Voluntary Disclosure of Integrated Reporting and Cost of Capital in Brazil: an Alternative Explanation

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ABSTRACT

There is an ongoing debate about whether integrated reporting should be mandatory or voluntary. Empirical evidence mostly focused on South African mandatory disclosures, indicate that the firm's information environment is relevant to explain the effects on the cost of capital. However, results based on voluntary disclosures indicate that the country's level of enforcement explains the effects. This paper analyses the effects of voluntary disclosures of integrated reports on the cost of capital for Brazilian listed companies. Our design is developed to control the level of enforcement and evaluate if firm-specific characteristics may explain the effects on information asymmetry related to the disclosure of integrated financial and non-financial information. We collect data from 2014 to 2017 and compare the effects on capital cost for a group of firms that voluntarily disclose integrated reports with a control group identified via Propensity Score Matching. We can identify that larger firms, with stronger corporate governance and lower risk, are more likely to voluntarily disclose integrated reports. In our second stage, we find no effect on the cost of capital after the voluntary disclosure. Taken together, our results are aligned with prior studies focused on mandatory disclosures: the firm's information environment is relevant to explain the potential capital market benefits of Integrated Reporting.

Keywords: *Integrated Reporting, Voluntary Disclosure, Cost of Capital, Propensity Score Matching*

Introduction

There is an ongoing debate if integrated reporting should be mandatory or voluntary, involving regulatory agencies and capital market authorities, such as the International Accounting Standards Board (IASB), the Financial Accounting Standards Board (FASB), the International Organization of Securities Commissions (IOSCO), the Johannesburg Stock Exchange (JSE), and the Global Reporting Initiative (GRI) (Baboukardos & Rimmel, 2016; Barth, Cahan, Chen, & Venter, 2017).

The International Integrated Reporting Council (IIRC) is one of the leading initiatives that promote the implementation of 'integrated thinking' and the disclosure of integrated

financial and non-financial information (Zhou, Simnett, & Green, 2017). Integrated reporting would offer a holistic view of the organization, thus reducing information asymmetry (Frias-Aceituno, Rodrígues-Ariza, & García-Sanchez, 2014). Most empirical literature about the effects of mandatory disclosures of integrated reports considers South African listed companies. Results indicate that the reduction of information asymmetry, measured by the capital cost, is related to the firm's information environment. Barth et al. (2017) did not find an effect on the cost of capital in a sample of large firms. Zhou, Simnett and Green (2017) could find a reduction in the cost of capital, but only for firms with 'low analyst following'.

There is an expectation that voluntary disclosures could benefit companies (Baboukardos & Rimmel, 2016; Steyn, 2014) if investors are better-informed about prospects (An, Davey & Eggleton, 2011). If the signal is credible, thus reducing information asymmetry, firms could experience a reduction in their cost of capital (García-Sanchez & Noguera-Gámez (2017a, 2017b). However, the effects of voluntary disclosures do not necessarily mimic those from mandatory disclosures because firms may act strategically (Watson, Shrives, & Marston, 2002; Zaro, 2019). Thus, whether there is a benefit related to a reduction in capital cost is still an empirical question.

Zaro (2019) tested the effects of voluntary disclosures of integrated reports (and GRI reports) on the cost of equity and cost of debt. The author was able to find a reduction in the cost of equity, but just for companies operating in countries with higher levels of enforcement. Zaro's (2019) findings imply that the effects on the cost of capital are country-specific, whereas Barth et al. (2017) and Zhou et al. (2017) suggest that they are firm-specific. One potential explanation is related to the characteristics that lead firms in 'low enforcement' countries to disclose integrated reports voluntarily. If those firms operate in stronger information environments (for example, are cross-listed, larger and with stronger corporate governance), the null results for the cost of capital would also be explained by firm-specific, and not by country-specific characteristics).

Based on the discussion above, the purpose of this paper is to evaluate if Brazilian listed companies, that voluntarily disclosed integrated reports, experienced a reduction in their cost of capital. We focus on Brazilian companies because it provides the largest sample of voluntary disclosures of integrated reports by a country in the 'low enforcement group', according to Zaro's (2019) sample. By controlling the country-specific characteristic, we can test whether firms operating in stronger information environments are more likely to disclose integrated reports. We collect data from 2014 to 2017. We then compare the treatment group with a control group to evaluate if integrated reports led to a reduction in the cost of capital. We apply a propensity score matching procedure in order to identify firms in the control group. Our results indicate that voluntary disclosures of integrated reports are made by firms operating in stronger information environments: firms are larger, with stronger corporate governance and lower risk. Accordingly, in our second stage, we do not see an effect on the capital cost after the disclosure of integrated reports.

