

Is voluntary International Integrated Reporting Framework adoption a step on the sustainability road and does adoption matter to capital markets?

Pei-Chi Kelly Hsiao

The University of Waikato, New Zealand

Charl de Villiers (corresponding)

The University of Auckland, New Zealand, and University of Pretoria, South Africa

Tom Scott

Auckland University of Technology, New Zealand

Please cite as:

Hsiao, P.-C.K., De Villiers, C. & Scott, T. 2022. Is voluntary International Integrated Reporting Framework adoption a step on the sustainability road, and does adoption matter to capital markets?, *Meditari Accountancy Research*, 30(3), 786-818. DOI: 10.1108/MEDAR-08-2020-0978

Abstract

Purpose – This paper aims to examine the type of firms that voluntarily adopt the International Integrated Reporting Framework (IIRF) and how markets respond to voluntary IIRF adherence.

Design/methodology/approach – Analysis of a matched global sample of listed firms that voluntarily adopt the IIRF (IIRF firms) and those that do not (non-IIRF firms). The samples range from 188 to 436 observations as alternative research designs, different matched samples and regression specifications, and several sensitivity analyses were conducted.

Findings – In markets where integrated reporting (IR) is not mainstream, voluntary IIRF adoption is more likely for firms with established sustainability practices. Such findings suggest that the IIRF is an incremental innovation for sustainability rather than an innovation that radically changes management and reporting practices. In Japan, where IR is mainstream, results show no observable differences between IIRF firms and non-IIRF firms. Consistent with the determinants results, we find no evidence of associations between voluntary IIRF adoption and the information environment, the cost of equity or firm value. However, additional analysis provides preliminary evidence suggesting capital market effects may differ for IIRF firms with higher sustainability or market performance.

Practical implications - This study offers useful insights into the current global debate on whether there is value in adopting the IIRF.

Originality – This study adds to the limited body of research on the determinants and consequences of voluntary IIRF adoption, offering insights for regulators, practitioners and proponents of IR. This study is the first to provide quantitative evidence of the influence sustainability practices have on voluntary IIRF adoption. Further, the results add to the current global debate on whether there is value in adopting the IIRF. We find that voluntary IIRF adoption has no clear and distinct influence on disclosure practices and capital markets, suggesting there are no additional benefits from prioritising the promotion or adoption of the IIRF over other disclosure forms. Unless there are advancements supporting the implementation of integrated thinking and information connectivity, the potential for the IIRF to improve information quality may be limited to encouraging more non-financial disclosure and transparency in countries where integrated disclosures are not trending.

Keywords: Integrated reporting; IIRC; International Integrated Reporting Framework; Voluntary adoption; Sustainability; Capital markets; Information environment; Cost of equity; Firm value

Article classification: Research paper

1. Introduction

There has been growing awareness of the International Integrated Reporting Framework (IIRF) since its release in December 2013 (de Villiers *et al.*, 2020, International Integrated Reporting Council (IIRC), 2018, Rinaldi *et al.*, 2018). Organisations worldwide have been adopting its concepts, with the International Federation of Accountants and the International Accounting Standards Board endorsing the framework, and regulators in Europe, Asia, Oceania, the Middle East and Africa supportive of the initiative (IIRC, 2018). Despite initial momentum in the uptake of the IIRF, its widespread adoption and acceptance is hindered by challenges in implementation, availability of competing guidelines, a lack of investor interest, and insufficient evidence to support the IIRC's assertions about the benefits of adopting the IIRF (IIRC, 2017, Rinaldi *et al.*, 2018, Rowbottom and Locke, 2016). This paper examines the determinants and consequences of voluntary IIRF adoption. We focus on a narrow definition of integrated reporting (IR) and investigate adoption of the IIRF rather than the application of IR principles or self-declared integrated disclosure¹. Our distinct focus on the IIRF is important as our findings provide insights on whether regulators should promote adoption of the IIRF over alternative guidelines and whether the economic benefits of preparing IIRF-inspired reports are greater than those of other disclosure forms.

A growing body of the voluntary IR literature provides evidence suggesting IR is an incremental innovation for sustainability, where it is a process that builds on established sustainability management and reporting practices and does not lead to transformative changes in organisational practices. There is case study and interview evidence showing sustainability committees and experience with sustainability reporting influence the decision to adopt the IIRF

¹ We refer to disclosure referencing the IIRF as 'integrated reports' and all other combined disclosure as 'integrated disclosure'. The IIRC (2013) describes integrated reports as investor-centric and requires application of prescribed guiding principles and content elements. The IIRC promotes IR as a process founded on integrated thinking, which requires active consideration of the interrelationships between an organisation's operating and functional units and the resources and relationships it uses or affects. Reports such as One Reports (Eccles and Krzus, 2010) and self-declared integrated reports in Japan (Corporate Value Reporting Lab, 2016) are stakeholder-centric and encourage the comprehensive inclusion of financial and non-financial information in a single report.

(Al-Htaybat and von Alberti-Alhtaybat, 2018, Feng *et al.*, 2017, Guthrie *et al.*, 2017, Stubbs and Higgins, 2014), and managers perceive IR as an extension of sustainability reporting (Chaidali and Jones, 2017, Lodhia, 2015, Stubbs *et al.*, 2014). Despite these findings, extant empirical archival studies have not considered firms' experience with sustainability management and reporting as a potential driver of IR adoption, but rather focused on the influences economic characteristics, board composition and country-level factors have on issuing integrated disclosure (Frías-Aceituno *et al.*, 2013a, Frías-Aceituno *et al.*, 2013b, García-Sánchez *et al.*, 2013, Girella *et al.*, 2019). Further, the limited number of empirical archival studies investigating the IIRF have not assessed the determinants of voluntary IIRF adoption, but instead focused on the determinants of integrated report content (Gerwanski *et al.*, 2019, Melloni *et al.*, 2017). Thus, we extend prior studies by examining the characteristics that differ between IIRF firms and non-IIRF firms, specifically assessing the influences sustainability practices have on voluntary IIRF adoption and any differences between markets where IR is mainstream (South Africa and Japan) and not².

Building on the argument that IR builds on existing sustainability practices, we expect that markets do not react to firms signalling voluntary IIRF adoption. Prior studies on the capital market consequences of IR mainly investigate the South African setting and general IR-related practices. Studies on mandatory IR have deemed disclosure more aligned with the IIRF as higher quality disclosure, finding positive associations between the level of compliance with the IIRF and improvements in analyst forecast estimates (Bernardi and Stark, 2018, Zhou *et al.*, 2017), the cost of equity (Zhou *et al.*, 2017), and firm value (Barth *et al.*, 2017, Lee and Yeo, 2016). Similarly, studies have found that engagement in IR-related practices attracts investors with a longer-term time horizon (Serafeim, 2015) and leads to higher share prices (Cortesi and Vena, 2019). Although these studies provide valuable insights on the consequences of better IR, their measures of disclosure quality do not separate the effects attributable to producing higher quality disclosure in

² The IIRC (2018) identifies two countries where IR and the IIRF are mainstream: South Africa and Japan. IR is mandatory in South Africa and voluntary in Japan. Other capital markets are still in the “awareness creation phase” (IIRC, 2018, p. 5). The IIRC (2018) reports that 279 firms in Japan engage in IR and this is consistent with our initial sample, where 28.95% of all identified IIRF firms are Japanese firms.

general and adoption of the IIRF. Further, South African findings could reflect country-specific characteristics or regulatory effects and may thus not be generalisable to voluntary settings. Supportive of this proposition, a recent study by Wahl *et al.* (2020) find no evidence of any capital market effects following from voluntary IIRF adoption. We extend this study by also assessing the relation between voluntary IIRF adoption and the cost of equity, and channels that may influence the capital market effects of voluntary IIRF adoption. Additionally, we use a larger sample of voluntary IIRF adopters, additional control variables and run further tests to alleviate endogeneity concerns.

We begin our investigation by examining the determinants of voluntary IIRF adoption. We focus on the year that firms first signal voluntary IIRF adoption, strengthening internal validity as historical events are unlikely to drive our results due to firms initiating the IIRF in different years. Using a unique hand-collected dataset of firms that declare adherence to the IIRF (IIRF firms) matched to firms that do not reference the IIRF and do not label their report as an integrated report (non-IIRF firms), we find that the determinants differ for firms in mainstream and non-mainstream markets. In markets where IR is not mainstream, voluntary IIRF adoption is more likely in firms with a corporate social responsibility (CSR) committee, experience with the Global Reporting Initiative (GRI) guidelines, and stronger environmental and social performance. In Japan, where IR is mainstream, there are no statistically significant differences between IIRF firms and non-IIRF firms. Such findings show that Japanese firms voluntarily adopt the IIRF for reasons not related to observable firm characteristics and suggest there may be no substantial differences between IIRF-inspired reports and other integrated disclosures.

We next investigate whether voluntary IIRF adoption affects the information environment, the cost of equity and firm value. Using a difference-in-differences (DiD) design, Heckman selection model (Heckman) and reporting ordinary least squares (OLS) estimates, we do not find any evidence of a significant association between voluntary IIRF adoption and analyst forecast error, analyst forecast dispersion, the cost of equity or firm value. Additionally, we assess two

channels through which voluntary IIRF adoption can affect the assessed consequences: disclosure quality (the disclosure quality channel) and higher sustainability performance or market performance (the value creation channel). We find no statistically significant result for the disclosure quality channel, suggesting the positive economic consequences of greater alignment with IIRF found in mandatory IR studies may be due to better disclosure in general rather than adoption of the IIRF. We do find results for the value creation channel in markets where IR is not mainstream. Specifically, voluntary IIRF adoption increases analyst forecast dispersion and firm value for IIRF firms with higher sustainability performance and decreases firm value for IIRF firms with higher market performance. The former suggests that integrated reports prepared by firms with better sustainability performance may contain relevant sustainability-related information for analysts who consider such information in investment appraisals, leading to divergence in the higher-end future estimates and increased firm value. The latter may be due to overvalued firms seeking to communicate the long-term financial stability of their growth, but were not able to do so in the first year of IIRF adoption. Our findings are robust to a number of sensitivity analysis employed to alleviate alternative explanations and endogeneity concerns, including alternative regression specifications, subsample analysis, alternative benchmark samples, and analysis on an expanded sample period.

Our study contributes to the IR literature in several ways and is of interest to regulators, practitioners and proponents of IR. First, we provide empirical archival evidence on the influence experience with sustainability management and reporting has on voluntary IIRF adoption. Such findings support the argument that IR is an incremental innovation for sustainability and explain why any changes in management and reporting practices are incremental rather than transformational (Guthrie *et al.*, 2017, Higgins *et al.*, 2014, Stubbs and Higgins, 2014).

Additionally, these findings reflect another barrier to widespread adoption of the IIRF, since firms with weaker sustainability practices are less inclined to adopt the IIRF voluntarily.

Second, our results for Japanese firms suggest that there may be no substantial differences in the disclosure content of IIRF firms and similar non-IIRF firms in countries where integrated disclosure practices are mainstream (Adams *et al.*, 2016), contributing to the debate on whether there is value in adopting the IIRF over alternative disclosure practices. Unless there are advancements supporting the implementation of integrated thinking and connectivity of information, the potential for the IIRF to improve information quality may be limited to encouraging more non-financial disclosure and transparency in countries where integrated disclosures are not already trending.

Finally, our study provides insights on the economic impacts voluntary IIRF adoption has on firms in the early stages of adoption. Consistent with our determinants findings, we find that markets do not react differently to the disclosures of IIRF firms before and after voluntary IIRF adoption, and market participants' views of integrated reports are no different relative to their views toward the disclosures of similar non-IIRF firms. However, there is preliminary evidence suggesting integrated reports may be an efficient means to communicate value related to sustainability operations rather than long-term financial stability and growth. Nevertheless, it is possible that the economic benefits from IIRF adoption may be present over the longer term as integrated thinking becomes embedded in organisational practices and improves understanding of value creation, management information and decision-making (Black Sun, 2014).

The remainder of the paper is structured as follows. Section 2 provides a review of relevant research and develops the hypotheses. Section 3 describes the research design and sample. Section 4 and Section 5 present the determinants and consequences models and results, respectively. Section 6 concludes.

2. Literature review and hypotheses development

The qualitative voluntary IR literature provides evidence that implementation of the IIRF builds on established sustainability reporting practices (Al-Htaybat and von Alberti-Alhtaybat, 2018, Feng *et*

al., 2017, Guthrie *et al.*, 2017, Higgins *et al.*, 2014, Stubbs and Higgins, 2014), suggesting the determinants of voluntary IIRF adoption may be a function of factors that influence sustainability reporting or other voluntary disclosure. However, the IIRF was intended to reform existing reporting practices by encouraging ideas such as connectivity and integrated thinking (de Villiers and Hsiao, 2017, de Villiers *et al.*, 2014, de Villiers *et al.*, 2017, IIRC, 2013), and therefore may be driven by a unique set of characteristics.

We broadly draw on the IR and the voluntary disclosure literatures in assessing the determinants of voluntary IIRF adoption. These two literatures advance several firm, industry and country-level characteristics to explain why managers voluntarily provide information. Firm characteristics related to economic resources and capability, management and market performance, and financing decisions (Cahan *et al.*, 2016, Dhaliwal *et al.*, 2011), and environmental, social and governance (ESG) performance, corporate governance characteristics and ownership structure have been found to influence reporting practices (Beyer *et al.*, 2010, Dhaliwal *et al.*, 2011, Frías-Aceituno *et al.*, 2013b). Moreover, prior studies find industry membership and environmentally sensitive classifications (de Villiers and Marques, 2016, Fasan and Mio, 2016), and cultural systems and institutional systems affect disclosure decisions (Frías-Aceituno *et al.*, 2013a, García-Sánchez *et al.*, 2013). There is evidence that voluntary disclosure practices are influenced by institutional, legitimacy and regulatory pressures (Brammer and Pavelin, 2006, Higgins *et al.*, 2014, Melloni *et al.*, 2016), as well as political costs, proprietary costs and litigation threats (Beyer *et al.*, 2010, Healy and Palepu, 2001). We focus our hypothesis development on sustainability practices, which has been identified as a key driver by qualitative voluntary IR studies.

