

Investor relations and information asymmetry^{*,**}

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ABSTRACT

Companies invest significant volumes of resources in investor relations (IR) departments. The professionals working in the IR department are responsible for communication between the company and the market, so that the information generated is widely disseminated and understood by investors. In this context, this research aims to investigate whether there is evidence that the IR activity decreases information asymmetry between the company and the market. Specifically, we evaluate the hypothesis that Brazilian companies with IR websites classified as more informative have a reduced bid-ask spread (proxy for asymmetry). Therefore, this paper classifies the informative content from IR websites of Brazilian companies for the years 2013 and 2014 and relates the outcomes obtained with information asymmetry metrics. Initially, the estimation considers the pooled ordinary least squares (POLS) model and, at a second moment, in order to mitigate potential endogeneity problems, the pooled two-stage least squares (2SLS) model is used. The results indicate that more informative IR websites are able to decrease the bid-ask spread of Brazilian listed companies. This finding strongly encourages companies to provide information to stakeholders on well-structured IR websites of their own.

Keywords: investor relations (IR), bid-ask spread, Brazilian capital market, financial information, information asymmetry.

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1. INTRODUCTION

Investor relations (IR) departments are responsible for communication between the company and the market (Marston, 1996). They work, not necessarily, by increasing information content, but improving information flow from the company to the market and from the market to the company (Bollen, Hassink & Bozic, 2006). Considering the above, IR is believed to help companies to reduce the problems stemming from information asymmetry, since greater access to information improves the monitoring process in organizations. Also, with greater access to company information, previously uninformed investors can assess more accurately company performance, reducing the likelihood of making mistakes in bond pricing. Periodic meetings with investors may be cited as examples of IR departments, in which specific questions about company figures can be addressed, as well as operational data (e.g. sales volume, production capacity) that are not required by regulatory bodies.

It is also noticed that in highly asymmetric environments, less informed investors mitigate uncertainty, decreasing the purchase price and/or increasing the selling price of bonds traded (Verrecchia, 2001; Welker, 1995), something which, in turn, reduces the possibility of trading, increasing the difference between supply and demand, and this is reflected in the bid-ask spread (Copeland & Galai, 1983). So, the motivation of this study lies on the fact that IR activities are capable of affecting information asymmetry, changing the behavior of uninformed investors (Chang, D'anna, Watson & Wee, 2008). In this context, facilitating access to company information reduces the risk of private information trading, attracting investors and increasing the amount of stocks traded (Brown & Hillegeist, 2007).

International studies point out that IR activities are able to decrease the risk associated with information asymmetry, increase share liquidity, decrease the cost of equity (Agarwal, Liao, Nash, Taffler & Taffler, 2008), improve visibility so that the company's shareholder base is widened, analyst and media coverage (Bushee & Miller, 2012), and increase accuracy and concordance in analysts'

forecasts, leading to a reduced cost of capital and increased share prices (Brennan & Tamarowski, 2000). However, in the case of Brazilian companies, the literature lacks papers that investigate the effects of IR programs as a whole.

In view of the above, this research aimed to investigate whether actions taken by the IR area can reduce information asymmetry between company and investors in the Brazilian capital market. Specifically, we evaluate the hypothesis that companies with IR websites classified as more informative have a reduced bid-ask spread. To do this, we initially estimated regressions by means of pooled OLS and, at a second moment, aiming to mitigate potential endogeneity problems, we adopted the estimator pooled 2SLS.

In the results, a negative correlation between the disclosure level in IR websites and the bid-ask spread is observed. In addition, evidence suggests that among the six categories making up the IR website's information checklist, the greater disclosure of press releases and other financial information services and availability of resources such as video/audio recording and online participation in meetings are factors that have statistical significance, and they are negatively correlated with the bid-ask spread.

The results found corroborate the papers by Agarwal et al. (2008), Brown and Hillegeist (2007), Healy, Hutton and Palepu (1999), Heflin, Shaw and Wild (2005), and Welker (1995). However, this group of studies was mainly based on disclosure indices that do not consider the isolated effect of financial information as performed by this study. Therefore, it is believed that the results found supplement in the literature on IR, since it shows that the dissemination of financial information is the activity that most contributes to reduce information asymmetry between the IR activities that were investigated.

The remainder of this paper is organized into four sections. We present the literature review in the second section. Section 3 consists of methodology, database, variables used, and empirical model. Section 4 discusses the results obtained and section 5 concludes the research.

2. LITERATURE REVIEW

This section presents the studies on which this research is based. The first subsection includes specific IR studies and the second presents the main references regarding the relationship between information asymmetry and bid-ask spread.

2.1 Investor Relations

Marston (1996) defines IR as the link between listed companies and agents in the global financial community, providing information that helps assessing the company. Traditionally, IR functions cover activities such as planning and executing routine and occasional disclosure of information, coordinating meetings and other services to shareholders, conducting public and individual meetings with analysts, shareholders, and potential investors, and continuously evaluating market responses to the company's performance (Instituto Brasileiro de Relações com Investidores [IBRI], 2008). Moreover, IR has been regarded as an important area in corporate marketing strategies to define the organization's image (Dolphin, 2004).

In 2014, Brazilian companies already had exclusive IR departments (90%), formally constituted for more than seven years (33%), which annually consumed resources ranging from 500,000 to 1,000,000 reais in communication, publication, advertising, and services provided by third parties (20%) (Instituto Brasileiro de Relações com Investidores [IBRI] & Fundação Instituto de Pesquisas Contábeis, Atuariais e Financeiras [FIPECAFI], 2015). The IR departments in Brazil are large when compared in world terms. Brazilian companies have a larger number of IR professionals, with an average of 2.8, as well as support staff professionals, with an average of 2.1, higher than the global average of 2.1 IR professionals and 1.1 support staff professionals (Bank of New York Mellon, 2015). In addition, the profile outlined by the 2015 IBRI & FIPECAFI survey shows that professionals working in the IR area are mostly aged between 30 and 50 years (58%), they accumulate five or more years of experience in the area (39%), they completed undergraduate (33%) and graduate courses (40%) in administration, whose wages vary between more than R\$ 26,000 to directors and R\$ 2,500 to junior analysts.

Within the academic community, there is an increasing interest in pointing out the benefits generated by IR activities. Brennan and Tamarowski (2000) concluded that IR activities are capable of increasing the number of

analysts who cover a company, improving the accuracy and concordance of forecasts. Moreover, the survey revealed that the number of analysts is associated with greater liquidity of stocks traded, reduced shareholders' cost of capital, and increased share prices. Agarwal et al. (2008) found that companies awarded Best IR Programs were able to reduce asymmetric information, leading to lower transaction costs and consequent increases in turnover. The results also showed that small winning companies obtained a significant increase in the liquidity of their stocks.