We provide a potential explanation for the results presented by Zaro (2019), at least in relation to Brazil, indicating that firm-specific characteristics are relevant to explain the expected benefits of integrating and disclosing financial and non-financial information for countries with 'low enforcement'. We contribute to the literature by showing that the firm's

information environment is relevant, not only for studies focusing on mandatory disclosures but also for voluntary disclosures.

Hypothesis development

The International Integrated Reporting Council was established in 2010 by the Accounting for Sustainability (A4S) project and the Global Reporting Initiative (GRI). The IIRC is the entity responsible for coordinating the implementation of integrated reporting worldwide, intending to create a globally accepted reporting structure that includes financial and non-financial information (e.g., social, environmental and governance) in a clear, concise, consistent and comparable format (A4S & GRI, 2010).

In 2013, the IIRC launched the International Integrated Reporting Framework (<IR> *Framework*) (IIRC, 2013). Since then, according to Baboukardos and Rimmel (2016), the IIRC has achieved considerable support from the economic and business community, in addition to international regulatory bodies and institutions, such as Carbon Disclosure Program (CDP), Financial Accounting Standards Board (FASB), Global Reporting Initiative (GRI), International Accounting Standards Board (IASB), International Public Sector Accounting Standards Board (IPSASB), International Organization for Standardization (ISO) e Sustainability Accounting Standards Board (SASB) (IIRC, 2014).

For Stubbs and Higgins (2018), integrated reporting is the latest reform in corporate reporting. Previous research has identified benefits provided by the implementation of 'integrated thinking' and 'integrated reporting', such as: transforming business processes (Phillips, Watson, & Willis, 2011); the breakdown of operational and reporting silos, resulting in improved systems and processes (Kassai & Carvalho, 2014); improving resource allocation decision making, reducing reputational risk and enabling companies to make better financial and non-financial decisions (Frías-Aceituno et al., 2014).

Integrated reporting would provide a more extensive view of corporate performance than 'traditional' reports, reflecting the organization's access, use, and impact of capitals (financial, material, human, intellectual, social and natural) (Frías-Aceituno, Rodríguez-Ariza, & García-Sanchez, 2013; Garcia-Sanchez & Noguera-Gámez, 2017a, 2017b).

Baboukardos and Rimmel (2016) and Bernardi and Stark (2018) analyzed the adoption of mandatory integrated reporting in South Africa. Their results indicate an increase in the value relevance of earnings, but a decrease in net assets' value-relevance. Barth et al. (2017) considered the capital market and the real effects of mandatory disclosures. Their results indicate positive effects in terms of better investment efficiency, higher operating cash flows and an increase in stock liquidity. Zhou et al. (2017) analyzed the alignment of the integrated reporting with the <IR> Framework for South African companies and found that the level of alignment is associated with more analysts' forecast accuracy and lower dispersion.

Results about the effects of capital cost after the introduction of mandatory disclosure in South Africa indicate that the benefits are concentrated in firms operating in weaker information environments. Barth et al. (2017) do not find any effect on capital cost in their sample or large firms. Zhou et al. (2017) only find a reduction in capital cost for firms with low analyst following. García-Sanchez and Noguera-Gámez (2017a, 2017b) find a reduction in the cost of capital for more leveraged firms, that operate in markets with limited investor protection. In the case of voluntary disclosures, Zaro (2019, p. 12) does not

find consistent results for the cost of debt but can find a negative relation with cost of equity that is "prevalent for companies with high enforcement environments".

The discussion based on the previous literature indicates that firms already operating in stronger information environments were already disclosing information that is now being integrated. One possibility is that analysts and investors were already able to understand the integration between capitals through reports that were not necessarily prepared under an 'integrated' approach. In our paper, we build our expectations based on signalling theory. When applied to corporate reporting, the theory implies that managers use voluntary disclosures to signal better economic-financial performance (Campbell, Shrives, & Bohmbach-Saager, 2001).

