámez, 2017b; Inchausti, 1997; Lee & Yeo, 2016). Further, companies with high profitability could be interested in disclosing more information to justify their performance level (García-Sánchez & Noguera-Gámez, 2017b; Inchausti, 1997; Lee & Yeo, 2016). Accordingly, company size, company leverage and company profitability, that may also negatively associate with the information asymmetry, are used as control variables in the present study.

Operationalisation of variables is presented in Table 1.

Table 1: Operationalisation of Variables

Key Concepts/ Variables	Description	Measurements	Source(s)
Independent Variable			
The adherence level of integrated reports	The degree of a firm's integrated report prepared in-line with all content elements of the principles-based framework introduced by the IIRC in 2013	66 content elements have been identified under 8 dimensions in an integrated report based on the IR framework issued by the IIRC. If a firm has presented a particular element in the integrated report can be scored as 1 and otherwise 0. Hence, the maximum total score, a firm could receive is 66 (see Appendix 1).	IIRC (2013), Abeywardena (2016)

Key Concepts/ Variables	**Description**	**Measurements**	**Source(s)**
Dependent Variable			
Information asymmetry	The difference in information available between managers of the firm and the market	Since the information asymmetry is not directly observable, this study employs three proxy variables namely earnings forecast error, earnings forecast dispersion, and cost of equity capital	Lin et al. (2009), Dierkens (1991), Clarke and Shastri (2000), Petersen and Plenborg (2006)
Earnings forecast error (EFE)	The discrepancy between actual earnings and forecasted earnings of a firm	*Earnings forecast error* = Actual earnings per share − Forecasted earnings per share	Waymire (1986)
Earnings forecast dispersion (EFD)	The disagreement among analysts/ investors with regard to the expected earnings per share of a given firm	*Earnings forecast dispersion* = Standard deviation (σ_f) of the forecasted earnings per share/Actual earnings per share	Hutira (2016)
Cost of equity capital (COEC)	The rate of return paid by firms to its equity investors/shareholders. This study considers only the cost of equity capital instead of the total cost of capital because IR mainly targets long-term equity investors to communicate the firm's value creation (IIRC, 2013; Humphrey et al., 2017). This study measures the cost of equity capital under two methods namely, Capital Asset Pricing Model (CAPM) and Price Earnings to Growth Model (PEG)	*Cost of equity capital under CAPM* = $R_f + \beta_i[\mathrm{E}(R_m) - R_f]$ (Refer Appendix 2) *Cost of equity capital under PEG model* = $\frac{\text{Price Earnings Ratio}}{\text{EPS Growth}}$ (see Appendix 2)	Zaro et al. (2022), Hsiao et al. (2021) Easton (2004), Easton (2009)

Key Concepts/ Variables	Description	Measurements	Source(s)
Control Variables			
Company size	The market capitalisation of a firm	Market price per share of the firm at the financial year end*Total number of outstanding shares at the financial year end	Barth et al. (2016)
Company leverage	The ratio between total debt to total equity of a firm	Total debt of the firm at the financial year end/total equity of the firm at the financial year end	García-Sánchez and Noguera-Gámez (2017b)
Company profitability	The return on assets (ROA) of a firm	Earnings before interest and taxes of the firm at the financial year end /total assets of the firm at the financial year end	García-Sánchez and Noguera-Gámez (2017b)
Dummy variable (D_1)	Whether the companies issue CSR/sustainability reports in addition to integrated reports	Dummy variable which equals 1 for firms which issue CSR/sustainability reports in addition to integrated reports, and 0 otherwise	Barth et al. (2016), Zhou et al. (2017)

Methods

Model Specification

To examine whether there is a significant change in information asymmetry in Sri Lanka after adopting IR, paired sample *t*-test for the pre-IR adoption sub-sample and post-IR adoption sub-sample is employed. This statistical technique has also been used by Ferreira and Martins (2020), Martinez (2016), and Vena et al. (2020) to test the change in information asymmetry after adopting corporate disclosure methods. Since the publication of integrated reports is voluntary in Sri Lanka, all companies have not issued integrated reports every year. Therefore, the pre and post-IR periods of companies may differ from each other and the average value of these proxy variables (EFE, EFD and COEC) is considered under each company by segregating them as pre and post-IR periods.