Bushee and Miller (2012) analyzed the post-hiring effects of an IR agency specialized in small and medium-sized businesses, seen as less visible, noticing significant improvements in visibility, widened shareholder base, analyst and media coverage. In contrast, Kirk and Vincent (2014) investigated the effects of internally investing in IR by hiring a member of the National Investor Relations Institute [NIRI]. As a result, companies that initiated an IR program internally had a significant increase in voluntary disclosure, analyst coverage, and number of institutional investors, improving share liquidity and market valuation.

Specifically regarding the use of websites for IR, Chang et al. (2008) found that Australian companies with websites having more information available showed greater analyst coverage, higher proportions of institutional investors, market capitalization, and trading volume. Chang, Hooi e Wee (2014) have shown the importance of active communication with analysts, especially in times of uncertainty, finding that disclosure by Australian companies on the internet correlate positively with accuracy of analysts' forecasts, in a scenario dominated by small companies with limited analyst coverage. Another advantage of using websites to disseminate information is the increased market value of companies, as shown by Ferreira (2012), which evidenced an average 19% increase in market value after the launch of a website for disclose information, when compared to companies that did not do so. Likewise, Garay, González, Guzmán and Trujillo (2013) found a strong positive correlation between the corporate disclosure level, on IR websites of companies listed in Argentina, Brazil, Chile, Colombia, Mexico, and Peru, and the company's value.

Corroborating the above, the world's fourth largest audit firm, Ernst & Young, conducted, in 2013, an international research with 163 institutional investors from six continents, where 89% of respondents reported

using non-financial information in at least one investment decision per year. Specifically, 54.2% of the investors interviewed see corporate websites as a source of relevant information in investment decision-making, only behind annual reports and integrated reports. Also, the benefits related to new ways of disseminating information through the internet have been observed by recent studies, as shown by Blankespoor, Miller e White (2014), who investigated the use of Twitter to divulge information to investors and other stakeholders, noticing that tweets during the period of profit/loss announcement were able to reduce information asymmetry, especially for less visible companies, and Yoo, Zo and Ciganek (2011), who identified a negative correlation between the adoption of XBRL by Korean companies and information asymmetry between these companies and the capital market.

Some studies were concerned with verifying which corporate features are capable of influencing the disclosure level of IR. Marston (1996), in a seminal research, identified a positive correlation between IR, firm size, and company stock listing on foreign stock exchanges. Mendes-da-Silva and Onusic (2014) found that larger and newly listed companies, as well as those recognized for adopting best governance practices (as required by the New Market) provided more corporate information on their websites. Likewise, Lundholm, Rogo and Zhang (2014) found that foreign companies listed on the U.S. stock exchange require more from their IR departments, providing more information and producing clearer texts in their reports. Basuony and Mohamed (2014), analyzing the determinants of voluntary disclosure of financial information on the internet by companies listed in Saudi Arabia and Oman, identified that company size is the main influence factor for disclosure. Mendes-Da-Silva and Magalhães (2005) found a positive relation between the size of Brazilian companies and the amount of financial information disclosed in corporate websites and a negative relation between the return on stocks and the amount of information. In addition, Mendes-da-Silva, Ferraz-Andrade, Famá and Maluf (2009) found that greater disclosure is associated with large companies, higher return on stocks, those that adhere to one level of differential corporate governance (New Market, Level 1 and 2), the most leveraged companies, and the categories of corporate information more required by brokerage firms and rating agencies. On the other hand, Hoffmann, Tutic and Wies (2011) found that companies with greater educational diversity of IR professionals showed more information on their IR websites and less intense activism on the part of shareholders.

It is noticed that the expansion of internet use has allowed the democratization of access to corporate information useful to the market, expanding the IR activity through interactive communication tools (chat and online participation in meetings), something which, in turn, helps the company to enhance investor perceptions, as well as it minimizes disagreement with its internal policies (Brown & Hellegeist, 2007). However, one of the difficulties found in the dissemination literature is measuring the information provided by companies on the internet. Some initial efforts to measure the content available online by companies can be seen in Deller, Stubenrath and Weber (1999), Geerings, Bollen and Hassink (2003), and Hedlin (1999). Hedlin (1999) investigated, through content analysis, what the companies advertise on their IR websites, proposing a three-stage model of internet disclosure: (i) it refers to presence on the internet; (ii) the internet is used to provide information beyond those mandatory ones; (iii) it comprises the advantages the internet offers, regarding the way information can be presented to the user. At the same time, Deller et al. (1999) conducted a detailed evaluation of items offered by listed companies on their IR websites in the USA, the UK, and Germany, and the authors were concerned about considering the new communication forms offered by the internet. The authors examined, for each company in the sample, the availability of these items: mandatory financial statements; historical series of financial statements, data in processable format, internal search engines and cookies; press releases and other information services; direct contact via email and direct marketing; recording of meetings, online participation, and links to external information.

The results showed that, in the USA, IR activities through the internet were more common (91% of the companies) and offered more resources, when compared to the other two countries, and that although the internet offered a variety of possibilities for communicating with investors (e.g. audio and video resources), it was only used partially in the three countries.

In a later study, Geerings et al. (2003), aiming to expand the results on online dissemination practices, changed the model by Hedlin (1999), incorporating five categories based on the characteristics previously investigated by Deller et al. (1999), in order to cover a larger number of items. The main change in Hedlin's model concerns the third stage, which was divided into three categories, as Table 1 illustrates. The authors concluded that most Euronext companies were at the second stage of internet use for IR activities and that larger companies (based on market capitalization), on average, provided more

information (18 to 29 items) when compared to smaller companies (14 items). Furthermore, leading companies

in France and the Netherlands were either at the third phase or ready to move into it.

Table 1 *Categories of information disclosed on the internet*

Stage	Category	Item description
I	1 – Presence on the internet with reports and other financial information	Balance sheet; statement of results; notes; statement of cash flows; preliminary reports; environmental and/or social reports; reports from previous years; historical series of financial data; accounting data.
II	2 – Communication of information to investors	Press releases; financial calendar; current share price; organizational structure; external links; information update.
III	3 – Advantages of internet presentation	Accounting data in hyperlink; corporate reports in PDF format; financial data in <i>Excel</i> ; corporate reports in XBRL format; option for language change; internal search engine; cookies.
	4 – Direct contact via email and direct marketing	E-mail from the investor relations department; direct marketing; frequently asked questions and answers; order online information service.
	5 – Video/audio and online participation	Video/audio recording of meetings; online participation in meetings.