In relation to capital market consequences, the findings of mandatory IR studies either imply that higher quality IR practices provide incremental information to capital markets over alternative reporting mechanisms, mitigating information asymmetry (Bernardi and Stark, 2018, Lee and Yeo, 2016, Zhou *et al.*, 2017), or that higher quality IR leads to more efficient internal decision-making, improving investment efficiency and subsequently increasing firm value (Barth *et al.*, 2017). While

it is possible to hypothesise a positive association between voluntary IIRF adoption and capital market consequences, there are a number of arguments supporting null results. As previously mentioned, prior studies find that the IIRF has not stimulated transformative changes in management and disclosure practices, and managers often consider integrated reports an extension or repackaging of sustainability reporting (Chaidali and Jones, 2017, Lodhia, 2015, Stubbs and Higgins, 2014). Further, there is a trend towards integrated disclosure practices regardless of whether firms adopt the IIRF and there are alternative guidelines that promote similar principles (Adams *et al.*, 2016, KPMG, 2019, Rowbottom and Locke, 2016). Investors may also view integrated reports as irrelevant to decision-making, as they seek timely information that has a clear impact on firm valuation (Abhayawansa *et al.*, 2018, Hsiao and Kelly, 2018, Slack and Tsalavoutas, 2018). Our consequences hypotheses focus on the information environment, the cost of equity and firm value. We draw on the findings of prior voluntary IR studies and expect that markets do not react to signals of voluntary IIRF adoption.

2.1 Sustainability practices

Sustainability reporting foundations are essential to the preparation of integrated reports (de Villiers *et al.*, 2014, IIRC, 2013). Establishment of a CSR committee constitutes a commitment of human resources and formal structures to CSR activities, and indicates public recognition of the importance of sustainability responsibilities (Michelon and Parbonetti, 2012, Shaukat *et al.*, 2016). Guthrie *et al.* (2017) find that sustainability committees play a major role in adopting and implementing the IIRF. Prior case studies have also evidenced that integrated reporters tend to have a track record of applying GRI guidelines and use these guidelines in preparing integrated reports (Al-Htaybat and von Alberti-Alhtaybat, 2018, Guthrie *et al.*, 2017, Stubbs and Higgins, 2014). Further, we expect a firm's level of environmental and social performance to reflect whether sustainability is embedded in organisational culture and the availability of accounting systems that would support voluntary IIRF adoption. Given that the presence of a CSR committee, experience with the GRI guidelines,

and better environmental and social performance represent establishment of fundamental systems that support sustainability accounting and internal skills that support voluntary IIRF adoption, we test the following hypotheses:

H_{1a}: Voluntary IIRF adoption is positively associated with having a CSR committee.

H_{1b}: Voluntary IIRF adoption is positively associated with GRI application.

H_{1c}: Voluntary IIRF adoption is positively associated with a firm's environmental and social performance.

2.2 The information environment

From the perspective of economics-based voluntary disclosure theory, discretionary information reduces information asymmetry (Verrecchia, 1983), and the quality of information serves as a signal investors use to appraise investment targets (Merton, 1987). These assertions hold to the extent that the information disclosed affects firm value and analysts can infer useful information from the disclosures. While it is not possible to directly measure the information environment, greater forecast accuracy and lower forecast dispersion are common proxies of a better information environment (Lang *et al.*, 2003).

Integrated reports seek to present information relevant to risk evaluation and potential future value creation in a concise manner, assisting capital providers in decision-making (de Villiers *et al.*, 2014, IIRC, 2013). Conceptually, integrated reports would improve the information environment if they provide value relevant information that is useful in assessing firms' long-term prospects and capital providers are able to extract this information to make more accurate valuations. Studies examining the effects of alignment with the IIRF in a mandatory setting are supportive of this proposition (Bernardi and Stark, 2018, Zhou *et al.*, 2017). However, case studies on voluntary IIRF adoption suggest the implementation process does not lead to transformative changes in internal and external communication (Dumay and Dai, 2017, Stubbs and Higgins, 2014), and integrated reports have been criticised for lacking disclosure of quantitative and forward-looking information about

risks and opportunities (Kılıç and Kuzey, 2018, Pistoni *et al.*, 2018). Further, investors are reliant on multiple information sources and do not consider integrated reports relevant to investment decision-making (Abhayawansa *et al.*, 2018, Hsiao and Kelly, 2018, Slack and Tsalavoutas, 2018). Based on evidence that suggests voluntary IIRF adoption has no influence on the information environment and that integrated reports play a minor role in investment appraisal, we hypothesise the following:

H_{2a}: Voluntary IIRF adoption is not associated with analyst forecast error.

H_{2b}: Voluntary IIRF adoption is not associated with analyst forecast dispersion.

2.3 *The cost of equity*

Accounting information can influence the cost of equity both directly and indirectly (Lambert *et al.*, 2007). Direct effects arise from higher quality information reducing information asymmetry, which directly affects market participants' assessment of the riskiness of future cash flows and increases market liquidity (Dhaliwal *et al.*, 2011, Merton, 1987). Indirect effects occur when higher quality information improves management decision-making, affecting firms' expected value and the covariance of their cash flows with the market's aggregate cash flow (Lambert *et al.*, 2007, Verrecchia, 2001).

Prior studies have found contrasting results for the relation between mandatory IR and the cost of equity. Zhou *et al.* (2017) find that higher quality IR disclosure lowers the cost of equity, arguing that this is due to investors' willingness to accept lower rate of returns due to less information risk. In contrast, Barth *et al.* (2017) find no relation between IR disclosure quality and the cost of equity, but find a positive association with future cash flows. While Barth *et al.* (2017) suggest this implies an improvement in management decision-making, their results show that this improvement does not have an indirect effect on the cost of equity. Due to contrasting evidence in mandatory IR studies and our expectation that voluntary IIRF adoption does not influence the information environment, we test the following hypothesis:

H₃: Voluntary IIRF adoption is not associated with cost of equity.

2.4 Firm value

For voluntary disclosure to influence firm value, it needs to provide incremental information that is useful for investors in assessing future cash flows and investment risk (Cahan *et al.*, 2016, Lee and Yeo, 2016). The traditional assumption is that investors are only interested in maximising risk-adjusted returns from investment. Therefore, investors may only be interested in non-financial information to the extent that it indicates potential investment risk or provides signals about management competency (Murray *et al.*, 2006). There is inconsistent evidence on whether and to what extent non-financial disclosure affects firm value. Some studies find that non-financial information could be considered immaterial to investors (EY, 2015, Murray *et al.*, 2006), while others find a positive association between ESG disclosure and firm value (Cahan *et al.*, 2016, de Klerk *et al.*, 2015).

Integrated reports would be value relevant if they have the ability to capture or summarise information that affects equity value. Studies on mandatory IR consistently conclude that IR disclosure quality is positively associated with firm value (Barth *et al.*, 2017, Lee and Yeo, 2016). However, there is a lack of evidence to claim that voluntary IIRF adoption provides incremental information and changes management practices (Chaidali and Jones, 2017, Lodhia, 2015, Stubbs and Higgins, 2014) or that investors consider integrated reports a relevant and influential information source (Abhayawansa *et al.*, 2018, Hsiao and Kelly, 2018, Slack and Tsalavoutas, 2018). Continuing from the prior hypotheses, we test for the following:

H₄: Voluntary IIRF adoption is not associated with firm value.

3. Research design and sample

3.1 Identification of IIRF firms and initiation year

The study defines ‘IIRF firms’ as firms that acknowledge use of the IIRF and ‘non-IIRF firms’ as firms that do not declare use of the IIRF and do not label their report as an integrated report. Non-IIRF firms include firms that prepare separate disclosures and those that adopt IR in principle but do not reference the IIRF or associate with the IIRC. The initiation year is determined as the first year an IIRF firm discloses that it has adopted the IIRF, either through participation in the IIRC Pilot Program or adoption of the draft or official IIRF. As firms initiate integrated reports in different years, our focus on initiation year strengthens internal validity as historical events are unlikely to explain our results.

We identified a comprehensive sample of IIRF firms using multiple sources. Following prior studies that investigate voluntary IIRF adoption (Gerwanski *et al.*, 2019, Girella *et al.*, 2019, Wahl *et al.*, 2020), the IIRC Examples Database is used as one source. We extended the search to include all organisations in the GRI database with reports labelled or tagged as ‘integrated’, and web searches using the search term ‘integrated report*’.

The IIRC Examples Database, GRI database, and web searches identified 1,624 organisations. As the IIRC was formed in 2010, annual reports, annual reviews, management reports and sustainability reports from 2009 onwards were obtained for each listed firm. Content analysis was performed to assess whether firms acknowledge use of the IIRF (for identification of IIRF firms), and when the firm first signalled adoption of the IIRF or participation in the IIRC Pilot Program (for identification of the initiation year). As the study focuses on voluntary disclosure by listed firms, non-publicly listed organisations (627), firms listed on the Johannesburg Stock Exchange (266), and firms that did not specify adoption of the IIRF (427) were removed from the sample. As at 22 September 2017, 304 listed firms were identified as voluntary IIRF firms³.

³ Our initial sample of voluntary IIRF firms are larger than the sample identified by prior studies that solely relied on the IIRC Examples Database (see: Gerwanski *et al.*, 2019; Girella *et al.*, 2019; Wahl *et al.*, 2020).

3.2 Research design

Endogeneity is a common concern for empirical studies and such issues may arise from self-selection, omitted variables and simultaneity (Roberts and Whited, 2013, Lennox *et al.*, 2012). To address self-selection bias, a matched group of non-IIRF firms was created by matching exactly on country, industry (two-digit SIC) and year, and closest in market capitalisation⁴. To test the rationales behind voluntary IIRF adoption, we employ a logistic regression model in examining how characteristics in the previous year ($t-1$) influence the release of an integrated report in the current year (t). For capital market consequences, we employ DiD, Heckman and report OLS estimates for comparison purposes. The Heckman and OLS models examine how IIRF adoption in the current year (t) influences subsequent capital market consequences ($t+1$).

DiD compares the change in investigated consequences for IIRF firms before and after voluntary IIRF adoption with the corresponding change for matched non-IIRF firms. Thus, our DiD analysis is run on data from the year before IIRF adoption (i.e., $t-1$ is the pre-adoption period) and the year after IIRF adoption (i.e., $t+1$ is the post-adoption period). The DiD model is stated in general form below:

$$y_{i,t} = \beta_0 + \beta_1 IIRF_{i,t} + \beta_2 POST_{i,t} + \beta_3 IIRF * POST_{i,t} + \sum CONTROL_{i,t} + \varepsilon_{i,t} \quad (1)$$

IIRF equals 1 if a firm is an IIRF firm, and 0 otherwise. *POST* equals 1 for post-adoption periods for the IIRF firm and matched non-IIRF firm ($t+1$), and 0 for pre-adoption periods ($t-1$). The interaction coefficient is expected to be statistically significant if there is any effect from voluntary IIRF adoption.

The Heckman correction adjusts for selection bias that might arise from unobserved characteristics, such as organisational culture and internal changes. We first estimate a probit model for selection and then insert a correction factor, the inverse Mills ratio (*MillsRatio*), calculated from

⁴ Exact matching is considered more suitable as: (1) the IR literature is inconclusive about the key determinants of voluntary IIRF adoption and one of the main purposes of this study is to investigate the determinants, and (2) matching on a few variables decreases the number of IIRF firms excluded due to absence of selected variables, increasing sample size and variability in the sample tested. The matching algorithm is a one-to-one match using nearest neighbour with replacement. There are no duplicate observations in the sample.

the probit model into the regression model of interest. The selection model modifies our determinants model and includes a number of valid exclusion restrictions⁵.

3.3 Sample description

After excluding IIRF firms that could not be matched and IIRF firms with missing ESG data⁶, the determinants analysis is based on a sample of 214 firms, comprising 107 pairs of IIRF firms and non-IIRF firms. For the consequences analysis, due to different data requirements, the samples for DiD (Heckman and OLS) comprise 380 (196 and 250) observations for the information environment analysis, 312 (188 and 230) observations for the cost of equity analysis, and 436 (210 and 296) observations for the firm value analysis.

Table 1 compares the country, industry and year distributions of the IIRF firms in the determinants sample and each DiD sample with the distribution of all identified IIRF firms. Panel A shows that the samples spread across 23 to 27 countries. Japan accounts for the largest proportion of the sample (34.62% to 46.73%), followed by firms in South Korea (6.54% to 8.97%). This country distribution is as expected since Japan is the only country where voluntary IR is mainstream (Corporate Value Reporting Lab, 2016, IIRC, 2018). Panel B shows that, according to SIC industry divisions, the samples are dominated by manufacturing (38.95% to 46.73%), while transportation and utilities (17.76% to 25.64%) and financial (16.84% to 20.51%) account for a sizable proportion. Panel C shows that the sample spreads across 2011 to 2017, with initiation years concentrated in 2014 and 2015 (varying from 25.23% to 32.11%).

⁵ Untabulated results show variables such as CSR committee and board size as statistically significant predictors of voluntary IIRF adoption. These variables are not statistically significant predictors of the consequences assessed and conceptually do not directly influence the information environment or investors' perception of risk and prediction of cash flows.

⁶ A number of IIRF firms were unable to be paired as there were no non-IIRF firms operating in the same country and industry. For instance, 26 IIRF firms were identified for Sri Lanka; however, those firms were excluded from the analysis because all firms in their respective industry are IIRF firms.

Table 1

Sample Distribution.