Diammond and Verrecchia (1991) and Verrecchia (2001) show that voluntary disclosures can reduce information asymmetry, thus reducing capital cost. Lang and Lundholm (1996) show that higher levels of disclosure are positively related to higher analyst following levels, thus resulting in greater forecast accuracy and lower dispersion. On the other hand, lack of disclosure can be interpreted as a 'bad signal' by the market, bringing negative effects on market value (Consoni, Colauto, & Lima, 2017; Frías-Aceituno, Rodríguez-Ariza, & García-Sanchez, 2014). Based on the discussion above, firms' effects on the capital cost that voluntarily disclose integrated reports would be conditional on the firm's information environment. If firms were already operating in stronger environments, prior literature suggests that the potential effects would be null or mitigated. We present our hypothesis in the alternative form:

H_1 – Brazilian listed companies that voluntarily disclosed integrated reporting experienced a reduction in their capital cost compared to a control group of firms that do not disclose integrated reports.

In the next section, we describe the two-stage methodology implemented in this study.

Methodology

General aspects

In countries like Brazil, firms can choose to voluntarily disclosure integrated reporting according to IIRC standards. Once this choice is endogenous and may depend on firms' characteristics, we use the Propensity Score Matching (PSM) method (Rosenbaum & Rubin, 1985) to obtain comparable firms in terms of the probability of disclosing the integrated reporting. Firms in the treatment group are firms that voluntarily disclosure IR. Firms from the control group with similar probability of voluntarily disclosing IR, except that those firms do not disclose it. Thus, companies with the same propensity score would be comparable, given that they have similar probabilities of being treated (Caliendo & Kopeining, 2008). In this study, we compare changes in the weighted average cost of capital (WACC) of treated firms in the period before and after the IR voluntary disclosure with changes in the WACC for matched firms in the same window.

The procedure for estimating the PSM occurred as follows: first, from estimating the probabilities of receiving the treatment, we create a counterfactual by pairing firms per year regardless of its sector. In this case, the control group could change over time, but the paired companies did not necessarily need to be in the same sector. In a second step, a matching was also carried out per year, but with the condition that each matched firm

belongs to the same sectors from the treated firm. For this case, the control group could change over time, but only within the sector in which the respective treated firm belongs.

The propensity scores were estimated using the logit choice model (Caliendo & Kopeinig, 2008). To minimize the occurrence of weak pairings, we used 0.20 as a calliper pairing, which imposes 0.20 as the maximum tolerance on the distance between two paired observations (Caliendo & Kopeinig, 2008). The pairing was done without replacement; that is, any observation in the control group is paired only with a single treated firm. Finally, to test whether Brazilian listed companies that voluntarily disclosed integrated reporting experienced a reduction in their capital cost, we perform in a second stage a fixed effect panel regression using WACC as the dependent variable.

Equation 1 presents the logistic model applied in the first stage:

$$P[IR_{it} = 1] = \beta_0 + \beta_1 BIG4_{it} + \beta_2 ROE_{it} + \beta_3 ADR_{it} + \beta_4 SIZE_{it} + \beta_5 LEV_{it} + \beta_6 Gover_{it} + \beta_7 Growth_{it} + \beta_8 CTRL_{it} + \varepsilon_{it} \qquad (1)$$

where:
IR_{it} it is a dummy variable set as 1 for a company i that disclose the integrated reporting in year t. Other variables are described in Table 1.

Table 1. Variables used in the logistic model (voluntary disclosure determinants).

Variable	Abbreviation	Definition	Reference
Audited by BIG4	BIG4	dummy variable set as 1 for firms audited by BIG4 and 0, otherwise	Archambault & Archambault, 2003; Frost, Gordon, & Pownall, 2005
Return on Equity	ROE	Net Income/Total Equity	Lang & Lundholm, 1996
Internationalization	ADR	dummy variable set as 1 for companies that issue ADRs and 0, otherwise.	Meek et al. (1995)
Company size	SIZE	Ln(total assets)	Diammond & Verrecchia, 1991; Frías-Aceituno, Rodríguez-Ariza, & García-Sanchez, 2012
Leverage	LEV	Current Liabilities + Non-Current Liabilities / Total Assets	Ahmed and Nicholls (1994)
High Governance	Gover	dummy variable set as 1 for firms listed in some level of Brazilian Stock Exchange and 0, otherwise	Murcia (2009) & Lanzana (2004).
Growth opportunity	Growth	variation of net operating revenue from t-1 to t.	Lopes & Alencar, 2010
Dilution of Share Control	CTRL	dummy variable set as 1 for firms with diluted control and 0, otherwise	Depoers (2000) & Alencar (2007)

Source: Author's own elaboration.