Source: *Adapted from Geerings et al. (2003).*

Thus, this paper contributes to the dissemination literature, increasing the amount of measures for IR activity on the internet. More details will be discussed in the methodology section.

2.2 Information Asymmetry and Bid-Ask Spread

Information asymmetry occurs when some economic agents have more information than others. As a consequence, uninformed investors negotiate with informed investors, generating problems related to adverse selection (Akerlof, 1970) and/or moral hazard (Jensen & Meckling, 1976). In order to mitigate the risk of such trading, uninformed investors reduce the price they are willing to pay for a bond and/or raise the price asked to sell it (Verrecchia, 2001; Welker, 1995), widening the gap

between offer and demand prices of the company's stocks, named as bid-ask spread.

Empirical studies conducted since the 1960s indicate the relation of the bid-ask spread, or simply spread, with liquidity in the trading of stocks and with information received by the market. The first analyses on the determinants of the bid-ask spread in the bond market followed the seminal article by Demsetz (1968). According to the author, spread may be defined as the difference between the lowest selling offer (ask) and the highest purchase offer (bid) immediately prior to trading. However, in order to mitigate problems caused by bid-ask bounce, as sometimes there are changes in quoted bid and ask that are quickly reversed, the midpoint spread is used in calculation (Aitken & Frino, 1996). Thus, the difference between them may be expressed as:

$$S_t = \frac{P_t^a - P_t^b}{Pm_t}$$

1

knowing that

$$Pm_t = \frac{P_t^a + P_t^b}{2}$$

2

where: P_t^a = ask quoted in time period t ; P_t^b = bid quoted in time period t ; Pm_t = midpoint spread in time period t ; S_t = bid-ask spread in time period t .

It is worth noticing that studies conducted since the 1990s started calculating spread in intraday (from quote to quote). The main justification for this methodology is the objective of analyses, which focused on intraday volume patterns of spread (Fleming, 1997; Lee, Mucklow & Ready, 1993; Mcinish & Wood, 1992) and liquidity calculation (Chakravarty & Sarkar, 1999; Fleming, 2003; Fleming & Sarkar, 1999). However, many samples, especially those with long-term databases, have included only daily data or data observed at long time intervals (Hasbrouck, 2007).

The pioneering study by Demsetz (1968) focused much more on liquidity and trading costs in stock markets than on information influence over spread. Further research, though, tried to deepen knowledge on the relation of this measure with the components of information asymmetry.

One of the first references of information influence on market equilibrium prices consisted in the paper written by Copeland (1979), where the author commented on the expectation of increasing spreads in face of price uncertainty, also noticing the influence of financial volumes traded according to this metrics.

Complementarily, Copeland and Galai (1983) used the combination of purchase and sale options and the role played by the market maker to demonstrate information influence on the bid-ask spread. According to the authors, the market maker seeks to maximize the bid-ask spread difference between two investor classes: one motivated by liquidity and another motivated by information. In addition, the study showed that spread correlates negatively with the market competition degree.

Glosten and Milgrom (1985) argue that spread may

be due to the costs of adverse selection arising from the information asymmetry existing between market participants, since the presence of privileged traders promotes a positive bid-ask spread, even when the market makers are risk neutral and have zero profit expectation. In the same line, Glosten (1987) created the model for calculating the bid-ask spread that captures the adverse selection component. According to the author, spread is divided into two components: one due to monopoly power, loading cost, and custody cost, and another due to information asymmetry, which is capable of generating advantages to informed traders.

Stoll (1989) states that three costs must be considered as embedded in the spreads to which traders are subject: order processing cost, asset storage cost, and adverse selection cost (information asymmetry component). By using daily NASDAQ/NMS data on share price and spreads, Stoll (1989) concludes that, on average, order processing cost represents 47% of the spread, the cost of holding assets, 10%, and what refers to the information asymmetry component represents 43% of the total cost.

Other proxies have been used in research to estimate information asymmetry: probability of insider trading (PIN), stock market liquidity, and bond volatility. There is evidence that suggests bid-ask spread as the measure of information asymmetry most frequently used in academic research (Girão & Machado, 2013). Due to its measurement characteristic, bid-ask spread reflects uncertainty about the asset's value and the greater uncertainty, the greater information asymmetry between parties in a negotiation. Finally, we can see, based on the studies presented herein (Copeland, 1979; Copeland & Galai, 1983; Glosten, 1987; Glosten & Milgrom, 1985; Stoll, 1989), that bid-ask spread is an adequate proxy for information asymmetry.

3. METHODOLOGY

This paper is a quantitative research with panel data. The information used refer to 2013 and 2014 and they were analyzed using the regression models pooled OLS and pooled 2SLS. The sample was selected from all companies classified as active on the Brazilian Securities, Commodities, and Futures Exchange (BM&FBOVESPA)

within these periods. Companies from the financial or insurance sector were removed, due to their differential capital structures, as well as companies that did not have data required to operationalize the explanatory variables used in the regressions. Thus, the final sample for OLS regressions included 304 observations for the years 2013

and 2014, in which each year is represented by the cross-section of 152 companies. Likewise, for 2SLS regressions, the final sample included 294 observations for the years 2013 and 2014, in which each year is represented by the cross-section of 147 companies.

The data used in this research comprise primary information obtained by accessing IR websites and secondary information whose sources were the databases BM&FBOVESPA, Economatica, Brazilian Securities and

Exchange Commission (CVM), S&P Capital IQ, and Reuters.

3.1 Information Asymmetry (SPREAD)

The proxy chosen to estimate information asymmetry in this study is bid-ask spread, calculated according to the seminal article by Demsetz (1968) and standardized (divided) by the midpoint spread within the trading period. Thus, the average daily spread for the trading period may be expressed according to equation 3:

$$S_{t,i} = \frac{\sum(P_{i,t}^a - P_{i,t}^b)}{\sum Pm_{i,t}} \quad \boxed{3}$$

where: $P_{i,t}^a$ = quoted ask (lowest selling offer) in time period t of company i ; $P_{i,t}^b$ = quoted bid (highest purchase offer) in time period t of company i ; $Pm_{i,t}$ = midpoint spread in time period t of company i ; $S_{i,t}$ = average daily bid-ask spread in time period t of company i ; Σ = Greek letter sigma, which represents the operation sum in this paper.

The midpoint spread ($Pm_{i,t}$) is given by $(P_{i,t}^a - P_{i,t}^b)/2$. Daily buy and sell offers were extracted from the BM&FBOVESPA website, where they are available for download. Only the most liquid stocks of each company were used for calculation and their outcome was regarded as absolute value.