Panel A: Distribution by Country

Country	Identified IIRF firms		Determinants		Information Environment		Cost of Equity		Firm Value	
	No.	%	No.	%	No.	%	No.	%	No.	%
Argentina	1	0.33	-	-	-	-	-	-	-	-
Australia	2	0.66	2	1.87	1	1.05	1	1.28	1	0.92
Austria	1	0.33	-	-	1	1.05	1	1.28	1	0.92
Belgium	3	0.99	2	1.87	1	1.05	1	1.28	2	1.83
Brazil	20	6.58	5	4.67	5	5.26	4	5.13	6	5.50
Canada	2	0.66	1	0.93	1	1.05	1	1.28	2	1.83
Chile	4	1.32	1	0.93	1	1.05	1	1.28	2	1.83
China	1	0.33	-	-	-	-	-	-	-	-
Colombia	8	2.63	-	-	-	-	-	-	-	-
Costa Rica	1	0.33	-	-	-	-	-	-	-	-
Denmark	1	0.33	1	0.93	1	1.05	1	1.28	1	0.92
Finland	6	1.97	2	1.87	2	2.11	2	2.56	2	1.83
France	8	2.63	2	1.87	4	4.21	3	3.85	3	2.75
Germany	3	0.99	1	0.93	3	3.16	2	2.56	2	1.83
Greece	1	0.33	-	-	-	-	-	-	-	-
Hong Kong	5	1.64	2	1.87	3	3.16	2	2.56	2	1.83
India	2	0.66	1	0.93	1	1.05	1	1.28	2	1.83
Italy	10	3.29	4	3.74	2	2.11	2	2.56	3	2.75
Japan	88	28.95	50	46.73	35	36.84	27	34.62	41	37.61
Kenya	1	0.33	-	-	-	-	-	-	-	-
Mauritius	1	0.33	-	-	-	-	-	-	-	-
Mexico	2	0.66	-	-	2	2.11	-	-	1	0.92
Netherland	20	6.58	3	2.80	-	-	1	1.28	1	0.92
New Zealand	2	0.66	-	-	-	-	-	-	-	-
Pakistan	2	0.66	-	-	-	-	-	-	-	-
Poland	4	1.32	-	-	1	1.05	-	-	-	-
Portugal	1	0.33	1	0.93	1	1.05	-	-	1	0.92
Russian Federation	4	1.32	1	0.93	2	2.11	2	2.56	2	1.83
Singapore	5	1.64	2	1.87	2	2.11	2	2.56	2	1.83
South Korea	19	6.25	7	6.54	7	7.37	7	8.97	9	8.26
Spain	21	6.91	4	3.74	5	5.26	3	3.85	3	2.75
Sri Lanka	26	8.55	-	-	-	-	-	-	-	-
Sweden	4	1.32	2	1.87	1	1.05	2	2.56	3	2.75
Switzerland	4	1.32	-	-	2	2.11	2	2.56	2	1.83
Taiwan	2	0.66	-	-	1	1.05	-	-	-	-
Turkey	1	0.33	1	0.93	1	1.05	1	1.28	1	0.92
United Kingdom	9	2.96	6	5.61	5	5.26	4	5.13	6	5.50
United States	9	2.96	6	5.61	4	4.21	5	6.41	8	7.34
Total	304	100	107	100	95	100	78	100	109	100

Panel B: Distribution by Industry

SIC Industry Division	Identified IIRF firms		Determinants		Information Environment		Cost of Equity		Firm Value	
	No.	%	No.	%	No.	%	No.	%	No.	%
Agriculture, Forestry and Fishing	1	0.33	-	-	-	-	-	-	-	-
Mining	4	1.32	1	0.93	1	1.05	-	-	-	-
Construction	13	4.28	5	4.67	5	5.26	2	2.56	6	5.50
Manufacturing	115	37.83	50	46.73	37	38.95	32	41.03	45	41.28
Transportation, Communications, Electric, Gas and Sanitary service	52	17.11	19	17.76	23	24.21	20	25.64	23	21.10
Wholesale Trade	12	3.95	4	3.74	3	3.16	2	2.56	3	2.75
Retail Trade	9	2.96	4	3.74	5	5.26	3	3.85	5	4.59
Finance, Insurance and Real Estate Services	69	22.7	20	18.69	16	16.84	16	20.51	20	18.35
Non-classifiable	24	7.89	4	3.74	4	4.21	3	3.85	7	6.42
Non-classifiable	5	1.64	-	-	1	1.05	-	-	-	-
Total	304	100	107	100	95	100	78	100	109	100

Panel C: Distribution by Year

Year	Identified IIRF firms		Determinants		Information Environment		Cost of Equity		Firm Value	
	No.	%	No.	%	No.	%	No.	%	No.	%
2010	3	0.99	-	-	-	-	-	-	-	-
2011	11	3.62	4	3.74	3	3.16	4	5.13	5	4.59
2012	29	9.54	11	10.28	11	11.58	8	10.26	11	10.09
2013	55	18.09	17	15.89	16.5	17.37	13	16.67	21	19.27
2014	89	29.28	31	28.97	24	25.26	21	26.92	28	25.69
2015	84	27.63	27	25.23	30.5	32.11	25	32.05	31	28.44
2016	32	10.53	16	14.95	10	10.53	7	8.97	13	11.93
2017	1	0.33	1	0.93	-	-	-	-	-	-
Total	304	100	107	100	95	100	78	100	109	100

Panel A, Panel B and Panel C report the country, industry and year distributions of the IIRF samples, respectively.

Note: Panels A–C report the country, industry and year distributions of the IIRF samples, respectively

4. Determinants analysis

4.1 Empirical model

Our regression model to test H₁ is as follows:

$$\begin{aligned}
 & \log[\text{prob}(IIRF_{i,t})/(1 - \text{prob}(IIRF_{i,t}))] \\
 & = \beta_0 + \beta_1 SUSTAINABILITY_{i,t-1} + \beta_2 OWNERSHIP_{i,t-1} \\
 & + \beta_3 LnMEDIA_{i,t-1} + \beta_4 LnSUBSIDIARY_{i,t-1} + \beta_5 BOARDSKILL_{i,t-1} \\
 & + \beta_6 BOARDSIZE_{i,t-1} + \beta_7 GENDIV_{i,t-1} + \beta_8 LEV_{i,t-1} + \beta_9 INTASSET_{i,t-1} \\
 & + \beta_{10} CONCENTRATE_{i,t-1} + \beta_{11} SENSITIVE_{i,t-1} + \beta_{12} CULTURE_{i,t-1} \\
 & + \beta_{13} NATION_{i,t-1} + \varepsilon_{i,t} \tag{2}
 \end{aligned}$$

Subscripts i and t denote firm and year, respectively. IIRF adoption ($IIRF$) is an indicator variable equal to 1 for IIRF firms and 0 for non-IIRF firms. The main variable of interest, sustainability practice ($SUSTAINABILITY$), takes the form of CSR committee ($BOARDCOM_CSR$), GRI application (GRI), and environmental and social performance (ESP). $BOARDCOM_CSR$ is an indicator variable equal to 1 if a firm has a CSR committee, and 0 otherwise. GRI is an indicator variable equal to 1 if a firm applied GRI guidelines prior to year t , and 0 otherwise. ESP is the mean environmental score and social score from ASSET4⁷. There is a moderate to strong relationship between $BOARDCOM_CSR$ and ESP ($r_p = 0.63, p < 0.01$), and a relationship between

⁷ The scoring criteria do not include integrated disclosure practices or adoption of the IIRF. The environmental score reflects resource use, emissions and product innovation. The social score reflects working conditions, human rights, community and product responsibility.

BOARDCOM_CSR and *GRI* ($\chi^2(1) = 22.75, p < 0.01$), showing these variables proxy for the same underlying firm characteristic.

A number of control variables are included, as defined in the Appendix, Table A1.

Institutional ownership (*OWNERSHIP*) is included as a control since demand for the IIRF may be market-led due to its focus on capital providers and the IIRC have been claiming growing demand from the investment community (IIRC, 2013, IIRC, 2018). Higgins *et al.* (2014) suggests institutional pressure influences managers to release an integrated report. Hence, we include media coverage (*LnMEDIA*) and subsidiaries (*LnSUBSIDIARY*) as measures of firm visibility and social and political pressures (Brammer and Pavelin, 2006, Dawkins and Fraas, 2011).

Perego *et al.* (2016) and Stubbs *et al.* (2014) find scepticism among managers and financial analysts regarding the usefulness of the IIRF, as they view it as an additional reporting burden or unnecessary exposure to litigation risk. Based on these findings, we include board skills (*BOARDSKILL*) since board members accustomed to a traditional financial paradigm may not be supportive of the IIRF due to scepticism about the value it adds to their firm. Corporate governance characteristics, including board size (*BOARDSIZE*) and gender diversity (*GENDIV*), have been found to influence integrated disclosure practices (Fasan and Mio, 2016, Frías-Aceituno *et al.*, 2013b).

Leverage (*LEV*) is included as firms with high levels of debt are expected to incur higher monitoring costs and therefore managers will seek to reduce costs by disclosing more information (Dhaliwal *et al.*, 2011). IR is a means for organisations to communicate the value created beyond traditional financial and non-financial disclosure. Hence, intangible assets (*INTASSET*) is controlled for since firms may use integrated reports to communicate to capital providers about their intangibles that are not captured by traditional financial accounting.

While non-IIRF firms are matched exactly on industry and country, industry and country specific characteristics are included to control for potential confounding effects. Industry concentration (*CONCENTRATE*) is included as a proxy for market competition (Dhaliwal *et al.*,

2011). From a proprietary costs perspective, firms in more competitive industries are exposed to greater risk from disclosure. Proprietary costs can reduce disclosure incentives as competitors and external stakeholders can exploit publically disclosed information if it signals weakness or reveals competitive advantages (Clarkson *et al.*, 2008). Firms operating in environmentally sensitive industries (*SENSITIVE*) tend to disclose more non-financial information (Cahan *et al.*, 2016, de Villiers and Marques, 2016). Additionally, prior studies found national culture (*CULTURE*) and national institution (*NATION*) influence disclosure (Cahan *et al.*, 2016, Dhaliwal *et al.*, 2012).

Collinearity is not a major problem in this study, as indicated by correlation analysis and the variance inflation factors (VIF). The highest VIF for Equation 2 is from *CULTURE* (2.25) and the mean VIF is 1.45. Untabulated independent *t*-tests indicate that the matching process is adequate in pairing IIRF firms with non-IIRF firms that are similar in market capitalisation, return on assets, market-to-book, market performance and analyst-related measures (e.g., beta and the cost of equity), and various corporate governance characteristics (e.g., board independence and aggregate corporate governance score from ASSET4). Therefore, these variables are assessed in additional analysis for potential confounding effects.

4.2 Results

Table 2 provides descriptive statistics and bivariate test results. Consistent with the expectation that prior sustainability management and reporting practices influence voluntary IIRF adoption, IIRF firms are more likely to have a CSR committee ($\chi^2(1) = 14.34, p < 0.01$), experience with the GRI guidelines ($\chi^2(1) = 7.84, p < 0.01$), and better environmental and social performance (difference in means: *ESP* = 12.53, $p < 0.01$). The results also confirm the expectations that firms with greater social and political visibility are more likely to release integrated reports (difference in means: *LnMEDIA* = 0.50, $p < 0.01$; *LnSUBSIDIARY* = 0.53; $p < 0.01$). These findings are reflected in the correlation matrix. Further, the Mann-Whitney test shows that IIRF firms operate in relatively more concentrated industries compared to their matched counterpart (difference in medians:

Table 2

Determinants: Descriptive statistics and bi-variate tests

Panel A: Descriptive statistics and independent t-tests

Variable	Full sample (n = 214)					IIRF firms (n = 107)		Non-IIRF firms (n = 107)		<i>t</i> -test		M-W
	Mean	Median	Sd	Min	Max	Mean	Sd	Mean	Sd	<i>p</i> -value	<i>p</i> -value	
ESP _{t-1}	74.76	86.77	23.37	8.79	95.86	81.03	18.26	68.50	26.18	0.001	0.001	
OWNERSHIP _{t-1}	51.29	50.67	22.06	1.10	100.00	50.03	19.64	52.55	24.27	0.405	0.358	
LnMEDIA _{t-1}	6.51	6.46	1.27	0.00	9.51	6.76	1.14	6.26	1.34	0.004	0.013	
LnSUBSIDIARY _{t-1}	4.90	4.91	1.35	1.61	8.27	5.16	1.35	4.63	1.30	0.004	0.003	
BOARDSKILL _{t-1}	59.66	60.00	25.70	0.00	100.00	57.42	25.86	61.90	25.47	0.203	0.199	
BOARDSIZE _{t-1}	11.36	11.00	3.92	3.00	26.00	11.29	3.74	11.44	4.11	0.781	0.973	
GENDIV _{t-1}	8.69	0.00	11.33	0.00	45.45	9.49	11.75	7.89	10.89	0.305	0.338	
LEV _{t-1}	0.26	0.25	0.17	0.00	0.79	0.27	0.16	0.25	0.17	0.433	0.389	
INTASSET _{t-1}	0.12	0.04	0.15	0.00	0.77	0.11	0.13	0.12	0.18	0.494	0.707	
CONCENTRATE _{t-1}	0.04	0.00	0.10	0.00	0.74	0.05	0.11	0.03	0.09	0.069	0.025	
CULTURE _{t-1}	0.00	0.10	1.44	-3.04	1.38	0.00	1.44	0.00	1.44	1.000	1.000	
NATION _{t-1}	0.00	0.16	1.29	-3.55	4.85	0.00	1.30	0.00	1.30	1.000	1.000	

Panel B: Cross-tabulations and tests of independence

IIRF _t	SENSITIVE _{t-1}			IIRF _t	BOARDCOM CSR _{t-1}			IIRF _t	GRI _{t-1}		
	N	Y	Total		N	Y	Total		N	Y	Total
0	72 (67.29)	35 (32.71)	107 (100)	0	32 (29.91)	75 (70.09)	107 (100)	0	43 (40.19)	64 (59.81)	107 (100)
1	71 (66.36)	36 (33.64)	107 (100)	1	10 (9.35)	97 (90.65)	107 (100)	1	24 (22.43)	83 (77.57)	107 (100)
Pearson $\chi^2(1) = 0.021, p = 0.885$			Pearson $\chi^2(1) = 14.338, p = 0.001$			Pearson $\chi^2(1) = 7.844, p = 0.005$					
Fisher's exact = 1.000			Fisher's exact = 0.001			Fisher's exact = 0.008					