H_0: Difference of means (EFE, EFD and COEC) between two sub-samples equals zero.

H_1: Difference of means (EFE, EFD and COEC) between two sub-samples does not equal zero.

IR is a powerful disclosure model which has the potential to impact on information asymmetry. Since this study investigates the impact of IR on information asymmetry using three proxy variables, namely, EFE, EFD, and COEC, the following three regression models for panel data are estimated to draw empirical evidence to test H_2 and its sub-hypotheses.

$$EFE_{it} = \beta_0 + \beta_1 IR\_TOTAL_{it} + \beta_2 MC_{it} + \beta_3 LEV_{it} + \beta_4 ROA_{it} + \beta_5 D1_{it} + \varepsilon_{it} \quad (1)$$

$$EFD_{it} = \beta_0 + \beta_1 IR\_TOTAL_{it} + \beta_2 MC_{it} + \beta_3 LEV_{it} + \beta_4 ROA_{it} + \beta_5 D1_{it} + \varepsilon_{it} \quad (2)$$

$$COEC_{it} = \beta_0 + \beta_1 IR\_TOTAL_{it} + \beta_2 MC_{it} + \beta_3 LEV_{it} + \beta_4 ROA_{it} + \beta_5 D1_{it} + \varepsilon_{it} \quad (3)$$

where, EFE_{it} is earnings forecast error, EFD_{it} is earnings forecast dispersion, $COEC_{it}$ is cost of equity capital, IR_TOTAL_{it} represents total IR score of the firm, MC_{it} is size of the firm, LEV_{it} is leverage of the firm, ROA_{it} is profitability of the firm, $D1_{it}$ is a dummy variable which equals 1 for firms which issue CSR/sustainability reports in addition to integrated reports, and 0 otherwise, and $\mathcal{E}_{it}$ specifies the error term of the model.

Sample and Data

As the sample, this study has considered all companies which issued integrated reports under the IIRC framework during the post-IR period (i.e., 2013/2014-2018/2019). However, year-wise, samples differ as all companies have not published integrated reports every year since the publication of integrated reports is voluntary in Sri Lanka. Therefore, this study has used an unbalanced panel which is consistent with Frias-Aceituno et al. (2013), Rossignoli et al. (2021), and Soriya and Rastogi (2022) who also faced the same issue in their studies conducted in contexts where IR is voluntary. The gathered data were analysed using the EViews software. Table 2 presents the number of companies that have issued integrated reports each year during the post-IR period.

Table 2: Year-wise Sample

	2013/ 2014	**2014/ 2015**	**2015/ 2016**	**2016/ 2017**	**2017/ 2018**	**2019/ 2020**
Number of companies	20	30	44	58	73	88

To separate pre- and post-IR adopting periods, the year 2013/2014 is used explicitly because the principles-based IR framework was released by the IIRC for

companies internationally in December 2013. By 2018/2019, IR adoption has been there for 6 years in Sri Lanka. Therefore, the post-IR period was selected as 6 years from 2013 (i.e., 2013/2014-2018/2019). Even though year-wise samples vary (i.e., some companies have issued integrated reports during all 6 years, while others have not issued), overall, 93 companies have issued integrated reports at least 1 time during the post IR period. Since the sample size is more than 50, it is sufficient for conducting a regression analysis (Soriya & Rastogi, 2022; VanVoorhis & Morgan, 2007). The pre-IR period was also chosen as 6 years prior to the post-IR period (i.e., 2007/2008-2012/2013) for comparison. Further, the same sample of companies in the post-IR period was considered as the sample of the pre-IR period. Since the pre and post-IR periods of companies may differ from each other, the average value of these proxy variables is considered under each company by segregating them individually as pre and post-IR periods.

Data relating to content elements of integrated reports and accounting figures relating to variables were collected from annual reports and audited financial statements of listed companies in Sri Lanka. Market-based data were collected from the CSE data library. Analysts' earnings forecast data relating to listed companies were collected from the Bloomberg data terminal, which maintains such data as consensus earnings estimates.