3.2 IR Website

The absence of an index or ranking available that classifies Brazilian listed companies having the amount

of information provided on their IR websites as a basis motivated the preparation of a list of their own, starting from a similar study by Geerings et al. (2003), summarized in Table 1, and instructions contained in the IR Guide IBRI-BOVESPA for including specific issues in the Brazilian market.

Visits carried out during the three-month period (May to July 2014) noticed the presence (or not) of the 33-item checklist distributed into six categories, with a visit to each website. At the end of collection, the confirmation round was performed, in which 60% of the sample were randomly revisited, and no difference was found. Regarding the scoring form, we assigned the scores 1, for presence, and 0, for absence of each item, the lowest score was 0 and the highest was 33. This study considered the same score for the variable IR for 2013 and 2014. Table 2 displays the complete list of verified items.

Table 2 Items checked on companies' website

Category	Item
1 – Presence on the internet	
1	Website
2	Investor relations website
2 – Financial information	
3	Annual report
4	Financial statements
5	Quarterly information
6	Standardized financial statements
7	Files from the Brazilian Securities and Exchange Commission and the annual reports
8	Sustainability reports
9	Reports from previous years
10	Main financial indicators
3 – Press releases and other information services	
11	Press releases
12	Earning release
13	Schedule of disclosure
14	Corporate governance information
15	Current share price
16	Share price history
17	Risk factors
18	Analyst coverage
19	Analyst forecasts
20	Rating agencies
21	Corporate structure or shareholding structure
4 – Advantages of internet presentation	
22	Time series of financial data
23	Financial data in processable format
24	Bilingual
25	Internal search engine
26	Recent information update
5 – Direct contacts via email and mailing list	
27	Investor relations department email
28	Direct marketing (email alert)
29	Frequently asked questions
30	Online investor information service order
6 – Video/audio recording and online participation in meetings	
31	Video/audio recording of meetings
32	Participate in online meetings
33	Conference call for presenting results open to the public

Source: Adapted from Geerings et al. (2003).

3.3 Control Variables

In addition to the variables SPREAD and IR, this study used the control variables described below:

- Analyst coverage (COV) – number of investment analysts who accompany the company and make forecasts about it. Samples were collected from three separate sources – S&P Capital IQ, on the IR website, and on the Reuters website (www.reuters.com) – in a supplementary way, in order to ensure the highest possible reliability for this variable. If the number of investment analysts that accompany the company is greater than or equal to the average number of analysts in the sample, COV = 1, otherwise, COV = 0. A negative relation between information asymmetry and analysts' coverage is expected because, generating new information, through their recommendations and forecasts, analysts function as information asymmetry reducers in the capital market (Healy & Palepu, 2001).
- Volatility (VOLAT) – monthly standard deviation of a company's share prices. In the Economatica database, volatility calculation in n days uses a series of close prices $n + 1$ days: $d_0, d_1, d_2, d_3, \dots, d_n$. Thus:

$$VOLATILITY = \sqrt{\sum (S_i - S_m)^2 / n \times PPY}$$

where: d_i = open day quote of i ; $I = 1 \dots n$; S_i = neperian logarithm of (d_i/d_{i-1}) ; S_m = mean value of $S_1, S_2, S_3, \dots, S_n$; PPY = periods per year ($PPY = 252$, if daily close; $PPY = 52$, if weekly close; $PPY = 12$, if monthly close; $PPY = 4$, if quarterly close; $PPY = 1$, if annual close). VOLAT is regarded as a proxy for information asymmetry since, if the asset value floated long before issuance, external investors will have less information about a company's investment risk (Halov & Heider, 2005). If company's volatility is greater than or equal to the sample mean value, $VOLAT = 1$, otherwise, $VOLAT = 0$. A positive relation between volatility and spread is expected.

- Share price (PRICE) – average share price within the period investigated. The presence of information asymmetry causes distrust between investors and a reduced turnover, leading to lower liquidity and a drop in a company's share prices (Verrecchia, 2001; Welker, 1995). Given this, it is expected that PRICE correlates negatively with spread.
- Internationalization (ADR) – a dummy indicative of company's participation in the New York Stock Exchange (NYSE) through a Level II or III ADR program. Participation in the international market requires the company to disclose more information in order to meet the requirements of international regulatory bodies, something which

reduces information asymmetry between company and investors. Therefore, a negative correlation between ADR and spread is expected.

- Market value (LNVMAR) – the natural logarithm of market value is used in this paper as a proxy for size.
- Free float (FLOAT) – percentage of stocks available for free trading in the market in relation to the total stocks issued by the company. For companies with more than one stock class, the most liquid share information was used within the period under analysis. A low percentage of free float configures a strong stockholding concentration, something which might lead the company to provide less information to the public environment, causing an increased information asymmetry. If the percentage of free float is high, managers would be more likely to disclose information, in order to reduce information asymmetry and maintain the company's share valuation. Therefore, it is expected that the percentage of stocks traded in the capital market has a negative relation with information asymmetry.
- Share liquidity index (LIQSHARE) – The formula for calculating share liquidity used by the Economatica system is given by:

$$LIQSHARE = 100 \times \left(\frac{p}{P}\right) \times \sqrt{\left(\frac{n}{N}\right) \times \left(\frac{v}{V}\right)}$$

where: n = number of deals with the stock in the chosen period; v = money volume with the stock in the chosen period; N = number of deals with all stocks in the selected period; V = money volume with all stocks in the chosen period; p = number of days in which there was at least one deal with the stock in the chosen period; P = total number of days in the chosen period. Previous studies found that increased information asymmetry are associated with reduced liquidity of a company's stocks (Agarwal & O'Hara, 2007; Bharath, Pasquariello & Wu, 2009), suggesting that share liquidity and information asymmetry can be negatively correlated.

- Interest coverage ratio (INTERESTCOVERAGE)

– calculated as the operating profit (EBIT) divided by interest expense. It represents the company's financial capacity to honor its obligations with creditors.

- Current liquidity (CURRENTLIQ) – current assets divided by current liabilities. It represents the company's financial capacity to honor its short-term obligations.
- Net debt (NETDEBT) – net debt divided by total assets. The company's debt percentage may be another cause of information asymmetry. The greater leverage, the more information disclosure is needed by the stock market and the less information asymmetry between company and shareholders.

A negative correlation is expected between this variable and information asymmetry.

- New Market (NM) – a variable that represents the company's corporate governance quality. If the company belongs to BOVESPA's New Market differential governance level, NM = 1; otherwise, NM = 0.