Panel C: Correlation matrix

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
(1) IIRF _t		0.259	0.192	0.229	-0.063	0.170	0.203	-0.088	0.002	0.066	0.059	0.026	0.010	0.154	0.000	0.000
(2) BOARDCOM_CSR _{t-1}	0.259		0.326	0.631	0.124	0.308	0.312	0.026	0.067	0.025	0.101	0.072	0.048	0.079	0.118	-0.116
(3) GRI _{t-1}	0.192	0.326		0.481	-0.094	0.273	0.133	-0.046	0.147	-0.024	0.133	0.035	0.091	0.200	0.069	0.132
(4) ESP _{t-1}	0.269	0.535	0.465		0.041	0.339	0.253	-0.184	0.252	0.131	0.093	0.134	0.130	0.158	-0.080	-0.139
(5) OWNERSHIP _{t-1}	-0.057	0.143	-0.117	0.053		-0.131	0.080	-0.059	0.029	0.158	0.108	0.181	-0.027	-0.063	-0.181	-0.046
(6) LnMEDIA _{t,t-1}	0.197	0.291	0.247	0.345	-0.075		0.406	-0.010	0.313	0.040	0.059	0.106	0.116	0.182	0.204	0.016
(7) LnSUBSIDIARY _{t-1}	0.196	0.332	0.106	0.303	0.068	0.397		0.035	0.253	0.126	0.071	0.121	-0.189	0.337	0.098	-0.270
(8) BOARDSKILL _{t-1}	-0.087	0.025	-0.040	-0.109	-0.031	-0.023	0.017		-0.106	-0.485	-0.109	-0.322	-0.143	-0.153	0.600	0.273
(9) BOARDSIZE _{t-1}	-0.019	0.076	0.132	0.224	-0.059	0.272	0.285	-0.127		0.074	0.116	-0.099	-0.101	0.118	0.042	0.002
(10) GENDIV _{t-1}	0.071	0.030	-0.036	0.066	0.168	0.028	0.129	-0.464	0.028		0.099	0.335	0.072	0.142	-0.594	-0.559
(11) LEV _{t-1}	0.054	0.078	0.097	0.041	0.112	0.080	0.086	-0.094	0.120	0.034		0.040	0.100	0.186	-0.159	0.021
(12) INTASSET _{t-1}	-0.047	0.073	-0.001	0.073	0.231	0.092	0.119	-0.374	-0.066	0.474	0.027		0.157	0.104	-0.300	-0.174
(13) SENSITIVE _{t-1}	0.010	0.048	0.091	0.165	-0.012	0.121	-0.176	-0.150	-0.048	0.046	0.101	0.101		-0.133	-0.165	-0.020
(14) CONCENTRATE _{t-1}	0.125	-0.066	-0.025	0.043	0.028	-0.015	0.195	-0.062	0.048	0.144	0.044	0.088	-0.070		-0.239	-0.164
(15) CULTURE _{t-1}	0.000	0.098	0.074	-0.020	-0.189	0.178	0.104	0.575	0.044	-0.590	-0.139	-0.351	-0.156	-0.205		0.373
(16) NATION _{t-1}	0.000	-0.114	0.148	-0.056	-0.024	0.003	-0.251	0.239	0.061	-0.410	0.043	-0.188	0.000	-0.180	0.249	

Panel A reports tests for differences based on two-tailed independent *t*-test (parametric) and Mann-Whitney *U*-test (non-parametric). Panel B reports tests of independence based on the chi-square test and Fisher's exact test. Panel C reports Pearson correlations below the diagonal and Spearman correlations above the diagonal. Correlation coefficients in bold indicates two-tailed statistical significance at the 0.05 level. Variables are as defined in the Appendix, Table A1.

$CONCENTRATE = 0.01, p < 0.05$); however, both groups have a Herfindahl-Hirschman index below 0.15 and operate in unconcentrated industries. Untabulated analysis shows that these differences are attributable to the non-Japanese sample. There are no statistically significant differences between the observable characteristics of IIRF firms and non-IIRF firms in Japan.

Table 3 reports the logistic regression results for the full sample and subsample analysis based on Japanese firms and non-Japanese firms. All models have predictive power as they successfully classify 62.00% to 71.93% of observations, which is superior to 50% accuracy by chance. Apart from statistically weak evidence of a positive association between *ESP* and *IIRF* for Japanese firms (Model 6: coeff. = 0.0195, $p < 0.10$), the results seen for the full sample are attributed to the non-Japanese sample. In countries where IR is not mainstream, there is strong statistical evidence in support of H₁. *BOARDCOM_CSR* is positively associated with *IIRF* (Model 7: coeff. = 2.060, $p < 0.01$), supporting H_{1a} and is consistent with the notion that CSR committees represent a commitment to CSR practices and provide expertise relevant to sustainability management and reporting, playing an important role in IIRF adoption (Guthrie *et al.*, 2017). As predicted by H_{1b}, *GRI* is positively associated with *IIRF* (Model 8: coeff. = 0.994, $p < 0.10$), suggesting systems that support sustainability accounting are fundamental to IIRF adoption and confirm prior study findings that integrated reporters tend to have experience with GRI guidelines (Al-Htaybat and von Alberti-Alhtaybat, 2018, Guthrie *et al.*, 2017, Stubbs and Higgins, 2014). Model 9 shows a positive association between *ESP* and *IIRF* (coeff. = 0.0413, $p < 0.01$), providing support for H_{1c}. Firms with higher sustainability performance are expected to have a sustainability culture and systems in place that support disclosure of information promoted by the IIRF.

In Japan, there is weak evidence in support for H_{1c}. However, overall these findings suggest Japanese firms adopt the IIRF for reasons not related to tested observable firm characteristics. Consistent with the fact that IR is mainstream in Japan (IIRC, 2018), our matches show homogeneity in reporting practices. Based on the list provided by Corporate Value Reporting Lab (2016), self-declared integrated reporters account for 48% (24/50) of the Japanese non-IIRF firms in

Table 3

Determinants: Regression results

IIRF _t	Pred. Sign	Full sample			Japanese firms			Non-Japanese firms		
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
BOARDCOM_CSR _{t-1}	+	1.519*** (3.33)			1.024 (1.38)			2.060*** (3.59)		
GRI _{t-1}	+		0.675** (2.01)			0.620 (1.24)			0.994* (1.90)	
ESP _{t-1}	+			0.0237*** (2.86)			0.0195* (1.78)			0.0413*** (3.43)
OWNERSHIP _{t-1}	+	-0.00942 (-1.21)	-0.00371 (-0.52)	-0.00711 (-1.00)	-0.00987 (-0.59)	-0.0112 (-0.65)	-0.0130 (-0.79)	-0.00820 (-0.81)	0.00184 (0.21)	-0.00449 (-0.51)
LnMEDIA _{t-1}	+	0.208 (1.56)	0.235* (1.78)	0.192 (1.42)	0.146 (0.79)	0.142 (0.76)	0.158 (0.83)	0.250 (1.21)	0.330* (1.67)	0.160 (0.71)
LnSUBSIDIARY _{t-1}	+	0.234 (1.60)	0.312** (2.25)	0.252* (1.75)	-0.0917 (-0.32)	-0.0215 (-0.08)	-0.137 (-0.45)	0.396** (2.05)	0.434** (2.53)	0.409** (2.20)
BOARDSKILL _{t-1}	-	-0.0170** (-2.21)	-0.0151** (-2.01)	-0.0143* (-1.90)	-0.0145 (-0.88)	-0.0173 (-1.02)	-0.0168 (-1.03)	-0.0216 (-1.63)	-0.0198 (-1.54)	-0.0204 (-1.48)
BOARDSIZE _{t-1}	-	-0.100** (-2.34)	-0.103** (-2.51)	-0.118*** (-2.74)	-0.0653 (-0.98)	-0.0837 (-1.25)	-0.0903 (-1.29)	-0.124* (-1.81)	-0.0928 (-1.51)	-0.119* (-1.77)
GENDIV _{t-1}	+	0.0275 (1.28)	0.0260 (1.31)	0.0283 (1.40)	-0.00289 (-0.06)	-0.00521 (-0.11)	-0.00519 (-0.11)	0.0374 (1.37)	0.0316 (1.30)	0.0386 (1.56)
LEV _{t-1}	+	0.373 (0.38)	0.389 (0.42)	0.651 (0.70)	1.288 (0.99)	1.467 (1.12)	1.779 (1.31)	-0.251 (-0.16)	-0.397 (-0.28)	-0.00698 (-0.01)
INTASSET _{t-1}	-	-2.770** (-2.38)	-2.660** (-2.26)	-2.573** (-2.20)	2.507 (0.78)	2.345 (0.72)	2.524 (0.75)	-4.522*** (-2.89)	-4.256*** (-2.81)	-4.424*** (-2.88)
SENSITIVE _{t-1}	+	0.000410 (0.00)	0.0315 (0.09)	-0.123 (-0.36)	-0.110 (-0.21)	-0.0857 (-0.16)	-0.296 (-0.54)	0.0224 (0.05)	0.00351 (0.01)	-0.143 (-0.29)
CONCENTRATE _{t-1}	+	3.927** (2.55)	3.049* (1.73)	2.950* (1.65)	17.25* (1.87)	13.00 (1.33)	12.92 (1.33)	4.153*** (2.59)	3.095* (1.75)	3.132* (1.65)
CULTURE _{t-1}	+	0.0819 (0.50)	0.104 (0.66)	0.124 (0.78)				0.00164 (0.01)	-0.145 (-0.49)	-0.197 (-0.62)
NATION _{t-1}	+	0.288** (2.19)	0.183 (1.38)	0.228* (1.75)				0.396** (2.49)	0.236 (1.43)	0.343** (2.09)
N		214	214	214	100	100	100	114	114	114
Chi-squared (Wald)		33.13	27.43	29.57	12.65	11.74	13.93	34.04	27.56	35.23
Pseudo R ²		0.229	0.187	0.220	0.167	0.161	0.185	0.375	0.307	0.365
Classified %		68.69	67.29	68.69	62.00	62.00	62.00	71.93	69.30	68.42

Two-tailed tests of significance: * $p < 0.10$, ** $p < 0.05$, and *** $p < 0.01$. Logistic regression coefficients are reported with t -statistics in parentheses. Robust standard errors are used. Nagelkerke pseudo R² is reported. Variables are as defined in the Appendix, Table A1.

the sample. Hence, Japanese firms are implementing IR practices regardless of adopting the IIRF and there may be no substantial differences between IIRF-inspired reports and integrated disclosure.

For the control variables, while there is weak statistical evidence of a positive relation between *LnMEDIA* and *IIRF* (Model 8: coeff. = 0.330, $p < 0.10$), the results are inconsistent across models. The positive relation between *LnSUBSIDIARY* and *IIRF* is consistent with more visible firms adopting the IIRF to mitigate legitimacy and political pressures (Model 7: coeff. = 0.396, $p < 0.05$). While there is a statistically significant and negative relationship between *BOARDSKILL* and *IIRF* (Model 1: coeff. = -0.0170, $p < 0.05$), this result is influenced by the proportion of Japanese firms in the sample⁸. The results show *BOARDSIZE* is negatively associated with *IIRF* (Model 7: coeff. = -0.124, $p < 0.10$), which may be attributed to the decision-making process of larger boards. The median board size of sample firms is 11, and Jensen (1993) and Yermack (1996) suggest the optimal board size is seven to eight directors and eight to nine directors, respectively. For larger boards, management strategies may be contingent on the opinions held by the chief executive officer (Jensen, 1993, Yermack, 1996), who may not consider adoption of the IIRF a strategic priority. Similarly, larger boards with varied or conflicting individual opinions may face difficulties in reaching a consensus about whether implementation of the IIRF is an optimal management strategy (Fasan and Mio, 2016).

The statistically significant negative association for intangible assets (Model 7: coeff. = -4.522, $p < 0.01$) suggests firms with less reported intangibles use integrated reports to communicate to capital providers about their intangibles that are not captured by traditional financial accounting. Alternatively, due to disclosure costs, firms are less likely to disclose further detailed information in integrated reports when they already account for intangible assets in their financial statements. Although the statistical significance of the effects are not consistent across models, the results suggest the likelihood of voluntary IIRF adoption increases with *CONCENTRATE*, which reflects

⁸ Japanese firms have, on average, higher *BOARDSKILL* compared to non-Japanese firms (difference in means: *BOARDSKILL* = 35.50, $p < 0.01$). Interaction analyses show *BOARDSKILL* loses statistical significance after interacting with an indicator variable for Japanese firms.

lower industry competition (Model 7: coeff. = -4.153, $p < 0.01$), and decreases with greater national voice and freedom (Model 7: coeff. = 0.396, $p < 0.05$). The results for industry concentration are supportive of the proprietary information argument. While proprietary costs could arise from disclosure of sensitive information regardless of industry concentration, firms in less competitive industries face less disclosure risk and could use integrated reports to broadly outline their strategy and value creation proposition rather than report sensitive information. The results for national voice and freedom show firms operating in countries with less voice and freedom use integrated reports to signal their trustworthiness and willingness to increase transparency.

4.3 Sensitivity analysis

We performed extensive testing to assess whether our results are sensitive to alternative model specifications, alternative matching, and extension of lagged period. Untabulated analysis shows that our results are robust to the inclusion of additional characteristics that potentially influence voluntary disclosure, including: firm size, reported loss, market-to-book, return on assets, share price performance, beta, price volatility, earnings volatility, earnings surprise, earnings quality, audit committee, board independence, board meetings, aggregate corporate governance score, insider ownership, media sentiment, CSR-related media variables, number of business segments, market listing, number of foreign subsidiaries, multinational operations, auditor, analyst following, analyst forecast error, analyst forecast dispersion, cost of equity, litigation risk, minority investor protection, legal system, rule of law, regulatory quality, and government effectiveness. The direction of the variables of interest remains consistent regardless of the additional controls added or substituted. In comparison with alternative models, the models in the main analysis is a relatively good fit for the data when considering the pseudo R^2 and Akaike's information criterion. The results are robust to substituting *ESP* with alternative measures available from ASSET4, including environmental score, social score, and integration/vision and strategy score. Further, inclusion of country, industry and year fixed effect dummies does not affect the interpretation of any results.

The results of the variables of interest are robust to untabulated subsample analysis of early adopters (observations that relate to 2014 and before) and later adopters (observations that relate to 2015 and after). The results also remain robust after partitioning the sample into manufacturing firms and non-manufacturing firms, and financial firms and non-financial firms.