Empirical Results

Change in Information Asymmetry after Adopting IR in Sri Lanka

To examine whether there is a significant change of mean values between two sub samples (pre-IR period and post-IR period), a paired sample *t*-test was carried out for each proxy variable of information asymmetry, namely, EFE, EFD, and COEC. Accordingly, the following two hypotheses were tested using a two-tailed *t*-test assuming unequal variances between two sub-samples.

H_0: Difference of means (EFE, EFD and COEC) between two sub-samples equals zero ($\mu_1 - \mu_2 = 0$).

H_1: Difference of means (EFE, EFD and COEC) between two sub-samples does not equal zero ($\mu_1 - \mu_2 \neq 0$).

According to Table 3, the mean of EFE has reduced from 4.61 in the pre-IR period to 2.26 in the post-IR period. According to the *t*-value and its significance ($t = 3.37$, $p = 0.00$), there is a significant change in EFE between the two sub-samples. Hence, H_{1a} of the study, there is a significant change in earnings forecast error of firms after adopting IR in Sri Lanka, is supported. The mean of EFD has reduced from 0.90 in

the pre-IR period to 0.26 in the post-IR period. According to the *t*-value and its significance ($t = 3.12$, $p = 0.00$), there is a significant change in EFD between the two sub-samples. Hence, H_{1b}, there is a significant change in earnings forecast dispersion of firms after adopting IR in Sri Lanka is also supported. The mean of COEC under CAPM has reduced from 0.07 to 0.05. According to Table 3, the *t*-value and its significance ($t = 2.55$, $p = 0.01$) indicate that there is a significant change in COEC between the two sub-samples. Further, the mean of COEC under PEG has also reduced from 0.17 to 0.15. According to the *t*-value and its significance ($t = 2.94$, $p = 0.00$), there is a significant change in COEC between the two sub-samples. Hence, H_{1c} of the study, there is a significant change in the cost of equity capital of firms after adopting IR in Sri Lanka is also supported. The outcome of the hypotheses testing results presented in Table 3 reveals a significant change (reduction) in information asymmetry in Sri Lanka after adopting IR.

Table 3: Paired Sample *t*-test for EFE, EFD, and COEC

	EFE		***EFD***		***COEC_CAPM***		***COEC_PEG***	
	PRE	*POST*	*PRE*	*POST*	*PRE*	*POST*	*PRE*	*POST*
Mean	4.61	2.26	0.90	0.26	0.07	0.05	0.17	0.15
Variance	24.56	4.82	1.86	1.16	0.00	0.00	0.00	0.00
t Stat	3.37		3.12		2.55		2.94	
P(T<=t) two-tail	0.00**		0.00**		0.01*		0.00**	
t Critical two-tail	2.01		2.02		1.99		1.99	

Note: *$p < 0.05$; ** $p < 0.01$

This finding is consistent with previous studies such as Ferreira and Martins (2020) and Vena et al. (2020), who have also found a significant reduction in information asymmetry after adopting IR. In contrast, Martinez (2016) has found no evidence of reducing information asymmetry after adopting IR. As a reason, the author states that the companies with a better information environment are the ones that more closely follow IR principles, and as a result the reduction of information asymmetry is not significant. Further, the author highlights that a small sample (64 companies) used, and the short period (3 years) analysed could be another reason that IR does not significantly reduce information asymmetry. Ferreira and Martins (2020) and Vena et al. (2020) revealed a significant change in information asymmetry using a large sample over a longer time. Vena et al. (2020) have used a sample of 211 companies from 2009 to 2017, whereas Ferreira and Martins (2020) used 269 companies from 2011 to 2018. In the same way, the sample period of the present study was considered 2007-2019, which contains 6 years of data for pre-IR adopting

period (2007/2008-2012/2013) and 6 years data for post-IR adopting period (2013/2014-2018/2019). Therefore, using an extended time period for the present study would possibly have produced more accurate information indicating a reduction in information asymmetry in Sri Lanka in contrast to Martinez (2016) who identified no reduction, using a shorter period.

The Impact of IR on Information Asymmetry in the Post IR Period in Sri Lanka

Regression estimates of the above three models are used to test whether there is a negative impact of the alignment of integrated reports with the IR framework on information asymmetry in Sri Lanka.