3.4 Instrumental Variables

Based on the evidence found by Hoffmann et al. (2011), that the IR team's education influences the amount of information provided by the company on its IR website, we used all information about the IR director available in the 2013 and 2014 Reference Form for constructing five variables: education in finance, graduate course in IR, experience in finance, MA and/or Ph.D. degree, and experience abroad. IR directors with such characteristics are presumed to provide more information to the stock market by using the company's IR website. Thus, such variables are assumed to be exogenous, i.e. not correlated with the error term at the second stage of the equation, since they could only influence information asymmetry through the IR variable (information available on the

company's IR website). The instrumental variables used are shown below.

- Education in finance (EDUFIN) – dummy variable that takes a value equal to 1 if the IR director has a degree in the finance area (Administration, Accounting, and Economics).
- Graduate certificate in IR (GRADIR) – dummy variable that takes a value equal to 1 if the IR director has a graduate degree in IR.
- Experience in finance (EXPFIN) – dummy variable that takes a value equal to 1 if the IR director has experience in financial institutions.
- MA and Ph.D. (MAPhD) – dummy variable that takes a value equal to 1 if the IR director has an MA and/or Ph.D. degrees in any area of knowledge.
- Experience abroad (EXPABROAD) – dummy variable that takes a value equal to 1 if the IR director has experience abroad, he may have worked or studied in any country, except Brazil.

Table 3 displays a summary of the description of variables used in this study, as well as the expected correlation.

Table 3 Summary of the description of variables

Variable	Description	Source	Expected relation
SPREAD	Information asymmetry. Obtained by the sum of differences between the lowest selling offer and the highest purchase offer for a stock in the period divided by the sum of mean values of these two values. This variable was measured in terms of absolute value.	BM&FBOVESPA	Dependent variable
IR	Note assigned to the investor relations (IR) website, as detailed in Table 2.	IR website	Negative with spread
LIQSHARE	Share liquidity index: $100 \times (p/P) \times \sqrt{((n/N) \times (v/V))}$	Economática	Negative with spread
VOLAT	Monthly standard deviation of a company's stocks. If greater than or equal to the sample mean value, VOLAT = 1, otherwise, VOLAT = 0.	Economática	Positive with spread
INTERESTCOVERAGE	Operating profit (EBIT) divided by interest expense.	Economática	?
CURRENTLIQ	Current assets divided by current liabilities.	Economática	Negative with spread
PRICE	Average share price. Its calculation uses the average daily quotes in the period.	Economática	Negative with spread
NETDEBT	Net debt divided by total assets.	Economática	Negative with spread
COV	Company's analyst coverage. Expressed by the number of analysts who issue recommendations of the company's assets. If greater than or equal to the average number of analysts in the sample, COV = 1, if not, COV = 0.	S&P Capital IQ, Reuters, and IR website	Negative with spread

Cont.

Table 3 Cont.

Variable	Description	Source	Expected relation
LNVMAR	Market value. Natural logarithm of market value, proxy used for size.	Economática	Negative with spread
ADR	Internationalization. Dummy variable type indicating if the company belongs to a Level II or III ADR program.	www.adr.com	Negative with spread
FLOAT	Free float. Percentage of shares aimed at free trading.	Economática	Negative with spread
NM	New Market. If the company belongs to the New Market differential governance level, NM = 1, otherwise, NM = 0.	BOVESPA	Negative with spread
EDUFIN	Dummy: 1 if the IR director worked or studied abroad (any country except Brazil).	RF/CVM	Positive with IR
GRADIR	Dummy: 1 if the IR director attended a graduate course in IR.	RF/CVM	Positive with IR
EXPFIN	Dummy: 1 if the IR director worked in a financial institution.	RF/CVM	Positive with IR
MAPhD	Dummy: 1 if the IR director has a MA or Ph.D. degree in any area of knowledge.	RF/CVM	Positive with IR
EXPABROAD	Dummy: 1 if the IR director worked or studied abroad (any country except Brazil).	RF/CVM	Positive with IR

BM&FBOVESPA = Brazilian Securities, Commodities, and Futures Exchange; CVM = Brazilian Securities and Exchange Commission; RF = Reference Form.

Source: Prepared by the authors.

3.5 Empirical Model

In order to investigate the relation between information asymmetry and IR, the average spread, in absolute value, was regressed as a function of the explanatory variable IR

website and control variables reported in the literature as likely to influence on spread, something which resulted in equation 4:

4

$$Spread_{i,t} = \alpha + \beta_1 IR_{i,t} + \beta_2 Cov_{i,t} + \beta_3 Volat_{i,t} + \beta_4 Price_{i,t} + \beta_5 ADR_{i,t} + \beta_6 LnVMark_{i,t} + \beta_7 FreeFloat_{i,t} + \beta_8 LiqShare_{i,t} + \beta_9 InterestCoverage_{i,t} + \beta_{10} CurrentLiq_{i,t} + \beta_{11} LiqDebt_{i,t} + \beta_{12} NM_{i,t} + \varepsilon_{i,t}$$

where: $IR_{i,t}$ = score assigned to the IR website, according to the items detailed in Table 1; $Spread_{i,t}$ = average bid-ask spread of firm i in period t (metrics for information asymmetry), as detailed in equation 3 (the other variables are defined in Table 3).

However, according to Brown and Hillegeist (2007), there is evidence that information dissemination and information asymmetry are endogenously linked, since, if better quality disclosure is able to reduce information asymmetry, firms with high asymmetry would have More incentives to increase the quality of disclosures in order to reduce information asymmetry.

In these circumstances, when estimating data through ordinary least squares, we have biased and inconsistent estimators for the model parameters. According to Wooldridge (2006), a possible solution to the endogeneity problem is the use of two-stage least squares.

In this way, the two-stage least squares were used with pooled data (pooled 2SLS), in which, at the first stage, the endogenous variable is regressed as a function of its instrumental variables, in order to obtain an exogenous measure (equation 6). At the second stage, the model is estimated using the regression value from the first stage to the explanatory variable (equation 5). Thus, the econometric model is represented by:

5

$$\text{Spread}_{i,t} = \alpha + \beta_1 \text{IR}_{i,t} + \beta_2 \text{Cov}_{i,t} + \beta_3 \text{Volat}_{i,t} + \beta_4 \text{Price}_{i,t} + \beta_5 \text{ADR}_{i,t} + \beta_6 \text{LnVMark}_{i,t} + \beta_7 \text{FreeFloat}_{i,t} + \beta_8 \text{LiqShare}_{i,t} + \beta_9 \text{InterestCoverage}_{i,t} + \beta_{10} \text{CurrentLiq}_{i,t} + \beta_{11} \text{LiqDebt}_{i,t} + \beta_{12} \text{NM}_{i,t} + \varepsilon_{i,t}$$