Population and sample
The population subject to this analysis is divided into two groups: the treatment group comprises companies listed in B3 (Brasil, Bolsa, Balcão) that disclose the integrated reporting or partially adopt the IIRC guidelines; firms that do not disclose IR form the non-treatment group. These firms are used in a first stage to obtain the control group (matched firms with similar probability of being treated). Data comes from B3, firms' website and Economática. Firms listed in the "Report or Explain for Sustainable Development Goals (SDG)" were identified on B3 website, with updated data until 10.19.2018. Information about IR was also consulted on firms' websites that range from 2014 to 2017.

To obtain information on the alignment of the companies' reports with the IIRC guidelines, the content analysis technique is used to know the narrative of the "About the

Report" section of the treatment group. According to Bardin (2011, p.44) "content analysis appears as a set of communication analysis techniques that uses systematic and objective procedures to describe the content of messages". Thus, in the companies' reports, the following terminologies are considered: integrated reporting, sustainability report, annual report, integrated annual report, or even annual and sustainability report. Companies that produce these reports are part of the treatment group, even those with a different name from the integrated report, but that present in their narratives, notably in the section mentioned above, the search for alignment with the guidelines proposed by the IIRC. Names of such firms are presented in Table 2.

Table 2. Brazilian companies adopting the integrated reporting from 2014 to 2017.

Nº	COMPANY	SEGMENT	2014	2015	2016	2017
1	AES Tietê S.A.	Electric Power	X	X	X	X
2	B2W-Companhia Digital	Various Trade-Products				X
3	Banco do Brasil S.A.	Financial Intermediaries-Banks	X	X	X	X
4	BNDES	Services Finan. Divs.- Investment and Resource Management	X	X	X	X
5	Bradesco S.A.	Financial Intermediaries-Banks		X	X	X
6	Braskem	Petrochemical				X
7	BRF S.A.	Processed Foods-Meat and Meat Products	X	X	X	X
8	CCR S.A.	Transportation	X	X	X	X
9	CEMIG Distribuição S.A.	Electric Power			X	X
10	Centrais Eletr.Bras.S.A.-ELETROBRÁS	Electric Power				X
11	Centrais Eletr.de Santa Catarina	Electric Power			X	X
12	COPEL	Electric Power			X	X
13	CPFL Energia	Electric Power	X	X	X	X
14	CTEEP-Cia.Transmissão Energia Elétrica Paulista	Electric Power				X
15	Duratex	Timber		X	X	X
16	ECORODOVIAS	Transportation-Exploration of Highways		X	X	X
17	EDP-Energias do Brasil S.A.	Electric Power			X	X
18	Eletrobrás Participações S.A. - ELETROPAR	Electric Power				X
19	Eletropaulo Metrop.-Eletr.São Paulo S.A.	Electric Power	X	X	X	X
20	Engie Brasil Energia S.A.	Electric Power		X	X	X
21	FibriaCelulose S.A.	Cellulose	X	X	X	X
22	Gerdau	Steel and Metallurgy			X	X
23	Grupo Segurador BB e Mapfre	Insurance				X
24	Itaú Unibanco	Financial Intermediaries-Banks	X	X	X	X
25	Light S.A.	Electric Power			X	X
26	Lojas Americanas S.A.	Various Trade-Products				X
27	Lojas Renner S.A.	Retail-Fabrics, Clothing and Footwear		X	X	X
28	M.Dias Branco S.A.-Ind.Com.de Alimentos	Processed Foods- Miscellaneous Foods		X	X	X
29	Natura	Personal articles	X	X	X	X
30	Petrobrás S.A.	Oil, Gas and Biofuels		X	X	X
31	Santander S.A.	Financial Intermediaries-Banks	X	X	X	X
32	Sonae Sierra Brasil S.A.	Financial and Other-Property Explorer	X	X	X	X
33	SUZANO Papel e Celulose S.A.	Paper And Cellulose	X	X	X	X
34	Telefônica Brasil S.A.	Telecommunications		X	X	X
35	TOTVS	Programs and Services		X	X	X
36	Votorantim Cimentos	Industry	X	X	X	X
37	WEG S.A.	Machines and equipment		X	X	X
	TOTAL		**14**	**24**	**30**	**37**

Source: Author's own elaboration according to data extracted from the B3 website-Brasil, Bolsa, Balcão (B3, 2018).