Table 4: Regression Estimates

	Model 1		**Model 2**		**Model 3 (CAPM)**		**Model 3 (PEG)**	
Variable	**Coeff.**	***t***	**Coeff.**	***t***	**Coeff.**	***t***	**Coeff.**	***t***
C	-1.17	-0.38	1.57	0.68	-1.48	-1.62	-0.49	-0.99
TOTAL_IR	-0.01	-0.71	-0.01	-1.37	-0.02**	-2.64	-0.00	-0.84
LMC	0.04	0.30	-0.17	-1.73	-0.02	-0.53	-0.05*	-2.55
LLEV	0.05	0.50	-0.05	-0.93	0.03	0.79	-0.01	-0.74
LROA	-0.23	-1.79	-0.58**	-4.80	0.01	0.29	0.05*	1.91
D1	0.53	1.49	0.31**	4.11	-0.01	-0.05	-0.06	-0.55
Adjusted R^2	0.003		0.34		0.02		0.01	
F-statistic	1.11		16.14		1.82		1.38	
Durbin-Watson	2.21		1.65		2.00		2.22	

Notes: 1. No. of observations is 558
2. *$p < 0.05$; **$p < 0.01$

Data stationarity was checked using the summary of unit root testing[1] in EViews software. Since the majority probability values of all unit root tests were less than 0.05, it confirmed the stationarity of data in all variables. To ensure the normality and linearity of data, Jarque–Bera Test was carried out. Accordingly, to eliminate the skewness and kurtosis problems, data of all dependent and control variables were transformed into logarithm values. This transformation process is consistent with Zhou et al. (2017) and Lehavy et al. (2011), who also faced similar problems in related studies. As per the Durbin-Watson test conducted to identify auto/serial correlation

[1]Summary of unit root testing includes four tests; Levin, Lin & Chu test, Im, Pesaran and Shin test, ADF - Fisher Chi-square test, and PP - Fisher Chi-square test.

of the data set, all models indicated the Durbin-Watson stat value higher than 1.6 (Table 4). Therefore, the collected data set does not contain the pattern of error terms. In summarising regression estimates in Table 4, the most appropriate regression estimates were selected based on the Hausman Specification Test. As per the Hausman Specification Test, estimates of the random effects model are most appropriate to test H_2.

According to the regression estimates in Table 4, TOTAL_IR and earnings forecast error do not indicate a systematic relationship. Other than the main independent variable (TOTAL_IR), control variables such as company size, company leverage, company profitability, and dummy variable (D1: companies which issue sustainability/CSR reports in addition to integrated reports; 1 for issuing company and otherwise 0) do not significantly impact on earnings forecast error. These results lead to rejecting H_{2a} – firms producing integrated reports more aligned to the IR framework have a lower analyst forecast error. TOTAL_IR and earnings forecast dispersion do not indicate a systematic relationship. Only one control variable (company profitability) and dummy variable (D1) are statistically significant. Accordingly, the estimates summarised in Table 4 lead to rejecting H_{2b} – firms producing integrated reports more aligned to the IR framework have lower analyst forecast dispersion. Hence, from the accuracy of the earnings forecast perspective, adopting IR has no significant impact on information asymmetry in Sri Lanka.

There is a statistically significant negative relationship between TOTAL_IR and the cost of equity capital under CAPM. It indicates that when TOTAL_IR is increased by 1 unit, the cost of equity capital will reduce by 0.02 units. Hence, in terms of investors' information risk perspective, there is a significant impact on information asymmetry. These results support H_{2c} – firms producing integrated reports more aligned to the IR framework have lower cost of equity capital. TOTAL_IR and cost of equity capital under PEG do not indicate a systematic relationship (see Table 4). Hence, in terms of the cost of equity capital of firms under PEG, there is no significant impact on information asymmetry. Thus, TOTAL_IR and the cost of equity capital in Sri Lanka under the PEG model do not indicate a significant result compared to the cost of equity capital under the CAPM.

The negative relationship reported in this study between TOTAL_IR and the cost of equity capital is also consistent with past studies such as Zaro et al. (2022) which also used the CAPM to estimate the cost of equity capital. Apart from that, García-Sánchez and Noguera-Gámez (2017b), Vitolla et al. (2019) and Zhou et al. (2017) have also revealed a negative association between IR and the cost of equity capital.