6

$$\text{IR}_{i,t} = \alpha + \beta_1 \text{EduFin}_{i,t} + \beta_2 \text{ExpFin}_{i,t} + \beta_3 \text{GradIR}_{i,t} + \beta_4 \text{MAPhD}_{i,t} + \beta_5 \text{ExpAbroad}_{i,t} + \beta_{\text{Controls}} + \varepsilon_{i,t}$$

where: *Controls* = vector of the control variables as presented in equation 5 and defined in Table 3; *ExpAbroad*_{*i,t*} = dummy variable that takes a value 1 if the IR director has experience abroad, either for study or work; *ExpFin*_{*i,t*} = dummy variable that takes a value 1 if the IR director has experience in any financial institution; *EduFin*_{*i,t*} = dummy variable that takes a value 1 if the IR director

has attended a course in the finance area; *MAPhD*_{*i,t*} = dummy variable that takes a value 1 if the IR director has a MA and/or Ph.D. degree in any area of knowledge; *GRADIR*_{*i,t*} = dummy variable that takes a value 1 if the IR director has a graduate degree in the IR area; $\varepsilon_{i,t}$ = residue of company *i* in period *t*.

4. RESULTS

The factors affecting spread were initially investigated by means of pooled OLS, with a robust standard error, considering cluster by sector. The results are found in the first set of results in Table 4. The second set of results comes from the pooled 2SLS regression estimated with

robust standard error, considering cluster by sector, in which the variable IR is treated as endogenous. At the bottom of Table 4 there are the partial F statistics and the partial R² for the first stage of pooled 2SLS and values for the test by Hausman (1978).

Table 4 Regression results for the relation between investor relations (IR) and information asymmetry

	Pooled OLS		Pooled 2SLS			
	Dep: spread		Fisrt stage		Seconde stage	
	Coefficient	t	Dep: IR		Dep: spread	
	Coefficient	t	Coefficient	t	Coefficient	z
IR	-0.000991***	-3.00			-0.00296*	-1.67
Instruments						
Education in finance			-1.219***	-3.80		
Experience in finance			0.227	0.27		
Graduate certificate in IR			2.137**	2.66		
MA and Ph.D.			0.381	0.82		
Experience abroad			-0.263	-0.29		
Control variables						
Analyst coverage	0.00191	0.65	1.215	1.21	0.00352	0.90
Volatility	0.000248	0.09	-0.128	-0.26	0.0000143	0.00
Price	0.0000629	1.29	0.00514	0.45	0.0000847	1.03
ADR	0.00345	1.26	0.496	0.50	0.00444	1.51
Market value	-0.00698***	-4.30	1.137***	3.61	-0.00405*	-1.76
Free float	-0.0000151	-0.60	0.00613	0.56	0.0000110	0.27
Share liquidity	0.00321*	1.88	-0.391	-1.26	0.00188	1.35
Interest coverage	0.0000157	0.70	0.0116	1.18	0.0000515	1.32
Current liquidity	-0.000876	-1.50	-0.0698	-0.55	-0.000889***	-2.84
Net debt	-0.00714	-0.91	1.599	1.08	0.000299	0.05
New Market	-0.00644**	-2.45	2.903**	2.47	0.000225	0.03

Cont.

Table 4 Cont.

Observations (n)	307	296	296
Adjusted R ²	0.439	0.283	0.134
F statistics (partial)		24.85	
R ² (partial)		0.023	
Wu-Hausman F		1.20666 F[1,282] p = 0.27293	
Durbin-Wu-Hausmann (chi-square)		1.26117 χ^2 [1] p = 0.26143	

***, **, *: statistical significance of 1%, 5%, and 10%, respectively.

Source: Prepared by the authors.

The initial analysis, shown in the first column of Table 4, was conducted using pooled OLS regressions and it indicates, as expected, that the variable IR is negatively related with SPREAD at the 1% significance level, denoting that companies with IR websites with higher scores have a lower bid-ask spread. A negative relation is also observed, as expected, between the variables MARKET VALUE and NEW MARKET and the variable SPREAD.

Following the recommendations of Lacker and Rusticus (2010), Table 4 also presents the results of first-stage estimates, including not only the instruments, but all the second-stage control variables to estimate the two-stage least-squares (pooled 2SLS). The results showed that the instrumental variable graduate certificate in IR had a positive and statistically significant coefficient at the 5% significance level, as expected. However, the variable financial education, different from what was expected, had a negative and statistically significant sign at a 1% significance level. The other instrumental variables (experience abroad, MA/Ph.D. and experience in finance) did not have a statistical significance that justified any inference about them.

Also according to Lacker and Rusticus (2010), the simple way to investigate the adequacy of instruments to the model is the analysis of the partial F statistics at the first stage of the 2SLS regression. In this way, the partial F analysis must follow that recommended by Stock, Wright and Yogo (2002). Thus, when the number of instruments is equal to 5, the critical value for F is 15.09. So, F values lower than 15.09 might indicate that the instruments are weak, and this does not occur (partial F: 24.85).

In addition, the test by Hausman (1978) did not have statistical significance to reject the null hypothesis (H_0 : regressors are exogenous), reinforcing the view that the instruments chosen are exogenous, as expected. Therefore, although the partial R² is low (2.3%), it is believed, having results of the tests by Hausman (1978) and Stock et al. (2002) as a basis, that the instruments are sufficiently exogenous and adequate, thus the 2SLS method is preferred instead of the OLS.

Finally, the results from the second stage are displayed in Table 4 and evidence obtained reinforces the previously obtained results. The main result is the negative relation between IR and SPREAD. Consistent with the literature, the quality of online content on IR activities was an explanatory factor of bid-ask spread, with a negative coefficient and statistically significant at the 10% level. This result indicates that IR websites with better information contents are inversely related to the company's information asymmetry measured by bid-ask spread.

As a supplementary analysis, the individual categories that form the variable IR, as described in Table 2, were regressed through pooled 2SLS in order to verify if there was a difference of magnitude between the categories. In this situation, what changes with regard to equations 5 and 6 is only the variable $IR_{i,t}$, which is now represented as $IR_{j,i,t}$ where $IR_{j,i,t}$ is the score assigned to the characteristic j (as detailed in Table 2, the IR score consists of six characteristics) from the IR website of company i in year t and the other variables are defined as previously described. The results for estimated coefficients of the variable $IR_{j,i,t}$ are described in Table 5.

Table 5 Results for information category using the pooled 2SLS method

Variables	Coefficient	P value
IR_01	0.01293	0.700
IR_02	-0.09726*	0.098
IR_03	-0.05773**	0.049
IR_04	-0.00375	0.777
IR_05	0.01839	0.326
IR_06	-0.04005***	0.000

***, **, *: Statistical significance of 1%, 5%, and 10%, respectively.

Source: Prepared by the authors.