Alternative matches are tested to assess model generalisability and sensitivity of the results to the match specification. Seven alternative samples are tested, comprising matches based on ASSET4 and Worldscope, and using four industry classifications, two-digit GICS, four-digit GICS, two-digit SIC and three-digit SIC. Alternative samples vary from 154 observations to 232 observations, and apart from matches on two-digit SIC, 26.47% to 42.86% of the alternative samples are firms not included in the main analysis. Replications of the main analyses show the results are robust to different matches.

Corporate Value Reporting Lab (2016) shows that the time between implementing IR practices and the release of an integrated report could range from one year to 12 years, where the mode for initiating and reporting is one year and median is two years. Therefore, we examine how characteristics two years prior to the initiation year ($t-2$) influence the release of an integrated report in the current year (t). Untabulated results show that the findings for H₁ remain robust.

5. Consequences analysis

5.1 Empirical models

5.1.1 The information environment

Our regression model to test H₂ is as follows:

$$\begin{aligned}
 INFORMATION_{i,t} &= \beta_0 + \beta_1 IIRF_{i,t} + \beta_2 GRI_{i,t} + \beta_3 LnSIZE_{i,t} + \beta_4 SqEARN SURP_{i,t} \\
 &+ \beta_5 LOSS_{i,t} + \beta_6 LnEARNVOLI_{i,t} + \beta_7 LISTING_{i,t} + \beta_8 FOLLOW_{i,t} \\
 &+ \beta_9 HORIZON_{i,t} + \Sigma FE_{i,t} + \varepsilon_{i,t}
 \end{aligned} \tag{3}$$

The dependent variable, information environment (*INFORMATION*), takes the form of analyst forecast accuracy (*FERROR*) and analyst forecast dispersion (*DISPERSION*). Following Dhaliwal *et al.* (2012), three forecast error horizons are separately estimated, current-year earnings (*FERROR(0)*), one-year-ahead earnings (*FERROR(1)*) and two-year ahead earnings (*FERROR(2)*). *DISPERSION* is the standard deviation of one-year ahead analyst earnings per share (EPS) forecast, scaled by the absolute value of the median consensus EPS forecast for a firm.

All independent variables are as defined in the Appendix, Table A2. IIRF adoption (*IIRF*) is the main variable of interest. Given the previous findings that suggests GRI guidelines guide the preparation of integrated reports, GRI application (*GRI*) is included as a control for sustainability information and is used to separate the effects of GRI application and IIRF adoption.

We draw on Behn *et al.* (2008), Hope (2003) and Dhaliwal *et al.* (2012) to identify control variables that explain analyst forecast characteristics. Firm size (*LnSIZE*) is included as a proxy for a firm's general information environment and various correlated factors, such as information availability and managers' incentives (Dhaliwal *et al.*, 2012, Hope, 2003). Earnings surprise (*SqEARNSURP*), loss (*LOSS*) and earnings volatility (*LnEARNVOLI*) reflect information uncertainty and forecast difficulty (Behn *et al.*, 2008, Hope, 2003, Lang *et al.*, 2003).

Market listing (*LISTING*) is controlled for as Lang *et al.* (2003) argues that firms listed on multiple exchanges face explicit disclosure requirements and implicit pressure from investors to provide more information, which in turn improves the information environment for these firms. Analyst following (*FOLLOW*) indicates competition among analysts, where greater competition as a result of higher following provides analysts with incentives to enhance forecast accuracy (Dhaliwal *et al.*, 2012). Forecast horizon (*HORIZON*) is included as it is expected that forecasts announced closer to the actual earnings announcement are more accurate than one that is announced in an earlier period (Behn *et al.*, 2008). Fixed effect dummies (*FE*) are included to control for country, industry and year effects.

5.1.2 The cost of equity

Our regression model to test H₃ is as follows:

$$\begin{aligned} COE_{i,t} = & \beta_0 + \beta_1 IIRF_{i,t} + \beta_2 GRI_{i,t} + \beta_3 LnSIZE_{i,t} + \beta_4 LnMTB_{i,t} + \beta_5 LEV_{i,t} \\ & + \beta_6 BETA_{i,t} + \beta_7 LTG_{i,t} + \beta_8 LnDISPERSION_{i,t} + \beta_9 FOLLOW_{i,t} \\ & + \Sigma FE_{i,t} + \varepsilon_{i,t} \end{aligned} \quad (4)$$

The dependent variable, cost of equity (*COE*), takes the estimates of the cost of equity capital by Bloomberg⁹. *IIRF* and *GRI* are as previously explained.

We draw on Dhaliwal *et al.* (2011), Khurana and Raman (2004), Richardson and Welker (2001) and Gebhardt *et al.* (2001) to identify control variables that explain the cost of equity. Firm size (*LnSIZE*), the market-to-book ratio (*LnMTB*) and leverage (*LEV*) are measures associated with risk in general. Market value is inversely associated, while market-to-book and leverage is positively associated (Khurana and Raman, 2004). Beta (*BETA*) is a measure of systematic risk and is positively correlated with the cost of equity capital according to the Capital Asset Pricing Model. Long-term growth (*LTG*) is positively associated with growth and risk as earnings derived from growth opportunities are more uncertain than normal earnings (Khurana and Raman, 2004). Gebhardt *et al.* (2001) found the direction of analyst forecast dispersion (*LnDISPERSION*) alternates with different model specifications. In the absence of information from analysts, firm disclosures are a key source of information. Thereby, the benefits of firm disclosure could be greater for firms with lower analyst following (*FOLLOW*) (Richardson and Welker, 2001). *FE* are included to control for country, industry and year effects.

⁹ Attempts were made to estimate the implied cost of equity using Gebhardt *et al.* (2001), Easton (2004) and Claus and Thomas (2001); however, the sample suffered from missing observations.

5.1.3 Firm value

The model used to test H₄ is a modified Ohlson (1995) model:

$$\begin{aligned} \ln PRICE_{i,t} = & \beta_0 + \beta_1 IIRF_{i,t} + \beta_2 GRI_{i,t} + \beta_3 \ln BVPS_{i,t} + \beta_4 ABEARN_{i,t} + \Sigma FE_{i,t} \\ & + \varepsilon_{i,t} \end{aligned} \quad (5)$$

The de Klerk *et al.* (2015) model defines the market value of equity as a function of book value, accounting earnings and other non-financial information. The dependent variable, share price ($\ln PRICE$), is the natural logarithm of the closing price of a firm. Book value per share ($\ln BVPS$) is the natural logarithm of the book value per share of common shareholders' equity. Abnormal earnings ($ABEARN$) is calculated on a per share basis as net income before extraordinary expenses, less the cost of equity multiplied by opening book value of equity. $IIRF$, GRI and FE are as previously explained.

5.2 Results

Table 4 presents the descriptive statistics for the DiD samples. There is no significant difference between any of the analyst variables, the cost of equity and firm value of IIRF and non-IIRF firms. Untabulated correlation analysis also shows no statistically significant relations between $IIRF$ and the capital market consequences measures. Untabulated results show that independent t -tests and correlation analysis on the Heckman and OLS samples are consistent with the above.

Table 4Consequences: Descriptive statistics and independent *t*-tests*Panel A: Information environment*

Variable	Full sample (n = 380)					IIRF firms (n = 190)		Non-IIRF firms (n = 190)		<i>t</i> -test	
	Mean	Median	Sd	Min	Max	Mean	Sd	Mean	Sd	<i>p</i> -value	<i>p</i> -value
Information environment											
FERROR(0)	0.02	0.01	0.05	0.00	0.40	0.02	0.06	0.02	0.05	0.414	0.711
FERROR(1)	0.04	0.01	0.11	0.00	0.77	0.04	0.11	0.04	0.10	0.854	0.946
FERROR(2)	0.05	0.02	0.13	0.00	0.92	0.05	0.13	0.05	0.12	0.901	0.781
DISPERSION	0.28	0.10	0.60	0.01	4.64	0.33	0.76	0.22	0.37	0.090	0.855
Control											
GRI	0.71	1.00	0.46	0.00	1.00	0.81	0.39	0.60	0.49	0.000	0.000
LnSIZE	8.96	8.85	1.20	6.08	11.99	9.03	1.22	8.89	1.18	0.249	0.174
SqEARNSURP	0.13	0.11	0.09	0.00	0.48	0.13	0.09	0.13	0.10	0.851	0.480
LOSS	0.07	0.00	0.26	0.00	1.00	0.07	0.26	0.07	0.26	1.000	1.000
LnEARNVOLI	0.58	0.31	0.73	0.00	3.83	0.61	0.71	0.55	0.74	0.453	0.070
LISTING	5.86	6.00	3.68	1.00	17.00	5.99	3.67	5.74	3.69	0.504	0.548
FOLLOW	16.24	15.83	8.45	0.00	38.58	16.87	8.53	15.61	8.33	0.146	0.260
HORIZON	202.12	197.00	28.57	124.50	278.00	201.12	28.19	203.12	28.99	0.498	0.595

Panel B: Cost of equity

Variable	Full sample (n = 312)					IIRF firms (n = 156)		Non-IIRF firms (n = 156)		<i>t</i> -test	
	Mean	Median	Sd	Min	Max	Mean	Sd	Mean	Sd	<i>p</i> -value	<i>p</i> -value
COE	11.10	10.47	3.40	5.85	24.41	11.27	3.52	10.94	3.27	0.388	0.406
GRI	0.76	1.00	0.43	0.00	1.00	0.85	0.36	0.68	0.47	0.001	0.001
LnSIZE	9.16	9.07	1.14	6.35	11.99	9.30	1.12	9.02	1.15	0.031	0.022
LnMTB	3.33	3.46	2.18	0.42	8.07	3.32	2.19	3.33	2.17	0.960	0.743
LEV	0.26	0.25	0.16	0.00	0.63	0.27	0.16	0.25	0.15	0.481	0.605
BETA	0.96	0.94	0.45	0.08	2.00	0.99	0.49	0.92	0.41	0.152	0.150
LTG	10.27	8.97	15.95	-46.05	93.67	9.60	16.54	10.94	15.37	0.460	0.272
LnDISPERSION	-2.19	-2.32	1.09	-4.34	1.53	-2.15	1.20	-2.22	0.97	0.577	0.912
FOLLOW	17.50	17.42	7.98	0.00	38.58	18.62	7.85	16.39	7.97	0.013	0.027

Panel C: Firm valuation

Variable	Full sample (n = 436)					IIRF firms (n = 218)		Non-IIRF firms (n = 218)		<i>t</i> -test	
	Mean	Median	Sd	Min	Max	Mean	Sd	Mean	Sd	<i>p</i> -value	<i>p</i> -value
LnPRICE	3.06	2.89	1.50	0.24	8.03	3.02	1.49	3.10	1.50	0.575	0.831
GRI	0.66	1.00	0.47	0.00	1.00	0.79	0.41	0.53	0.50	0.000	0.000
LnBVPS	2.42	2.44	1.09	0.00	5.51	2.38	1.12	2.45	1.06	0.503	0.769
ABEARN	0.00	0.00	0.01	-0.04	0.01	0.00	0.00	0.00	0.01	0.811	0.298

Panel A, Panel B and Panel C report descriptive statistics and independent *t*-tests for the information environment, the cost of equity and firm value analyses, respectively. Tests for differences are based on two-tailed independent *t*-test (parametric) and Mann-Whitney *U*-test (non-parametric). Variables are as defined in the Appendix, Table A2.

Table 5

Effect of Voluntary IIRF Adoption on Firms' Information Environment.

Panel A: DiD

Variable	Pred. Sign	DiD			
		FERROR(0)	FERROR(1)	FERROR(2)	DISPERSION
		(1)	(2)	(3)	(4)
IIRF	-	0.00184 (0.44)	-0.0104 (-1.13)	-0.00853 (-0.66)	0.0892 (1.33)
POST	-	0.00155 (0.23)	-0.000100 (-0.01)	-0.00391 (-0.22)	-0.0700 (-0.95)
IIRF*POST	-	0.00277 (0.37)	0.0173 (1.20)	0.00773 (0.42)	-0.00825 (-0.08)
GRI	-	0.00672 (1.45)	0.0228** (2.46)	0.0257** (2.32)	0.162*** (2.62)
LnSIZE	-	-0.0127*** (-2.74)	-0.0289*** (-3.38)	-0.0242* (-1.88)	-0.0644* (-1.76)
SqEARNSURP	+	0.0404 (1.10)	0.153** (2.00)	0.0301 (0.34)	0.572 (1.30)
LOSS	+	0.104*** (5.24)	0.220*** (5.56)	0.256*** (5.77)	0.697*** (4.07)
LnEARNVOLI	+	0.00935 (1.11)	0.00803 (0.44)	0.0380* (1.77)	0.0316 (0.38)
LISTING	-	0.00322* (1.77)	0.00806** (2.57)	0.00802** (1.99)	0.0220 (1.50)
FOLLOW	-	0.000408 (0.81)	0.000865 (0.92)	0.000542 (0.50)	-0.00858 (-1.43)
HORIZON	+	0.0000988 (1.12)	0.000120 (0.67)	0.000225 (1.10)	0.000695 (0.81)
Country dummies		Y	Y	Y	Y
Industry dummies		Y	Y	Y	Y
Year dummies		Y	Y	Y	Y
N		380	380	380	380
Adj. R ²		0.511	0.576	0.518	0.357