However, they have used the PEG model in measuring the cost of equity capital which is not significant in the Sri Lankan context. Hence, this study provides evidence on the sufficiency of IR level in Sri Lanka to reduce the cost of equity capital. Further, it implies that investors can reduce information/ estimation risk using quality information in integrated reports. Therefore, they tend to invest by expecting a lower return. In other words, firms could enjoy a reduction in the cost of equity capital (Vitolla et al., 2019).

In relation to the impact of IR on information asymmetry from analysts' forecast accuracy perspective, the results of this study are not congruent with the expected relationships as per the voluntary disclosure theory and other existing empirical findings. The theory specifies that if there is quality disclosure or value-relevant information, it increases the analysts' earnings forecast ability. Therefore, as inverse measures, earnings forecast error and earnings forecast dispersion should be negatively related to TOTAL_IR. Accordingly, past studies such as Barth et al. (2017), García-Sánchez and Noguera-Gámez (2017a), Lee and Yeo (2016), and Zhou et al. (2017) have revealed that TOTAL_IR is negatively related to earnings forecast error and earnings forecast dispersion.

As per the current study, the impact of TOTAL_IR on earnings forecast error and earnings forecast dispersion is not statistically significant. These findings are consistent with Wahl et al. (2020), which also failed to find a robust significant relationship between TOTAL_IR and forecast accuracy. For an imperious reason, they have explained that the sample used as voluntary IR-adopting companies that already have a relatively high level of transparency due to more disclosure. Therefore, it has only a minimal impact on the decrease of information asymmetry by publishing integrated reports. Further, García-Sánchez and Noguera-Gámez (2017a) and Martinez (2016) have found that the incremental effect of IR of companies with a better information environment (with higher financial and sustainable reporting quality) is relatively low. Listed companies in Sri Lanka also publish integrated reports voluntarily, and relatively, they have higher transparency with more disclosure. Therefore, this could be a reason for not indicating a significant negative impact of IR on earnings forecast error and earnings forecast dispersion in the present study.

Apart from the above, Horton et al. (2013) state that forecast accuracy is increased significantly more for mandatory adopters than non-adopters and voluntary adopters. In such a case, a compulsory adoption of reporting requirements affects all firms within the given area of application regardless of the level of transparency the firms

exercise (Wahl et al., 2020). Wahl et al. (2020) mention another reason in the voluntary setting is the lack of credibility of non-financial information in integrated reports. Since auditing non-financial information is not mandatory, companies that issue integrated reports voluntarily face difficulties in providing a third-party assurance for such information. Hence, the nonappearance of assurance may be a risk for analysts/investors in forecasting earnings. As empirical studies found, investors value audited IR reports more because it is crucial for enhancing the credibility of information (Fuhrmann et al., 2017; Landau et al., 2020; Maroun, 2019). Supporting to this, Grassmann et al. (2021) reveal that the presence of an assurance statement in an integrated report significantly decreases information asymmetry, and also, the combination of both the high assurance quality and high disclosed connectivity of the capitals in the integrated reports allow a significant reduction in information asymmetry. Thus, without third-party assurance, analysts/investors may not completely utilise all information in integrated reports as expected, and therefore the incremental impact of IR on the forecast accuracy can be limited. Similarly, as most listed companies in Sri Lanka also voluntarily publish integrated reports without third-party assurance for non-financial information, the IR impact on analysts' forecast accuracy may be limited. Moreover, previous studies which revealed a significant negative association between IR and information asymmetry, such as Barth et al. (2017), Bernardi and Stark (2018), Lee and Yeo (2016), and Zhou et al. (2017), have captured the contexts where publication of IR is mandatory with a third-party assurance for information.