Results in Table 2 show an increase in the number of companies that disclose IR on time. Since each firm's first disclosure year varies across firms, we included in the econometric model a dummy variable set as 1 for the first year that a firm discloses the IR to capture the signal effect of the IR voluntary disclosure.

Table 3 presents details about the sample used in the PSM first stage. Such sample includes firms from the treatment group (companies that adopt Integrated Reporting or partially follow IIRC guidelines) and firms from the non-treatment group (other companies). In the end, 778 firm-year observations were used in the first stage.

Table 3. Selection of the research sample

Definition	Amount
The number of initial observations of this research from 2010 to 2017 was extracted from the Economática® database.	5,240
(-) Loss of observations of companies with negative equity and total assets or without information	374
(-) Loss of company observations without information for Beta 60 months	40
(-) Loss of observations due to lack of accounting information ("missing values")	4,048
(=) Final sample after deductions and before PSM	778

Source: Author's own elaboration, from data extracted from Economática®.

Empirical model

To test whether Brazilian listed companies that voluntarily disclosed integrated reporting experienced a reduction in their cost of capital, we perform in a second stage a fixed effect panel regression using WACC as the dependent variable, based on adaptations in the models of Alencar (2005, 2007), Zhou et al. (2017) and García-Sanchez and Noguera-Gámez (2017a, 2017b):

$$WACC_{it} = \beta_0 + \beta_1 + \beta_2 Treat_i + \beta_3 Post\ IR_{it} + \beta_4 Treat_i * Post\ IR_{it} + Controls_{it} + \varepsilon_{it} \qquad (2)$$

First Year$_{it}$ is a dummy variable set as 1 for the year that firm i in the treatment group disclose IR, Treat$_i$ is a dummy variable set as 1 for firms in the treatment group and 0 for firms in the control group, and Post IR$_{it}$ represents a dummy variable set as 1 for years after the IR disclosure for both firms in the treatment group and its respective counterfactual. Firms in the treatment group are firms that voluntarily disclosure IR. The control group, obtained in the first stage described by equation 1, is formed by firms with similar probability of voluntarily disclosing IR, except that those firms do not disclose it.

We also perform other specifications of model 2 by first looking at a first-year-ahead t+1 analysis that controls for heterogeneity in year t, then by a first-year-ahead t+1 analysis that controls for heterogeneity in year t+1, and at last by considering the change in WACC from t to t-1 that controls for heterogeneity in year t+1, as follows:

$$WACC_{it+1} = \beta_0 + \beta_1 + \beta_2 Treat_i + \beta_3 Post\ IR_{it} + \beta_4 Treat_i * Post\ IR_{it} + Controls_{it} + \varepsilon_{it}$$

$$WACC_{it+1} = \beta_0 + \beta_1 F_{it} + \beta_2 Treat_i + \beta_3 Post\ IR_{it} + \beta_4 Treat_i * Post\ IR_{it} + Controls_{it+1} + \varepsilon_{it+1}$$

$$\Delta WACC_{it+1} = \beta_0 + \beta_1 + \beta_2 Treat_i + \beta_3 Post\ IR_{it} + \beta_4 Treat_i * Post\ IR_{it} + Controls_{it+1} + \varepsilon_{it+1}$$

Where:
  WACC$_{it}$ represents the weighted average cost of capital of company *i* in year *t*.
  ΔWACC$_{it+1}$ account for the change in the weighted average cost of capital of company i from *t* to *t+1*.

The coefficients β_1 and β_4 indicate that the disclosure of the integrated reporting has on the weighted average cost of capital (WACC). Specifically, the coefficient β_1 shows a change in cost of capital in the year that a firm discloses the IR, and β_4 shows if the IR disclosure reduces/increases the cost of capital in the years following the disclosure. According to hypothesis H1, we expect negative coefficients for β_1 and β_4. In other words, we expect that Brazilian listed companies that voluntarily disclosed integrated reporting experienced a reduction in their cost of capital.