Panel B: Heckman and OLS

Variable	Pred. Sign	Heckman				OLS			
		FERROR(0) _{t+1} (5)	FERROR(1) _{t+1} (6)	FERROR(2) _{t+1} (7)	DISPERSION _{t+1} (8)	FERROR(0) _{t+1} (9)	FERROR(1) _{t+1} (10)	FERROR(2) _{t+1} (11)	DISPERSION _{t+1} (12)
IIRF _t	-	-0.0695 (-0.66)	-0.0773 (-1.62)	-0.0927 (-1.60)	-0.205 (-0.96)	-0.0242 (-0.97)	-0.00735 (-0.66)	-0.0211 (-1.34)	0.00387 (0.07)
GRI _t	-	0.0369 (0.87)	0.0358* (1.91)	0.0409* (1.85)	0.0960 (0.96)	0.0476* (1.73)	0.0342*** (2.61)	0.0423** (2.40)	0.124* (1.87)
LnSIZE _t	-	-0.0481 (-1.46)	-0.0116 (-0.95)	-0.0186 (-1.14)	-0.0467 (-0.51)	-0.0690** (-2.10)	-0.0262** (-2.43)	-0.0392*** (-2.62)	-0.0942 (-1.30)
SqEARN SURP _t	+	-0.0937 (-0.45)	0.318** (2.33)	0.333* (1.95)	0.911 (1.01)	-0.215 (-1.09)	0.172 (1.39)	0.159 (1.02)	0.285 (0.38)
LOSS _t	+	0.0295 (0.41)	0.0134 (0.36)	0.0235 (0.53)	0.323* (1.66)	0.0830 (1.13)	0.0438 (1.29)	0.0836* (1.74)	0.412*** (2.69)
LnEARNVOLI _t	+	0.128 (1.65)	0.00351 (0.16)	0.0257 (0.79)	0.156 (0.80)	0.126 (1.56)	0.00902 (0.42)	0.0394 (1.17)	0.202 (1.14)
LISTING _t	-	0.00954 (1.18)	0.00433 (1.03)	0.00477 (0.95)	0.00506 (0.23)	0.0130* (1.65)	0.00500 (1.33)	0.00652 (1.38)	0.0165 (0.74)
FOLLOW _t	-	-0.00256 (-0.84)	0.000438 (0.22)	0.0000775 (0.03)	-0.0167* (-1.88)	0.00130 (0.63)	0.00243* (1.78)	0.00305* (1.90)	-0.00415 (-0.64)
HORIZON _t	+	-0.000510 (-0.76)	0.000204 (0.88)	0.000134 (0.44)	-0.000318 (-0.19)	-0.0000565 (-0.10)	0.000425* (1.91)	0.000566* (1.83)	0.000371 (0.27)
MillsRatio		0.0243 (0.40)	0.0418 (1.40)	0.0479 (1.30)	0.122 (0.77)				
Country dummies		Y	Y	Y	Y	Y	Y	Y	Y
Industry dummies		Y	Y	Y	Y	Y	Y	Y	Y
Year dummies		Y	Y	Y	Y	Y	Y	Y	Y
N		196	196	196	196	250	250	250	250
Adj. R ²		0.085	0.346	0.326	0.193	0.122	0.392	0.429	0.237

Panel A reports results for DiD and Panel B reports results for Heckman and OLS. Two-tailed tests of significance: * $p < 0.10$, ** $p < 0.05$, and *** $p < 0.01$. Regression coefficients are reported with t -statistics in parentheses. Standard errors in DiD estimates are clustered by firm and robust standard errors are used for Heckman and OLS estimates. Variables are as defined in the Appendix, Table A2.

Table 5, Table 6 and Table 7 reports the regression results for H₂, H₃ and H₄, respectively. The results show no significant association between voluntary IIRF adoption and analyst forecast characteristics, the cost of equity and firm value in any model. There is no evidence of a selection bias as *MillsRatio* is not statistically significant in any specification. Except for *GRI* in the information environment analysis, the control variables have direction effects consistent with those documented by prior studies (Behn *et al.*, 2008, Gebhardt *et al.*, 2001, Hope, 2003, Khurana and Raman, 2004, Lang *et al.*, 2003, Ohlson, 1995)¹⁰.

Table 6
Effect of Voluntary IIRF Adoption on Cost of Equity.

Variable	Pred. Sign	DiD	Heckman	OLS
		COE (1)	COE _{<i>t</i>+1} (2)	COE _{<i>t</i>+1} (3)
IIRF	-	0.152 (0.47)	-1.188 (-1.15)	0.0747 (0.34)
POST	-	0.448 (0.91)		
IIRF*POST	-	-0.0354 (-0.08)		
GRI	-	-0.520 (-1.56)	0.249 (0.64)	0.0399 (0.12)
LnSIZE	-	-0.0701 (-0.32)	-0.624** (-2.11)	-0.196 (-1.04)
LnMTB	-	-0.111 (-0.37)	0.179 (0.49)	-0.222 (-0.83)
LEV	+	2.644** (2.28)	1.662 (1.21)	2.715** (2.47)
BETA	+	3.073*** (7.57)	2.166*** (4.21)	2.534*** (6.18)
LTG	+	-0.0113 (-1.30)	-0.00385 (-0.42)	-0.00912 (-0.99)
LnDISPERSION	+	0.242 (1.47)	0.488** (2.04)	0.265* (1.79)
FOLLOW	-	0.00584 (0.21)	0.0598 (1.27)	0.0184 (0.57)
MillsRatio			0.900 (1.24)	
Country dummies		Y	Y	Y
Industry dummies		Y	Y	Y
Year dummies		Y	Y	Y
N		312	188	230
Adj. R ²		0.651	0.721	0.740

Two-tailed tests of significance: * $p < 0.10$, ** $p < 0.05$, and *** $p < 0.01$. Regression coefficients are reported with t -statistics in parentheses. Standard errors in DiD estimates are clustered by firm and robust standard errors are used for Heckman and OLS estimates. Variables are as defined in the Appendix, Table A2.

¹⁰ While initiation of stand-alone non-financial disclosures may provide incremental information for investors, as documented by Dhaliwal *et al.* (2012), the additional information may be related to the initiation only, rather than information contained in subsequent disclosures. The positive association may indicate that some analysts find GRI disclosures distracting, explaining less accuracy and a wider dispersion. Further, it should be noted that our research design is not focused on GRI adoption, therefore sample selection bias (which does not affect our IIRF-related results) may explain this GRI result.

Table 7

Effect of Voluntary IIRF Adoption on Firm Value.

Variable	Pred. Sign	DiD	Heckman	OLS
		LnPRICE (1)	LnPRICE _{t+1} (2)	LnPRICE _{t+1} (2)
IIRF	+	-0.0330 (-0.45)	0.165 (0.40)	-0.0938 (-1.26)
POST	+	0.0558 (0.56)		
IIRF*POST	+	-0.0176 (-0.17)		
GRI	+	0.0699 (1.04)	-0.00345 (-0.02)	0.0530 (0.59)
LnBVPS	+	0.774*** (13.81)	0.773*** (8.20)	0.792*** (9.46)
ABEARN	+	18.98* (1.96)	0.0103 (0.49)	0.0119 (0.55)
MillsRatio			-0.182 (-0.64)	
Country dummies		Y	Y	Y
Industry dummies		Y	Y	Y
Year dummies		Y	Y	Y
N		436	210	296
Adj. R ²		0.873	0.811	0.806

Two-tailed tests of significance: * $p < 0.10$, ** $p < 0.05$, and *** $p < 0.01$. Regression coefficients are reported with t -statistics in parentheses. Standard errors in DiD estimates are clustered by firm and robust standard errors are used for Heckman and OLS estimates. Variables are as defined in the Appendix, Table A2.

5.3 Channels for IIRF adoption consequences

We assess two channels through which voluntary IIRF adoption can affect the information environment, the cost of equity and firm value. First, we expect firms with higher quality disclosure to obtain greater capital market benefits relative to firms with lower quality disclosure (the quality channel). Mandatory IR studies evidenced that higher quality IR disclosure provides incremental information or improves internal decision-making, resulting in a reduction in information asymmetry and increased firm value (Barth *et al.*, 2017, Bernardi and Stark, 2018, Lee and Yeo, 2016, Zhou *et al.*, 2017). We use acknowledgement of leading IR practice and award-winning reports as a measure of disclosure quality¹¹. Table 8, Panel A reports the regression results on the full sample, showing no statistically significant results. A possible explanation is that firms with similar observable characteristics produce similar quality disclosure. Non-IIRF firms have been identified to have leading IR practice despite not adopting the IIRF (18.07% of non-IIRF firms and 36.14% of IIRF firms have been acknowledged to produce high-quality disclosure), and approximately three-quarters of the matched IIRF firms and non-IIRF firms have the same value for

¹¹ Disclosure quality (*QUALITY*) is an indicator variable coded 1 if firm i has been identified as leading practice or have received a disclosure award, and 0 otherwise. Data for leading practice and award recognition is collected from the IIRC Examples Database, Australasian Reporting Awards, PwC's Building Public Trust 'Excellence in reporting' awards, WICI Awards for Integrated Reporting, and Nikkei Annual Report Award.

Table 8

Channels for IIRF adoption consequences

Panel A: The disclosure quality channel

Variable	FERROR(0) _{t+1}	DISPERSION _{t+1}	COE _{t+1}	LnPRICE _{t+1}
	(1)	(2)	(3)	(4)
IIRF _t	-0.0541 (-0.42)	-0.169 (-0.69)	-0.865 (-0.72)	-0.364 (-0.95)
QUALITY	0.0188 (0.46)	0.168 (1.45)	0.241 (0.42)	0.0544 (0.24)
IIRF* QUALITY	0.0258 (0.50)	-0.0693 (-0.49)	-0.170 (-0.26)	0.0844 (0.32)
Controls	Y	Y	Y	Y
Country dummies	Y	Y	Y	Y
Industry dummies	Y	Y	Y	Y
Year dummies	Y	Y	Y	Y
N	166	166	166	166
Adj. R ²	0.085	0.157	0.542	0.834

Panel B: The value creation channels

Variable	ESP				LnMTB			
	FERROR(0) _{t+1}	DISPERSION _{t+1}	COE _{t+1}	LnPRICE _{t+1}	FERROR(0) _{t+1}	DISPERSION _{t+1}	COE _{t+1}	LnPRICE _{t+1}
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
IIRF _t	0.0206 (0.11)	0.235 (0.62)	1.108 (0.89)	0.0309 (0.06)	0.0373 (0.22)	0.131 (0.51)	0.875 (0.79)	0.0819 (0.16)
DECILE	-0.122 (-0.85)	-0.642* (-1.90)	-0.437 (-0.40)	-0.680*** (-3.03)	-0.247 (-0.77)	-0.286 (-0.59)	-0.430 (-0.34)	0.503 (1.28)
IIRF* DECILE	0.296 (1.26)	0.936* (1.78)	0.707 (0.41)	1.119** (2.51)	0.193 (0.80)	1.535 (1.56)	-3.012 (-1.40)	-1.101** (-2.51)
Controls	Y	Y	Y	Y	Y	Y	Y	Y
Country dummies	Y	Y	Y	Y	Y	Y	Y	Y
Industry dummies	Y	Y	Y	Y	Y	Y	Y	Y
Year dummies	Y	Y	Y	Y	Y	Y	Y	Y
N	96	96	96	96	96	96	96	96
Adj. R ²	0.167	0.178	0.697	0.880	0.190	0.312	0.738	0.884

Panel A and Panel B report results for the disclosure quality channel (full sample) and the value creation channels (non-Japanese firms), respectively. Two-tailed tests of significance: * $p < 0.10$, ** $p < 0.05$, and *** $p < 0.01$. Regression coefficients are reported with t -statistics in parentheses. Robust standard errors are used. Variables are as defined in the Appendix, Table A2.

the disclosure quality indicator. This finding further emphasises the argument that positive market consequences may not be due to adoption of the IIRF per se, but rather better disclosure regardless of the format and report label.

Second, integrated reports are considered a means to communicate the value creation story of an organisation (Guthrie *et al.*, 2017, Higgins *et al.*, 2014, IIRC, 2013). Hence, it is possible that firms with higher sustainability or market performance utilise integrated reports to convey information that is not captured in traditional disclosure. Thus, we expect different results for firms in the top decile of sustainability performance (*ESP*) or the market's expectations of future growth (*LnMTB*). Table 8, Panel B presents the findings excluding non-Japanese firms, showing that voluntary IIRF adoption by IIRF firms with higher *ESP* increases analyst dispersion and firm value. The increase in firm value and analyst forecast dispersion suggests that IIRF adoption by firms with higher sustainability performance can cause a divergence in the higher-end future estimates, which would increase analyst variance and firm value. This finding further suggests that integrated reports may not be used by all analysts, but may contain value relevant information for financial analysts who evaluate sustainability information. In contrast, voluntary IIRF adoption by IIRF firms with higher *LnMTB* is associated with lower firm value. It is possible that such firms may be overvalued and adopt the IIRF with the intention to explain the long-term financial stability of their growth, which may explain the decrease in firm value. Overall, integrated reports may be an efficient means to communicate value related to sustainability operations rather than long-term financial stability and growth.

5.4 Sensitivity analysis

Several additional analyses were conducted to assess the appropriateness of conclusions drawn from the baseline results. Untabulated univariate DiD analysis and DiD analysis without fixed effect dummies are consistent with the baseline results. Untabulated subsample analyses based on country, industry and initiation year are consistent with the baseline results when we partition our sample

based on manufacturing firms and non-manufacturing firms, financial firms and non-financial firms, and early adopters and later adopters.

As an additional test for firm value, we follow the Tobin's Q model Lee and Yeo (2016) employed in assessing the association between mandatory IR and firm value. Using DiD, we estimate the change in Tobin's Q for IIRF firms pre and post-IIRF adoption relative to the corresponding change for non-IIRF firms by regressing Tobin's Q on two indicator variables indicating IIRF adoption and post-adoption period, their interaction, GRI application, firm size, return on assets, leverage, intangible assets, board independence, board size, and country, industry and year fixed effect dummies. Untabulated results are consistent with the baseline results, with a statistically insignificant coefficient on $IIRF*POST$ (coeff. = -0.0226, $p=0.795$). Untabulated Heckman and OLS estimates provide the same conclusion.

We also estimate equations (3) to (5) based on first differences of the continuous variables with and without fixed effect dummies. A change specification effectively uses the firm as its own control and reduces the likelihood of correlated omitted variables. The change models assess whether there is a relation between voluntary IIRF adoption and changes in the capital market consequences in $t+1$. Overall, untabulated results are consistent with the baseline results, suggesting no relation between voluntary IIRF adoption and capital market consequences.