Apart from the nature of issuing integrated reports in different contexts, such as voluntary or mandatory settings, analysts' earnings forecast accuracy may depend on some other factors. As Plumlee (2003) reports, analysts' forecast is a decreasing function of the changes in tax laws. As they further explain, analysts do not assimilate such complex information when changing tax law information because their costs exceed their benefits. The stakeholder or shareholder-centric governance may also moderate the relationship between IR disclosure and forecast accuracy (Flores et al., 2019). As per their findings, contexts that follow a shareholder-centric governance system have a robust association between IR and forecast accuracy. Besides these, Vena et al. (2020) indicate that cultural dimensions may also influence the association between IR and forecast accuracy. As per their findings, IR effectiveness is illustrious in countries with low power distance, strong collectivism values, and high masculinity levels. The current study has controlled only the company size, leverage, profitability, and issuance of sustainability/CSR reports; therefore, the impact of factors mentioned above on earnings forecast accuracy is unavoidable.

Conclusion

With the contemporary development of corporate reporting and disclosure methods, IR is recognised by corporate communities as a more powerful disclosure method that can replace all other reporting tools. Even though the publication of integrated reports is voluntary in Sri Lanka, currently, many listed companies are at a growing level of adoption (Abeywardana, 2016; Cooray et al., 2021; Herath et al., 2019; Jayasiri, 2021). Even though a few studies have been conducted to test the impact of IR on information asymmetry, especially in developed countries, the impact of IR on information asymmetry is not sufficiently known in developing countries. Thereby, many past studies have captured the research contexts where IR is a company's mandatory reporting requirement. In contrast to this common trend, the present study investigated the impact of IR on information asymmetry using Sri Lanka as a developing country that is adopting IR as a voluntary disclosure model.

Pertaining to the change in information asymmetry in Sri Lanka after adopting IR, results indicate a significant reduction in information asymmetry in Sri Lanka in the post-IR period compared to the pre-IR period. In relation to the impact of companies' adherence level of IR on information asymmetry in Sri Lanka during the post-IR period, the study found a statistically significant negative impact on information asymmetry only from the cost of equity capital perspective. The impact of IR on earnings forecast error and earnings forecast dispersion is not statistically significant. Thus, information asymmetry does not indicate a significant association with IR from the analysts' earnings forecast accuracy perspective. This concludes that IR has only a marginal impact on information asymmetry in Sri Lanka.

This study has several theoretical and practical implications. In this respect, the study supports the voluntary disclosure theory by revealing a marginal impact of IR on information asymmetry in Sri Lanka, while it indicates some instances where the theory does not properly apply in a voluntary setting. Furthermore, the study reveals a significant change in information asymmetry after adopting IR and, the cost of equity capital is negatively related to the level of integrated reports. This provides insights for investors and business managers to take their investment or financing decisions. For example, based on the quality of information in integrated reports issued by companies, investors can reduce their information/estimation risk and take investment decisions accordingly. In the same way, business managers can reduce the expected return demanded by investors or the cost of equity capital by providing more quality information through integrated reports. Aside from those, the findings of the present study will offer insights for regulatory bodies such as the Sri Lanka

Accounting and Auditing Standards Monitoring Board (SLAASMB), Securities and Exchange Commission of Sri Lanka (SECSL), and the Central Bank of Sri Lanka (CBSL) to promote IR within adequate enforcement because as per, Zaro et al. (2022), a negative effect of IR on information asymmetry is more prevalent for companies operating in high-enforcing environments. Overall, the study sheds light on how the wide adoption and diffusion of IR would impact information asymmetry in a developing country setting.

Though the study contributes to the knowledge in different ways, as with most studies, the current study's design is subject to several limitations. First, the unavailability of analysts' earnings forecasts data completely over certain years caused a reduction in the sample size. Therefore, the use of more consensus analysts' forecast data by future studies would generate more effective results. Second, as the publication of integrated reports in Sri Lanka is voluntary, and still only 93 (by 2019) listed companies out of the total listed companies (294) have issued integrated reports by following the IIRF. Hence, future studies can use a larger sample of companies from different country perspectives with the adoption of IR. Third, in measuring the cost of equity capital, this study employed two models, CAPM and PEG, due to their popularity and their extensive use in the corporate reporting literature. Hence, future studies may use alternative models that can overcome the limitations of existing models. Fourth, since the information asymmetry is not directly observable, future researchers could use different proxies from multiple perspectives; the present study uses two such perspectives, namely, earnings forecast accuracy and cost of equity capital. Finally, even though companies are gradually aligning with the IIRF as a reporting model, practicing integrated thinking offers more qualitative research that has not been adequately addressed by the quantitative methodology used in this study. Therefore, exploring the way of practicing the integrated concept using case organisations will offer opportunities for qualitative studies.