Control variables

Despite PSM advantage in obtaining companies with similar probabilities of being treated, firms can be different across other covariates that affect the cost of capital. To control for heterogeneity among firms, we included a set of control variables presented in Table 4.

Table 4. Summary of variables used to explain the influence of Integrated Reporting disclosure on companies' cost of capital

Variable	Description	Literature	Expected Relationship	Source
Size (SIZE)	$Ln(Total\ assets)$	Chen, Wei, and Chen (2003); Alencar (2005 and 2007); Rover et al.(2012)	(-)	Economática®
Total Liabilities (IND)	$\dfrac{Total\ Liabilities}{Total\ Assets}$	Baboukardos and Rimmel (2016); Bernardi e Stark (2018)	(+)	Economática®
Profitability (ROE)	$\dfrac{Net\ Income}{Book\ Value\ of\ Equity}$	Frías-Aceituno, et al. (2013): Baboukardos and Rimmel (2016)	(-)	Economática®
Market-to-Book (Mkb)	$\dfrac{Market\ Value\ of\ Equity}{Book\ Value\ of\ Equity}$	Frías-Aceituno et al. (2013); Pavlopoulos, Magnis, & Iatridis (2017)	(-)	Economática®
Degree of Financial Leverage (DFL)	$\dfrac{ROE}{ROA}$	Zhou et al. (2017); Barth et al.(2017)	(+)	Economática®
High Governance (GOVER)	Dummy variable set as 1 for firms listed at B3 corporate governance levels (Level 1, 2, Novo Mercado and BovespaMais) and 0, otherwise.	Pavlopoulos et al.(2017); Barth et al.(2017)	(-)	B3 website
Capital Market Performance (Q de TOBIN)	$\dfrac{Market\ Value + PC + PELP}{Total\ Assets}$	Assaf (2014); Lee and Yeo (2016); Barth et al. (2017)	(-)	Economática®
Beta	Company non-diversifiable (systematic) risk	Botosan and Plumlee (2002); Chen et al.(2003)	(+)	Economática®

Source: Author's own elaboration according to research data.

Data analysis

Results of descriptive statistics

Table 5 presents the dependent variable's descriptive statistics and the independent and control variables for firm-year observations before the first stage (778 firm-year observations). To minimize the possible effects on the results caused by the presence of outliers in the sample, variables were winsorized at 2.5% in each tail of the distribution.

Table 5. Descriptive statistics

Variables	N°of Obs.	Mean	Median	Standard deviation	1st Quartile	3rd Quartile
WACC	778	0.18	0.17	0.10	0.13	0.21
IR	778	0.20	0.00	0.40	0.00	0.00
First Year	778	0.03	0.00	0.16	0.00	0.00
Post IR	778	0.11	0.00	0.31	0.00	0.00
SIZE	778	15.51	15.43	1.53	14.63	16.45
IND	778	0.58	0.57	0.17	0.47	0.69
ROE	778	-0.01	0.10	1.06	0.03	0.19
MKB	778	2.29	1.44	3.59	0.79	2.59
DFL	778	4.52	1.80	16.30	1.35	2.63
GOVER	778	0.65	1.00	0.48	0.00	1.00
TOBIN'S Q	778	1.42	1.16	0.89	0.92	1.60
BETA	778	0.72	0.68	0.45	0.40	0.98

Source: Author's own elaboration.

The weighted average cost of capital (WACC) of Brazilian firms in the sample is around 18%. Moreover, a greater proportion of companies do not disclose the integrated report, probably due to the publication of the <IR> Framework being incipient and because it is not mandatory reporting for companies listed on B3. On average, 20% of the firm-years in the sample already report their results following the IIRC's guiding principles for the preparation of the integrated reporting at least one time, and only 3% of the sample represents the first year of the IR disclosure.

Comparing firms before the IR disclosure

Table 6 shows mean difference t-tests that compare treatment and non-treatment firms in the periods that range from 2010 to 2013, just before the release of the IF Framework. Using samples before the PSM application, we intend to show a substantial difference in firms that voluntarily disclose IR even in the years before releasing the IR Framework. In this case, initial evidence would suggest that the disclosure of IR and firms' characteristic could perform an endogenous relation, which is a requirement for the PSM implementation.