Among the six categories analyzed, the categories of financial information (IR_02), press releases, and other financial information services (IR_03), and video/audio recording and online participation in meetings (IR_06) were those that showed statistical significance, being negatively related with SPREAD. This finding indicates that IR managers should pay attention to the relevance of

providing additional information on their websites, such as analysts' forecasts, risk factors, and analyst coverage on equity and company credit rating. A teleconference to present results to the public and information such as conference calls audio and presentation videos by the company are also relevant.

5. CONCLUSION

This paper examined the effect of IR activities on information asymmetry. More specifically, it focused on investigating whether IR activities on the internet can reduce the adverse selection problem deriving from information asymmetry between buyers and sellers of a company's shares, measured by the bid-ask spread of daily share quotes. To do this, a survey of information disclosed by the companies on their IR websites was carried out, which enabled the formation of a single database on the way how Brazilian companies use the internet to communicate and disseminate their information to stakeholders.

Initially, the analyses were performed considering the pooled OLS estimation to investigate the relation between IR activity in companies and their information asymmetry in the market measured through the bid-ask spread. In order to make the results more robust and because this is a possible endogeneity problem between the variables SPREAD and IR, the pooled 2SLS was used, including the instrumental variables education in finance, graduate certificate in IR, experience in finance, MA and/or Ph.D. degree, and experience abroad.

In general, the results indicate that using the internet to disseminate relevant information to shareholders through the IR website impacts negatively on the bid-ask spread of Brazilian companies, reducing information asymmetry between companies and investors.

Among the six categories that constitute the variable IR, 'press releases and other financial information services'

and 'video/audio recording and online participation in meetings' were those that showed statistical significance, being negatively associated with bid-ask spread. Thus, we may say that IR managers must pay attention to the relevance of providing complementary information on their websites. Among the information regarded as more relevant for reducing information asymmetry, we highlight analyst forecasts, description of risk factors, analyst coverage on equity and company credit rating, as well as teleconferences for presentation of results and provision of audio conference calls and presentation videos by the company.

These findings may be relevant to managers and regulators, because they indicate that investments in the IR area can generate direct benefits to shareholders by reducing uncertainty about share prices. Therefore, we may say that more informative IR websites improve access to information, something which reduces information asymmetry in the capital market. Taken together, these results provide a strong incentive so that listed companies make information available to stakeholders on well-structured IR websites of their own.

Further research can go deeper into the approach of this study by investigating the effects of IR activities on information asymmetry, analyzing, for instance, the information content of specific events, such as conference calls or meetings with investors.

Finally, the results of this paper are useful for listed companies' decision-making between developing and

maintaining (or not) online voluntary information disclosure environments, contributing to enrich discussions about the effect of IR activities on information

asymmetry, in an emerging market such as the Brazilian one, therefore different from those previously analyzed.

REFERENCES

- Agarwal, P., & O'Hara, M. (2007). Information risk and capital structure [Working Paper]. *Social Science Research Network*. Retrieved from <http://papers.ssrn.com>.
- Agarwal, V., Liao, A., Nash, E. A., Taffler, R. J., & Taffler, R. (2008). The impact of effective investor relations on market value [Working Paper]. *Social Science Research Network*. Retrieved from <http://papers.ssrn.com>.
- Aitken, M., & Frino, A. (1996). The accuracy of the tick test: evidence from the Australian stock exchange. *Journal of Banking & Finance*, 20(10), 1715-1729.
- Akerlof, G. (1970). The market for "lemons": quality uncertainty and the market mechanism. *The Quarterly Journal of Economics*, 84(3), 488-500.
- Bank of New York Mellon. (2015). *Tendências globais em relações com investidores 2013: uma análise da pesquisa de práticas de RI no Brasil*. Retrieved from <https://www.adrbnymellon.com/files/pb43842.pdf>.
- Basuony, M. A. K., & Mohamed, E. K. A. (2014). Determinants of internet financial disclosure in GCC countries. *Asian Journal of Finance & Accounting*, 6(1), 70-89.
- Bharath, S. T., Pasquariello, P., & Wu, G. (2009). Does asymmetric information drive capital structure decisions? *Review of Financial Studies*, 22(8), 3211-3243.
- Blankespoor, E., Miller, G. S., & White, H. D. (2014). The role of dissemination in market liquidity: evidence from firms' use of Twitter™. *The Accounting Review*, 89(1), 79-112.
- Bollen, L., Hassink, H., & Bozic, G. (2006). Measuring and explaining the quality of internet investor relations activities: a multinational empirical analysis. *International Journal of Accounting Information Systems*, 7(4), 273-298.
- Brennan, M. J., & Tamarowski, C. (2000). Investor relations, liquidity, and stock prices. *Journal of Applied Corporate Finance*, 12(4), 26-37.
- Brown, S., & Hillegeist, S. A. (2007). How disclosure quality affects the level of information asymmetry. *Review of Accounting Studies*, 12(2-3), 443-477.
- Bushee, B., Miller, G. (2012). Investor relations, firm visibility, and investor following. *The Accounting Review*, 87(3), 867- 897.
- Chakravarty, S., & Sarkar, A. (1999). Liquidity in US fixed income markets: a comparison of the bid-ask spread in corporate, government and municipal bond markets. *FRB of New York Staff Report*, (73).
- Chang, M., D'anna G., Watson, I., & Wee, M. (2008). Does disclosure quality via investor relations affect information asymmetry? *Australian Journal of Management*, 33(2), 375-390.
- Chang, M., Hooi, L., & Wee, M. (2014). How does investor relations disclosure affect analysts' forecasts? *Accounting & Finance*, 54(2), 365-391.
- Copeland, T. E. (1979). Liquidity changes following stock splits. *The Journal of Finance*, 34(1), 115-141.
- Copeland, T. E., & Galai, D. (1983). Information effects on the bid-ask spread. *The Journal of Finance*, 38(5), 1457-1469.
- Deller, D., Stubenrath, M., & Weber, C. A. (1999). Survey on the use of the internet for investor relations in the USA, the UK and Germany. *European Accounting Review*, 8, 351-364.
- Demsetz, H. (1968). The cost of transacting. *The Quarterly Journal of Economics*, 82, 33-53.
- Dolphin, R. R. (2004). The strategic role of investor relations. *Corporate Communications: An International Journal*, 9(1), 25-42.
- Ernst & Young. (2013). *Tomorrow's investment rules: global survey of institutional investors on non-financial performance*. Retrieved from [http://www.ey.com/Publication/vwLUAssets/EY-Institutional-Investor-Survey/\\$File/EY-Institutional-Investor-Survey.pdf](http://www.ey.com/Publication/vwLUAssets/EY-Institutional-Investor-Survey/$File/EY-Institutional-Investor-Survey.pdf).
- Ferreira, A. D. (2012). *O impacto do custo de transação ao obter informações contábil-financeiras sobre o valor de mercado das empresas brasileiras* (Master's Degree). Fundação Capixaba de Pesquisa em Administração, Ciências Contábeis e Economia, Vitória.
- Fleming, M. J. (1997). The round-the-clock market for US treasury securities. *Economic Policy Review*, 3(2), pp. 24.
- Fleming, M. J. (2003). Measuring treasury market liquidity. *Economic Policy Review*, 9(3), pp. 57.
- Fleming, M. J., & Sarkar, A. (1999). Liquidity in U.S. treasury spot and futures markets quality [Working Paper]. *Federal Reserve Bank of New York*. Retrieved from <http://www.bis.org/publ/cgfs11flem.pdf>.
- Garay, U., González, M., Guzmán, A., & Trujillo, M. A. (2013). Internet-based corporate disclosure and market value: evidence from Latin America. *Emerging Markets Review*, 17, 150-168.
- Geerings, J., Bollen, L. H. H., & Hassink, H. F. D. (2003). Investor relations on the internet: a survey of the Euronext zone. *European Accounting Review*, 12(3), 567-579.
- Girão, L. F. A. P., & Machado, M. R. (2013). A produção científica sobre assimetria informacional em periódicos internacionais de contabilidade. *Revista Contabilidade e Controladoria*, 5(1), 99-119.
- Glosten, L. R., & Milgrom, P. R. (1985). Bid, ask and transaction prices in a specialist market with heterogeneously informed traders. *Journal of Financial Economics*, 14(1), 71-100.
- Glosten, L. R. (1987). Components of the bid-ask spread and the statistical properties of transaction prices. *Journal of Finance*, 47, 1293-1307.
- Halov, N., & Heider, F. (2005). Capital structure, asymmetric information and risk [Working Paper]. *Social Science Research Network*. Retrieved from <http://papers.ssrn.com>.
- Hasbrouck, J. (2007). *Empirical market microstructure: the institutions, economics, and econometrics of securities trading*. Oxford: Oxford University Press.