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Appendix 1: Content Elements of Integrated Reports (IR_TOTAL)

Dimension	Content Elements
1. Organizational overview and external environment	• Mission • Vision • Culture • Ethics • Values • Ownership structure • Operating Structure • Competitive Landscape • Market Positioning • Position within the value chain • Key Quantitative Information • Significant factors affecting the external environment • Needs & Interests of stakeholders • Macro & Microenvironment conditions

Dimension	Content Elements
	• Market Forces • Technological changes • Societal Issues • Environmental Challenges • Regulatory Environment • Political Environment
2. Governance	• Leadership Structure • Processes used to make strategic decisions • Actions taken to monitor the strategic decisions • organization's culture, ethics and values are reflected in its use of and effects on the capitals • Governance practices exceeding legal requirements • Responsibility those charged with governance take for promoting & enabling innovation • Linkage between remuneration and value creation
3. Business Model	• Relationship on key inputs to the capital • Input's ability to create value in the short, medium and long term • Organization's differentiation used in the market • Design of business model to adopt to change • Outputs • Internal Outcomes • External Outcomes • Identification of key elements • Diagram highlighting key elements
4. Risk & Opportunities	• Internal Risks • External Risks • Internal Opportunities • External Opportunities • Likelihood of Risks • Likelihood of Opportunities • Specific steps taken to mitigate risks • Specific Steps taken to create value form key opportunities
5. Strategy & Resource allocation	• Strategic Objectives • Strategies it has in place • Resource allocation plans to achieve objectives • Measurements for target outcomes • Linkage between Organization's strategy & resource allocation plans • Differentiates which give competitive advantage and enable to create value

Dimension	Content Elements
	• Stakeholders' engagements used in formulating strategy & resource allocation plans
6. Performance	• Quantitative indicators with respect to target risk & opportunities • Organization's effect on the capital • Response for key stakeholder's needs & interests • Linkage between past and current performance • Key performance indicators that combine financial measures with other components
7. Outlook	• Organization's expectations about the external environment • Impact from external environment to organization • Organization's response to critical challenges & uncertainties • Effect of external environment, risk & opportunities to achievement of objectives • Realistic appraisal of the organization's competitive landscape and market positioning, and the risks it faces. • The availability, quality and affordability of capitals • Disclosures about the organization's outlook
8. Basis of preparation & Presentation	• Summary of the organization's materiality determination process • A description of the reporting boundary • Summary of significant frameworks & methods used to quantify or evaluate material matters

Source: Based on the content elements of the principles-based framework issued by the IIRC in 2013, which was initially used in Sri Lanka by Abeywardana (2016)

Appendix 2: Models Used in Estimating Cost of Equity Capital

Cost of Equity Capital (COEC) under CAPM

Cost of Equity Capital under CAPM is measured using following formula.

$R_i = R_f + \beta_i[E(R_m) - R_f]$

where,

R_i = Cost of equity capital

R_f = Risk free rate

β_i = Beta of the investment

$E(R_m) - R_f$ = Market risk premium

Cost of Equity Capital (COEC) under PEG Model

The PEG ratio is equal to the price-earnings ratio divided by the earnings growth rate. Cost of Equity Capital under PEG Model is measured using following formula.

$$\frac{\text{Price Earnings Ratio}}{\text{EPS Growth}}$$

where,
Price Earnings Ratio = Share Price at the end of the year/ Earnings per Share of the year
EPS growth = Annual EPS growth

Accordingly, the cost of equity capital under PEG is equal to the square root of the inverse of the PEG ratio as follows (Easton, 2004; 2009).

$$\sqrt{\frac{\boldsymbol{EPS_1 - EPS_0}}{\boldsymbol{P_0}}}$$

where,
EPS_1 = Earnings per Share of the current financial year end
EPS_0 = Earnings per Share of the Previous financial year end
P_0 = Market Price per Share