The results of Table 6 show that firms that disclose and do not disclose the IR were on average different in terms of cost of capital, size, governance and beta, with 90% confidence level for the WACC and 99% for the others variables, respectively. The results suggest that that voluntary disclosure is related to larger and stronger corporate governance firms and lower risk, i.e., that operate in a stronger information environment.

Table 6. Mean difference t-test between companies that disclose and do not disclose the integrated reporting

Comparison between companies that do not disclose IR and those that disclose it, considering the period from 2010 to 2013 (before the release of the <IR> Framework).

Variable	Firms that do not disclose IR		Firms that disclose IR		Difference of Means	
	Mean (A)	Standard Deviation	Mean (B)	Standard Deviation	A-B	P-value
WACC	0.182	0.096	0.162	0.061	0.020*	0.0865
Size	15.037	1.331	16.836	1.366	-1.799***	0.0000
Total Liabilities	0.582	0.159	0.564	0.146	0.017	0.3878
Profitability (ROE)	-0.033	1.271	0.153	0.114	-0.187	0.2038
Market-to-Book (Mkb)	2.431	3.928	3.179	3.433	-0.747	0.1331

Degree of Financ. Lev. (DFL)	5.036	18.708	1.940	0.723	3.096	0.1532
High Governance (GOVER)	0.567	0.496	0.786	0.412	-0.219***	0.0005
TOBIN'S Q	1.508	1.039	1.687	0.975	-0.179	0.1780
BETA	0.858	0.459	0.708	0.374	0.149***	0.0095

Note: ***, ** and * indicate that the difference between the means is statistically significant at the levels of 1%, 5% and 10% significance level, respectively. *Source:* Author's own elaboration

Results of the regression model after propensity score matching

Table 7 presents the four specifications of the model used in the second stage (equation 2), both estimated using a panel regression with fixed effects for firms and year. Panel A and B use samples that were selected differently in the first stage. Panel A compares treatment firms with counterfactual firms obtained by pairing firms per year regardless of their sector. In this case, the control group could change over time, but the paired companies did not necessarily need to be in the same sector. Panel B compares treatment firms with counterfactual firms obtained by pairing firms per year, but with the condition that each matched firm belongs to the same sectors from the treated firm. For this case, the control group could change over time, but only within the sector in which the respective treated firm belongs.

Results of Panels A and B in Table 7 show that firms that voluntarily disclose the integrated reporting in Brazil did not experience significant changes in the weighted average cost of capital in the first year of the IR disclosure and the years that follow the first voluntary disclosure. This result is consistent with Zaro (2019) general findings that voluntary disclosures of integrated reports reduce the cost of equity and cost of debt just for companies operating in countries with higher enforcement levels. However, Zaro's (2019) findings imply that the effects on the cost of capital are country-specific, whereas other results as in Barth et al. (2017) and Zhou et al. (2017) suggest that they are firm-specific. Specifically, Zhou, Simnett and Green (2017) find a reduction in the cost of capital for South Africa firms, but only for firms with 'low analyst following', while Barth et al. (2017) do not find an effect on the cost of capital in a sample of large firms.

Table 7. Effect of integrated reporting voluntary disclosure on the cost of capital

Panel A: This Panel compares treatment firms with counterfactual firms obtained by pairing firms per year regardless of their sector. In this case, the control group could change over time, but the paired companies did not necessarily need to be in the same sector. The first stage provides 229 firm-year matched observations. The R-sq (within) of specifications 1, 2, 3 and 4 are, respectively, 0.1334, 0.1745, 0.1026 and 0.0497

	Specification 1	*Specification 2*	*Specification 3*	*Specification 4*
Variables	*Coefficients*	*Coefficients*	*Coefficients*	*Coefficients*
First Year IR	0.00395	0.02084*	0.01977	0.00315
*Treat * Post IR*	0.00124	-0.00025	-0.00722	0.00781
SIZE	0.02561*	0.06009***	0.04526**	0.00842
IND	0.08843	0.08614	0.00614	0.09194
ROE	-0.01775	-0.21889	-0.03118	-0.01183
MKB	0.00322	0.00147	0.00398	0.00070
DFL	-0.00094*	-0.00072**	0.00030	0.00014
TOBIN'S Q	-0.00097	0.02431**	0.00135	0.03501*
BETA	0.06437***	0.07626***	0.05869***	0.02660
Constant	-0.34809	-0.95589***	-0.62746*	-0.26892

Panel B: compares treatment firms with counterfactual firms obtained by pairing firms per year, but with the condition that each matched firm belongs to the same sectors from the treated firm. For this case, the control group could change over time, but only within the sector in which the respective treated firm belongs. The first stage provides 218 firm-year matched observations. The R-sq (within) of specifications 1, 2, 3 and 4 are, respectively, 0.1439, 0.1976, 0.2068 and 0.1117.