We conduct several robustness checks using alternative sample periods and matching procedures for non-IIRF firms. While the effects of confounding events are unlikely to pose as a problem for this study due to the initiation year for voluntary IIRF adoption varying across firms, we examine whether our DiD results are sensitive to using an expanded sample period. We repeat the tests for the information environment, the cost of equity and firm value using balanced panel data covering $t-2$ to $t+2$ and unbalanced panel data spanning across $t-5$ to $t+5$. Untabulated results are quantitatively the same as those reported in Tables 5, 6 and 7. To assess whether our results are sensitive to the matched group of non-IIRF firms, we repeat all tests using alternative samples

matched by two-digit GICS, four-digit GICS and three-digit SIC. The baseline results are robust to alternative sample specifications.

6. Conclusion

This study extends the IR literature by examining the determinants of voluntary IIRF adoption and the market reactions to firms signalling voluntary adherence to the IIRF. We find that the rationale behind voluntary adoption depends on whether IR is mainstream in the country. In countries where IR is not mainstream, the presence of a CSR committee, experience with the GRI guidelines, and environmental and social performance are important determinants to voluntary IIRF adoption. Such findings suggest established systems that support sustainability management and reporting influences voluntary IIRF adoption. Hence, our evidence complements prior studies that found IR is a concept that naturally develops within organisations focused on sustainability, and builds from established sustainability management and reporting practices (Al-Htaybat and von Alberti-Alhtaybat, 2018, Feng *et al.*, 2017, Guthrie *et al.*, 2017, Lodhia, 2015, Stubbs and Higgins, 2014). In Japan where IR is mainstream, there are no observable differences between IIRF firms and non-IIRF firms. Such findings indicate the possibility that there are no substantial differences between the disclosure of IIRF firms and similar non-IIRF firms due to a trend towards integrated disclosure (Adams *et al.*, 2016).

Using a DiD design, Heckman procedure and OLS approach, the consequences results show that there are no statistically significant differences between the information environment, the cost of equity and firm value of IIRF firms and non-IIRF firms. These findings are consistent with Wahl *et al.* (2020) and are supportive of our determinants findings. The reporting practices of IIRF firms may not differ from prior year practices, and further, it may not differ from non-IIRF firms with similar characteristics. Additional analysis shows the capital market effects could differ for firms with higher sustainability or market performance, suggesting integrated reports could be an efficient means at communicating sustainability-related value rather than other information. Overall, the

study provides novel evidence in support of the findings of extant qualitative studies, showing that integrated reports do not have a clear and distinct influence on disclosure practices and capital markets.

An improved understanding of the determinants and consequences of voluntary IIRF adoption has important implications for regulators, practitioners and proponents of the IIRF. There may be barriers to widespread adoption of the IIRF in countries where IR is not mainstream, as firms with weaker social and environmental management are less inclined to adopt the IIRF voluntarily. Hence, rather than promoting adoption of the IIRF in isolation, greater guidance and support for the development of these underlying processes may be called for (Adams *et al.*, 2016, Chaidali and Jones, 2017). Despite the IIRF's potential to bring about changes in reporting practices, there may be no substantial differences between IIRF-inspired reports and other reports. Without advancements in accounting systems that support integrated thinking and connecting information, the IIRF's potential to improve information quality may be limited to encouraging more non-financial disclosure and transparency in countries where integrated disclosures are not already trending.

The results must be interpreted with regard to the limitations of the study. First, relative to the group of all identified IIRF firms, the sample is biased towards larger and more visible firms due to data limitations. Hence, the results may not be generalisable to firms with characteristics that differ from the sampled firms. Second, while results from the subsample analysis enabled further insights on voluntary IIRF adoption, it is possible that changes in statistical significance are due to a reduced sample size. Non-significant variables may influence voluntary IIRF adoption; however, the effects are not large enough to be detected. Similarly, while the results show that there are no significant capital market consequences after voluntary IIRF adoption, it is possible that any consequences are gradual and could emerge in the long-term as organisations embed integrated thinking into their operations.

Notwithstanding these limitations, our study provides new insights into IR and identifies avenues for future research. There are many possible determinants of voluntary IIRF adoption and this study only assessed a subset of possible factors. Characteristics that are difficult to measure, including networks and associations, managerial behaviour and organisational culture, are potentially important determinants and are aspects to examine for future research. Our study is unable to clearly identify the rationales behind voluntary IIRF adoption in Japan, and assessment of unobservable characteristics could potentially reveal important insights and provide an explanation. Studies assessing differences in the information content of integrated reports and integrated disclosures are warranted, as well as research on changes in disclosure practices before and after IIRF adoption. Further, more research is needed on the long-term effects of voluntary IIRF adoption to substantiate the proposed benefits of adopting the IIRF over alternative guidelines and integrated disclosure practices.

References

- Abhayawansa, S., Elijido-Ten, E. and Dumay, J. (2019), "A practice theoretical analysis of the irrelevance of integrated reporting to mainstream sell-side analysts", *Accounting & Finance*, Vol. 59 No. 3, pp. 1615-1647.
- Adams, C. A., Potter, B., Singh, P. J. and York, J. (2016), "Exploring the implications of integrated reporting for social investment (disclosures)", *The British Accounting Review*, Vol. 48 No. 3, pp. 283-296.
- Al-Htaybat, K. and von Alberti-Alhtaybat, L. (2018), "Integrated thinking leading to integrated reporting: case study insights from a global player", *Accounting, Auditing & Accountability Journal*, Vol. 31 No. 5, pp. 1435-1460.
- Barth, M. E., Cahan, S. F., Chen, L. and Venter, E. R. (2017), "The economic consequences associated with integrated report quality: Capital market and real effects", *Accounting, Organizations and Society*, Vol. 62 No. Supplement C, pp. 43-64.
- Behn, B. K., Choi, J.-H. and Kang, T. (2008), "Audit Quality and Properties of Analyst Earnings Forecasts", *The Accounting Review*, Vol. 83 No. 2, pp. 327-349.
- Bernardi, C. and Stark, A. W. (2018), "Environmental, social and governance disclosure, integrated reporting, and the accuracy of analyst forecasts", *The British Accounting Review*, Vol. 50 No. 1, pp. 16-31.
- Beyer, A., Cohen, D. A., Lys, T. Z. and Walther, B. R. (2010), "The financial reporting environment: Review of the recent literature", *Journal of Accounting and Economics*, Vol. 50 No. 2, pp. 296-343.
- Black Sun (2014), "Realizing the benefits: The impact of Integrated Reporting", Black Sun.
- Brammer, S. and Pavelin, S. (2006), "Voluntary environmental disclosures by large UK companies", *Journal of Business Finance & Accounting*, Vol. 33 No. 7-8, pp. 1168-1188.

- Cahan, S. F., de Villiers, C., Jeter, D. C., Naiker, V. and van Staden, C. J. (2016), "Are CSR Disclosures Value Relevant? Cross-Country Evidence", *European Accounting Review*, Vol. 25 No. 3, pp. 579-611.
- Chaidali, P. and Jones, M. J. (2017), "It's a matter of trust: Exploring the perceptions of Integrated Reporting preparers", *Critical Perspectives on Accounting*, Vol. 48 No. Supplement C, pp. 1-20.
- Clarkson, P. M., Li, Y., Richardson, G. D. and Vasvari, F. P. (2008), "Revisiting the relation between environmental performance and environmental disclosure: An empirical analysis", *Accounting, Organizations and Society*, Vol. 33 No. 4, pp. 303-327.
- Claus, J. and Thomas, J. (2001), "Equity premia as low as three percent? Evidence from analysts' earnings forecasts for domestic and international stock markets", *The Journal of Finance*, Vol. 56 No. 5, pp. 1629-1666.
- Corporate Value Reporting Lab (2016), "Integrated Reporting to Support Sustainable Growth in Japan", available at: cvrl-net.com/archive/pdf/list2015_en_201603.pdf (accessed 05 August 2020)
- Cortesi, A. and Vena, L. (2019), "Disclosure quality under Integrated Reporting: A value relevance approach", *Journal of Cleaner Production*, Vol. 220, pp. 745-755.
- Dawkins, C. and Fraas, J. W. (2011), "Coming clean: The impact of environmental performance and visibility on corporate climate change disclosure", *Journal of Business Ethics*, Vol. 100 No. 2, pp. 303-322.
- de Klerk, M., de Villiers, C. and van Staden, C. (2015), "The influence of corporate social responsibility disclosure on share prices: Evidence from the United Kingdom", *Pacific Accounting Review*, Vol. 27 No. 2, pp. 208-228.
- de Villiers, C. and Hsiao, P.-C. K. (2017), "Integrated Reporting", in De Villiers, C. and Maroun, W. (Eds.) *Sustainability Accounting and Integrated Reporting*, Routledge, London, UK, pp. 13-24.
- de Villiers, C. and Marques, A. (2016), "Corporate social responsibility, country-level predispositions, and the consequences of choosing a level of disclosure", *Accounting and Business Research*, Vol. 46 No. 2, pp. 167-195.
- de Villiers, C., Hsiao, P.-C. K. and Maroun, W. (Eds.) (2020), *The Routledge Handbook of Integrated Reporting*, Routledge, London, UK.
- de Villiers, C., Rinaldi, L. and Unerman, J. (2014), "Integrated Reporting: Insights, gaps and an agenda for future research", *Accounting, Auditing & Accountability Journal*, Vol. 27 No. 7, pp. 1042-1067.
- de Villiers, C., Venter, E. R. and Hsiao, P.-C. K. (2017), "Integrated reporting: background, measurement issues, approaches and an agenda for future research", *Accounting & Finance*, Vol. 57 No. 4, pp. 937-959.
- Dhaliwal, D. S., Li, O. Z., Tsang, A. and Yang, Y. G. (2011), "Voluntary nonfinancial disclosure and the cost of equity capital: The initiation of corporate social responsibility reporting", *The Accounting Review*, Vol. 86 No. 1, pp. 59-100.
- Dhaliwal, D. S., Radhakrishnan, S., Tsang, A. and Yong George, Y. (2012), "Nonfinancial disclosure and analyst forecast accuracy: International evidence on corporate social responsibility disclosure", *The Accounting Review*, Vol. 87 No. 3, pp. 723-759.
- Dumay, J. and Dai, T. (2017), "Integrated thinking as a cultural control?", *Meditari Accountancy Research*, Vol. 25 No. 4, pp. 574-604.
- Easton, P. D. (2004), "PE ratios, PEG ratios, and estimating the implied expected rate of return on equity capital", *The Accounting Review*, Vol. 79 No. 1, pp. 73-95.
- Eccles, R. G. and Krzus, M. (2010), *One Report : Integrated Reporting for a Sustainable Strategy*, John Wiley & Sons, Hoboken, NJ, USA.
- EY (2015), "Tomorrow's Investment Rules 2.0: Emerging risk and stranded assets have investors looking for more from nonfinancial reporting", EYGM Limited.

- Fasan, M. and Mio, C. (2016), "Fostering stakeholder engagement: The role of materiality disclosure in integrated reporting", *Business Strategy and the Environment*, doi:10.1002/bse.1917
- Feng, T., Cummings, L. and Tweedie, D. (2017), "Exploring integrated thinking in integrated reporting – an exploratory study in Australia", *Journal of Intellectual Capital*, Vol. 18 No. 2, pp. 330-353.
- Frías-Aceituno, J. V., Rodríguez-Ariza, L. and García-Sánchez, I. M. (2013a), "Is integrated reporting determined by a country's legal system? An exploratory study", *Journal of Cleaner Production*, Vol. 44, pp. 45-55.
- Frías-Aceituno, J. V., Rodríguez-Ariza, L. and García-Sánchez, I. M. (2013b), "The role of the board in the dissemination of integrated corporate social reporting", *Corporate Social Responsibility and Environmental Management*, Vol. 20 No. 4, pp. 219-233.
- García-Sánchez, I.-M., Rodríguez-Ariza, L. and Frías-Aceituno, J.-V. (2013), "The cultural system and integrated reporting", *International Business Review*, Vol. 22 No. 5, pp. 828-838.
- Gebhardt, W. R., Lee, C. M. C. and Swaminathan, B. (2001), "Toward an Implied Cost of Capital", *Journal of Accounting Research*, Vol. 39 No. 1, pp. 135-176.
- Gerwanski, J., Kordsachia, O. and Velte, P. (2019), "Determinants of materiality disclosure quality in integrated reporting: Empirical evidence from an international setting", *Business Strategy and the Environment*, Vol. 28 No. 5, pp. 750-770.
- Girella, L., Rossi, P. and Zambon, S. (2019), "Exploring the firm and country determinants of the voluntary adoption of integrated reporting", *Business Strategy and the Environment*, Vol. 28 No. 7, pp. 1323-1340.
- Guthrie, J., Manes-Rossi, F. and Orelli, R. L. (2017), "Integrated reporting and integrated thinking in Italian public sector organisations", *Meditari Accountancy Research*, Vol. 25 No. 4, pp. 553-573.
- Healy, P. M. and Palepu, K. G. (2001), "Information asymmetry, corporate disclosure, and the capital markets: A review of the empirical disclosure literature", *Journal of Accounting and Economics*, Vol. 31 No. 1, pp. 405-440.
- Higgins, C., Stubbs, W. and Love, T. (2014), "Walking the talk(s): Organisational narratives of integrated reporting", *Accounting, Auditing & Accountability Journal*, Vol. 27 No. 7, pp. 1090-1119.
- Hope, O. K. (2003), "Disclosure Practices, Enforcement of Accounting Standards, and Analysts' Forecast Accuracy: An International Study", *Journal of Accounting Research*, Vol. 41 No. 2, pp. 235-272.
- Hsiao, P.-C. K. and Kelly, M. (2018), "Investment Considerations and Impressions of Integrated Reporting: Evidence from Taiwan", *Sustainability Accounting, Management and Policy Journal*, Vol. 9 No. 1, pp. 2-28.
- IIRC (2013), "The International <IR> Framework", IIRC.
- IIRC (2017), "Journey to Breakthrough: IIRC Integrated Report 2016", IIRC.
- IIRC (2018), "Breaking Through: IIRC Integrated Report 2017", IIRC.
- Jensen, M. C. (1993), "The Modern Industrial Revolution, Exit, and the Failure of Internal Control Systems", *The Journal of Finance*, Vol. 48 No. 3, pp. 831-880.
- Khurana, I. K. and Raman, K. K. (2004), "Litigation Risk and the Financial Reporting Credibility of Big 4 versus Non-Big 4 Audits: Evidence from Anglo-American Countries", *Accounting Review*, Vol. 79 No. 2, pp. 473-495.
- Kılıç, M. and Kuzey, C. (2018), "Assessing current company reports according to the IIRC integrated reporting framework", *Meditari Accountancy Research*, Vol. 26 No. 2, pp. 305-333.
- KPMG (2019), "Survey of Integrated Reports in Japan 2018", KPMG.
- Lambert, R., Leuz, C. and Verrecchia, R. E. (2007), "Accounting Information, Disclosure, and the Cost of Capital", *Journal of Accounting Research*, Vol. 45 No. 2, pp. 385-420.