- Hausman, J. A. (1978). Specification tests in econometrics. *Econometrica*, 46, 1251-1271.
- Healy, P. M., & Palepu, K. G. (2001). Information asymmetry, corporate disclosure, and the capital markets: a review of the empirical disclosure literature. *Journal of Accounting and Economics*, 31(1), 405-440.
- Healy, P. M., Hutton, A. P., & Palepu, K. G. (1999). Stock performance and intermediation changes surrounding sustained increases in disclosure. *Contemporary Accounting Research*, 16(3), 485-520.
- Hedlin, P. (1999). The internet as a vehicle for investor relations: the Swedish case. *European Accounting Review*, 8(2), 373-381.
- Heflin, F., Shaw, K., & Wild, J. (2005). Disclosure policy and market liquidity: impact of depth quotes and order sizes. *Contemporary Accounting Research*, 22, 829-866.
- Hoffmann, A. O., Tutic, A., & Wies, S. (2011). The role of educational diversity in investor relations. *Corporate Communications: An International Journal*, 16(4), 311-327.
- Instituto Brasileiro de Relações com Investidores, & Fundação Instituto de Pesquisas Contábeis, Atuariais e Financeiras. (2015). *7ª Pesquisa IBRI-Fipecafi sobre o perfil do profissional e da área de relações com investidores*. Retrieved from http://www.ibri.com.br/Upload/Arquivos/enquete/3756_7_Pesquisa_Sobre_Profissional_RI.pdf.
- Instituto Brasileiro de Relações com Investidores. (2008). *Novo guia de relações com investidores*. Retrieved from <http://www.ibri.com.br>.
- Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, 3(4), 305-360.
- Kirk, M. P., & Vincent, J. D. (2014). Professional investor relations within the firm. *The Accounting Review*, 89(4), 1421-1452.
- Larcker, D. F., & Rusticus, T. O. (2010). On the use of instrumental variables in accounting research. *Journal of Accounting and Economics*, 49(3), 186-205.
- Lee, C. M., Mucklow, B., & Ready, M. J. (1993). Spreads, depths, and the impact of earnings information: an intraday analysis. *Review of Financial Studies*, 6(2), 345-374.
- Lundholm, R. J., Rogo, R., & Zhang, J. L. (2014). Restoring the tower of Babel: how foreign firms communicate with US investors. *The Accounting Review*, 89(4), 1453-1485.
- Marston, C. (1996). The organization of the investor relations function by large UK quoted companies. *Omega*, 24(4), 477-488.
- McInish, T. H., & Wood, R. A. (1992). An analysis of intraday patterns in bid/ask spreads for NYSE stocks. *The Journal of Finance*, 47(2), 753-764.
- Mendes-da-Silva, W., & Magalhães, P. A., Filho (2005). Os determinantes da disseminação voluntária de informações financeiras na internet. *RAE eletrônica – Revista de Administração de Empresas*, 4(2), 1-23.
- Mendes-da-Silva, W., & Onusic, L. M. (2014). Corporate e-disclosure determinants: evidence from the Brazilian market. *International Journal of Disclosure and Governance*, 11(1), 54-73.
- Mendes-da-Silva, W., Ferraz-Andrade, J. M., Famá, R., & Maluf, J. A., Filho (2009). *Disclosure via website corporativo: um exame de informações financeiras e de governança no mercado brasileiro*. *RAE – Revista de Administração de Empresas*, 49(2), 190-205.
- Stock, J. H., Wright, J. H., & Yogo, M. (2002). A survey of weak instruments and weak identification in generalized method of moments. *Journal of Business & Economic Statistics*, 20(4), 518-529.
- Stoll, H. R. (1989). Inferring the components of the bid-ask spread: theory and empirical tests. *Journal of Finance*, 44(1), 115-134.
- Verrecchia, R. (2001). Essays on disclosure. *Journal of Accounting and Economics*, 22(1), 97-180.
- Welker, M. (1995). Disclosure policy, information asymmetry, and liquidity in equity markets. *Contemporary Accounting Research*, 11(2), 801-827.
- Wooldridge, J. M. (2006). *Introdução à econometria: uma abordagem moderna* (4a. ed.). São Paulo, SP: Pioneira Thomson Learning.
- Yoon, H., Zo, H., & Ciganek, A. P. (2011). Does XBRL adoption reduce information asymmetry? *Journal of Business Research*, 6(2), 157-163.

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