	Specification 1	*Specification 2*	*Specification 3*	*Specification 4*
Variables	*Coefficients*	*Coefficients*	*Coefficients*	*Coefficients*
First Year	0.00160	0.02520*	0.02555*	0.01091
*Treat * Post IR*	0.00006	0.00062	-0.01071	0.01250
SIZE	0.01508	0.52051**	0.03857*	0.00374
IND	0.05228	0.05839	0.02840	-0.02487
ROE	-0.01199	-0.10756	-0.10890***	-0.18148***
MKB	-0.00047	0.00462	0.00656	0.01925***
DFL	-0.00078**	-0.00090**	-0.00022	-0.00080**
TOBIN'S Q	-0.00096	0.02003**	-0.00981	-0.01057
BETA	0.05349***	0.30866	0.04956***	-0.00752
Constant	-0.14067	-0.77278*	-0.50297	-0.05226

Note: ***, ** and * indicate coefficients significant at the significance levels of 1%, 5% and 10%, respectively. *Source:* Author's own elaboration

Based on our results, we argue that the insignificant effect of voluntary disclosure on cost of capital in low enforcement countries as Brazil could rely on the characteristics that lead firms in 'low enforcement' countries to disclose integrated reports voluntarily, and not necessarily on the country characteristics. In other words, if those firms operate in stronger information environments (for example, are cross-listed, larger and with stronger corporate governance), the null results for the cost of capital would also be explained by firm-specific, and not by country-specific characteristics).

As results in Table 6 indicate that firms that voluntarily disclose IR are larger and have stronger corporate governance and lower risk, i.e., that operate in a stronger information environment, our results are aligned with prior studies focused on mandatory disclosures that the firm's information environment is relevant to explain the potential capital market benefits of Integrated Reporting. In this case, we provide an alternative explanation for the results presented by Zaro (2019) in relation to Brazil, indicating that firm-specific characteristics are relevant to explain the expected benefits of integrating and disclosing financial and non-financial information for countries with 'low enforcement'. We contribute to the literature showing that the firm's information environment is relevant not only for studies focusing on mandatory disclosures but also for voluntary disclosures.

Conclusion

In this study, we investigate whether Brazilian listed companies that voluntarily disclosed integrated reporting experienced a reduction in their capital cost. Empirical evidence mostly focused on South African mandatory disclosures, indicates that the firm's information environment is relevant to explain the effects on capital cost. However, results based on voluntary disclosures indicate that the country's level of enforcement explains these effects.

This paper provides an alternative explanation for the null results in low enforcement countries presented in the voluntary disclosure literature. Specifically, the insignificant effect of voluntary disclosure on capital cost in low enforcement countries as Brazil could rely on the characteristics that lead firms in 'low enforcement' countries to voluntarily disclose integrated reports, not necessarily on the country characteristics. In other words, if

those firms operate in stronger information environments, the null results for the cost of capital would also be explained by firm-specific, and not by country-specific characteristics.

Indeed, our results indicate that voluntary disclosures of integrated reports are made by firms operating in stronger information environments: firms are larger, with stronger corporate governance and lower risk. Moreover, we find that Brazilian firms that voluntarily disclose the integrated reporting do not affect the cost of capital after the disclosure of integrated reports. Taken together, our results are aligned with prior studies focused on mandatory disclosures that the firm's information environment is relevant to explain the potential capital market benefits of Integrated Reporting.

This alternative explanation suggests that research investigating the signalling effects of integrated reports voluntary disclosure may consider country-specific characteristics and how asymmetric is the environment of each firm. In this case, the effects of voluntary disclosures do not necessarily mimic those from mandatory disclosures because firms may act strategically and according to their own characteristics.

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