- Lang, M. H., Lins, K. V. and Miller, D. P. (2003), "ADRs, analysts, and accuracy: Does cross listing in the United States improve a firm's information environment and increase market value?", *Journal of Accounting Research*, Vol. 41 No. 2, pp. 317-345.
- Lee, K.-W. and Yeo, G. H.-H. (2016), "The association between integrated reporting and firm valuation", *Review of Quantitative Finance and Accounting*, Vol. 47 No. 4, pp. 1221-1250.
- Lennox, C. S., Francis, J. R. and Wang, Z. (2012), "Selection models in accounting research", *The Accounting Review*, Vol. 87 No. 2, pp. 589-616.
- Lodhia, S. (2015), "Exploring the transition to integrated reporting through a practice lens: An Australian customer owned bank perspective", *Journal of Business Ethics*, Vol. 129 No. 3, pp. 585-598.
- Melloni, G., Caglio, A. and Perego, P. (2017), "Saying more with less? Disclosure conciseness, completeness and balance in Integrated Reports", *Journal of Accounting and Public Policy*, Vol. 36 No. 3, pp. 220-238.
- Melloni, G., Stacchezzini, R. and Lai, A. (2016), "The tone of business model disclosure: An impression management analysis of the integrated reports", *Journal of Management & Governance*, Vol. 20 No. 2, pp. 295-320.
- Merton, R. C. (1987), "A simple model of capital market equilibrium with incomplete information", *The Journal of Finance*, Vol. 42 No. 3, pp. 483-510.
- Michelon, G. and Parbonetti, A. (2012), "The effect of corporate governance on sustainability disclosure", *Journal of Management & Governance*, Vol. 16 No. 3, pp. 477-509.
- Murray, A., Sinclair, D., Power, D. and Gray, R. (2006), "Do financial markets care about social and environmental disclosure?: Further evidence and exploration from the UK", *Accounting, Auditing & Accountability Journal*, Vol. 19 No. 2, pp. 228-255.
- Ohlson, J. A. (1995), "Earnings, book values, and dividends in equity valuation", *Contemporary Accounting Research*, Vol. 11 No. 2, pp. 661-687.
- Perego, P., Kennedy, S. and Whiteman, G. (2016), "A lot of icing but little cake? Taking integrated reporting forward", *Journal of Cleaner Production*, Vol. 136, Part A, pp. 53-64.
- Pistoni, A., Songini, L. and Bavagnoli, F. (2018), "Integrated Reporting Quality: An Empirical Analysis", *Corporate Social Responsibility and Environmental Management*, Vol. 25 No. 4, pp. 489-507.
- Richardson, A. J. and Welker, M. (2001), "Social disclosure, financial disclosure and the cost of equity capital", *Accounting, Organizations and Society*, Vol. 26 No. 7, pp. 597-616.
- Rinaldi, L., Unerman, J. and de Villiers, C. (2018), "Evaluating the integrated reporting journey: insights, gaps and agendas for future research", *Accounting, Auditing & Accountability Journal*, Vol. 31 No. 5, pp. 1294-1318.
- Roberts, M. R. and Whited, T. M. (2013), "Endogeneity in Empirical Corporate Finance", in Constantinides, G. M., Harris, M. and Stulz, R. (Eds.) *Handbook of the Economics of Finance*, Elsevier B.V, Philadelphia, PA, pp. 493-572.
- Rowbottom, N. and Locke, J. (2016), "The emergence of <IR>", *Accounting and Business Research*, Vol. 46 No. 1, pp. 83-115.
- Serafeim, G. (2015), "Integrated reporting and investor clientele", *Journal of Applied Corporate Finance*, Vol. 27 No. 2, pp. 34-51.
- Shaukat, A., Qiu, Y. and Trojanowski, G. (2016), "Board Attributes, Corporate Social Responsibility Strategy, and Corporate Environmental and Social Performance", *Journal of Business Ethics*, Vol. 135 No. 3, pp. 569-585.
- Slack, R. and Tsalavoutas, I. (2018), "Integrated reporting decision usefulness: Mainstream equity market views", *Accounting Forum*, Vol. 42 No. 2, pp. 184-198.
- Stubbs, W. and Higgins, C. (2014), "Integrated reporting and internal mechanisms of change", *Accounting, Auditing & Accountability Journal*, Vol. 27 No. 7, pp. 1068-1089.
- Stubbs, W., Higgins, C., Milne, M. J. and Hems, L. (2014), "Financial Capital Providers' Perceptions of Integrated Reporting", working paper, available at: <http://dx.doi.org/10.2139/ssrn.2473426> (accessed 05 August 2020)

- Verrecchia, R. E. (1983), "Discretionary disclosure", *Journal of Accounting and Economics*, Vol. 5, pp. 179-194.
- Verrecchia, R. E. (2001), "Essays on disclosure", *Journal of Accounting and Economics*, Vol. 32 No. 1, pp. 97-180.
- Wahl, A., Charifzadeh, M. and Diefenbach, F. (2020), "Voluntary Adopters of Integrated Reporting – Evidence on Forecast Accuracy and Firm Value", *Business Strategy and the Environment*, doi:10.1002/bse.2519
- Yermack, D. (1996), "Higher market valuation of companies with a small board of directors", *Journal of Financial Economics*, Vol. 40 No. 2, pp. 185-211.
- Zhou, S., Simnett, R. and Green, W. (2017), "Does Integrated Reporting Matter to the Capital Market?", *Abacus*, Vol. 53 No. 1, pp. 94-132.

Appendix: Variable definitions

Table A1

Determinants model.

<u>Code</u>	<u>Label</u>	<u>Definition</u>	<u>Source</u>
BOARDCOM_CSR _{<i>i,t</i>}	CSR committee	Indicator variable coded 1 if firm <i>i</i> has a CSR committee in year <i>t</i> , and 0 otherwise	ASSET4
BOARDSIZE _{<i>i,t</i>}	Board size	Number of directors on the board of directors of firm <i>i</i> at end of year <i>t</i>	ASSET4
BOARDSKILL _{<i>i,t</i>}	Board skills	Percentage of board members in firm <i>i</i> who have either a strong financial or an industry specific background for the year <i>t</i>	ASSET4
CONCENTRATE _{<i>i,t</i>}	Industry concentration	Based on the Herfindahl–Hirschman index, calculated as the sum of squares of sales for firm <i>i</i> in industry <i>j</i> , based on two-digit SIC. It is calculated for each year, and each industry and country. The values are then averaged over the past three years to reduce the influence of potential data errors on the measure	Compustat
CULTURE _{<i>i,t</i>}	National culture	A component of the principle component analysis of national culture. It is a composite measure of masculinity versus femininity (a low score reflects femininity, while a high score reflects masculinity), uncertainty avoidance index. (a low score suggests societies rely on more informal and unstructured behaviours, while a high score suggests societies prefer formal rules and strong social norm), and long-term orientation versus short-term normative orientation (a low score reflects short term orientation, while a high score reflects long term orientation). It has positive loadings for all three dimensions	geerthofstede.com (Official website)
ESP _{<i>i,t</i>}	Environmental and social performance	Mean of the environmental score and social score available from ASSET4 for firm <i>i</i> at the end of year <i>t</i>	ASSET4
GENDIV _{<i>i,t</i>}	Gender diversity	Percentage of female directors to total number of directors on the board of firm <i>i</i> at end of year <i>t</i>	ASSET4
GRI _{<i>i,t</i>}	GRI application	Indicator variable coded 1 if firm <i>i</i> applied GRI guidelines prior to year <i>t</i> , and 0 otherwise	GRI website
INTASSET _{<i>i,t</i>}	Intangible assets	Intangible assets scaled by total assets for firm <i>i</i> at end of year <i>t</i>	Worldscope
IIRF _{<i>i,t</i>}	IIRF adoption	Indicator variable coded 1 if firm <i>i</i> is an IIRF firm, and 0 otherwise	Corporate websites, Mergent Online
LEV _{<i>i,t</i>}	Leverage	Total debt scaled by total assets for firm <i>i</i> at end of year <i>t</i>	Worldscope
LnMEDIA _{<i>i,t</i>}	Media coverage	Natural logarithm of the total number of articles released in year <i>t</i> with firm <i>i</i> mentioned in the headlines. The applied settings excluded duplicates and republished news, and included articles of all available languages. Articles carried on press release wires were presumed as firm-initiated and excluded from the searches	Factiva
LnSUBSIDIARY _{<i>i,t</i>}	Subsidiaries	Natural logarithm of the number of recorded subsidiaries of firm <i>i</i>	OSIRIS
NATION _{<i>i,t</i>}	National voice and freedom	A component of the principle component analysis of national institution. It is a composite measure of voice and accountability (the extent to which a country's citizens are able to	World Bank, Reporters Without Borders

<i>OWNERSHIP</i> _{<i>i,t</i>}	Institutional ownership	participate in selecting their government and the extent of freedom of expression, freedom of association, and a free media) and freedom of press (the degree of freedom journalists and the media have, a low score represents relatively greater freedom). It has a negative loading for voice and accountability and positive loading for freedom of press. Percentage of outstanding shares held by institutional shareholders for firm <i>i</i> at the end of year <i>t</i>	Bloomberg
<i>SENSITIVE</i> _{<i>i,t</i>}	Environmentally sensitive industry	Indicator variable coded 1 if firm <i>i</i> operates in an environmentally sensitive industry (SIC codes: 800–899, 1000–1099, 1200–1399, 2600–2699, 2800–3099, 3300– 3399 and 4900–4999), and 0 otherwise	Compustat

Table A2

Consequences models.

<u>Code</u>	<u>Label</u>	<u>Definition</u>	<u>Source</u>
<i>ABEARN</i> _{<i>i,t</i>}	Abnormal earnings	Firm <i>i</i> 's net income before extraordinary expenses at year-end <i>t</i> , less its cost of equity at year-end <i>t</i> multiplied by book value of equity at <i>t</i> -1	Worldscope, Bloomberg
<i>BETA</i> _{<i>i,t</i>}	Beta	Comparison of the monthly price movements of firm <i>i</i> 's share price over a five year period with the total market index for the respective country	Datastream
<i>COE</i> _{<i>i,t</i>}	Cost of equity	Derived by the Capital Asset Pricing Model	Bloomberg
<i>(Ln)DISPERSION</i> _{<i>i,t</i>}	Analyst forecast dispersion	(Natural logarithm of the) standard deviation of firm <i>i</i> 's one-year ahead analyst EPS forecast, scaled by its absolute value of the median consensus EPS forecast for the forecast year <i>t</i>	I/B/E/S
<i>FERROR</i> _{<i>i,t</i>}	Analyst forecast error	Mean absolute forecast errors made in year <i>t</i> for firm <i>i</i> , scaled by firm <i>i</i> 's year-end price. Three forecast error horizons are separately estimated, current-year earnings (<i>FERROR</i> (0)), one-year-ahead earnings (<i>FERROR</i> (1)) and two-year ahead earnings (<i>FERROR</i> (2))	I/B/E/S Datastream
<i>FOLLOW</i> _{<i>i,t</i>}	Analyst following	Number of analyst following firm <i>i</i> throughout year <i>t</i>	I/B/E/S
<i>GRI</i> _{<i>i,t</i>}	GRI application	Indicator variable coded 1 if firm <i>i</i> applied GRI guidelines prior to year <i>t</i> , and 0 otherwise	GRI website/dataset
<i>HORIZON</i> _{<i>i,t</i>}	Forecast horizon	Median number of days between earnings announcement and forecast date for firm <i>i</i> in year <i>t</i>	I/B/E/S
<i>IIRF</i> _{<i>i,t</i>}	IIRF adoption	Indicator variable coded 1 if firm <i>i</i> is an IIRF firm, and 0 otherwise	Corporate websites, Mergent Online
<i>LEV</i> _{<i>i,t</i>}	Leverage	Total debt scaled by total assets for firm <i>i</i> at year-end <i>t</i>	Worldscope
<i>LISTING</i> _{<i>i,t</i>}	Market listing	Number of stock exchanges firm <i>i</i> is listed on at year-end <i>t</i>	OSIRIS
<i>LOSS</i> _{<i>i,t</i>}	Loss	Indicator variable coded 1 if firm <i>i</i> reports negative earnings for year <i>t</i> , and 0 otherwise	Worldscope

$LTG_{i,t}$	Long-term growth	Consensus (median) long-term growth forecast for firm i at year-end t	I/B/E/S
$LnBVPS_{i,t}$	Book value per share	Natural logarithm of the book value per share of common shareholders' equity for firm i at year-end t	Worldscope
$LnEARNVOLI_{i,t}$	Earnings volatility	Natural logarithm of the standard deviation of annual EPS for firm i over the previous five years ending at year t	Datastream
$LnMTB_{i,t}$	Market-to-book	Natural logarithm of the market capitalisation over book value of shareholders' equity for firm i at year-end t	Worldscope, Datastream
$LnPRICE_{i,t}$	Share price	Natural logarithm of the closing share price for firm i at year-end t	Datastream
$LnSIZE_{i,t}$	Firm size	Natural logarithm of market capitalisation for firm i at year-end t	Datastream
$POST_{i,t}$	Post-adoption period	Indicator variable coded 1 if the firm observation relates to post-adoption periods ($t+1$ and after), and 0 for pre-adoption periods ($t-1$ and before).	Corporate websites, Mergent Online
$SqEARNSURP_{i,t}$	Earnings surprise	Square-root of the absolute value of the difference between firm i 's EPS at year t and EPS at year $t-1$, scaled by year-end t share price	Datastream
