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## Effects of the Adoption of IFRS on the Credit Market: Evidence from Brazil

Vinícius Simmer de Lima<sup>a</sup>, Gerlando Augusto Sampaio Franco de Lima<sup>b,\*</sup>,  
Giorgio Gotti<sup>c</sup>

<sup>a</sup> University of Sao Paulo, Av. Prof. Luciano Gualberto, 908, Cidade Universitária, FEA, São Paulo - SP 05508-010, Brazil

<sup>b</sup> University of Illinois at Urbana-Champaign, 86 Wohlers Hall, 1206 South Sixth Street, Champaign, IL, 61820, United States

<sup>c</sup> University of Texas at El Paso, 500 West University Avenue, El Paso, TX 79968, United States

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### ABSTRACT

Based on a sample of approximately 6500 credit ratings and 137,000 loan contracts, this paper analyzes the effects of mandatory IFRS adoption on the Brazilian credit market. We find that the IFRS adoption effects were limited to firms displaying improved accounting information quality at the time of transition, lending support to the notion that economic benefits do not necessarily flow from the publication of financial reports in IFRS but, rather, depend on how earnestly firms adopt the recommended disclosure practices.

### 1. Introduction

Accounting information plays two primary roles in credit contract relationships (Beatty, 2008). First, it helps banks and other lenders evaluate credit risk (*ex ante*, mitigating the problem of adverse selection). Second, it helps monitor credit risk over the life of the debt contract through financial covenants (*ex post*, mitigating the problem of moral risk). The purpose of this study is to examine the impact of mandatory IFRS adoption in Brazil on the relevance of accounting information to credit risk assessment and on loan contract terms.

Over 120 jurisdictions—including developed, emerging, and developing economies—either permit or require the use of IFRS in financial reporting. Recent studies document a number of positive consequences to the equity markets associated with the introduction of IFRS, such as increased market liquidity, reduced equity cost, increased inflow of foreign investment, improvements in analyst forecast accuracy, and reduced insider information asymmetry (Brochet, Jagolinzer, & Riedl, 2013; Byard, Li, & Yu, 2011; Daske, Hail, Leuz, & Verdi, 2008; DeFond, Hu, Hung, & Li, 2011; Li, 2010; Lima, 2011; Tan, Wang, & Welker, 2011). However, prior research has primarily focused on the usefulness of IFRS to investors, with limited research examining the usefulness of IFRS to creditors.

As an example, several studies have analyzed the effect of IFRS adoption in the Brazilian capital market instead of the credit market. Considering the informational aspect, Lima, Lima, Carvalho, and Lima (2010) investigated whether underlying firm-level incentives influence firms' compliance with International Financial Reporting Standards (IFRS) convergence practices and whether this adoption impacts firms' cost of equity capital and market liquidity in Brazil—a setting with a poor institutional environment but high growth opportunities—using a sample of 54 companies from the São Paulo Stock Exchange. The results indicate that firm-level incentives are important drivers of compliance with IFRS convergence practices. The results suggest that firms that (a) are larger, (b) are more exposed to international markets, and (c) have greater financing needs are more likely to adopt IFRS practices by

\* Corresponding author.

E-mail addresses: [vnclima@gmail.com](mailto:vnclima@gmail.com) (V.S. de Lima), [gerlando@illinois.edu](mailto:gerlando@illinois.edu) (G.A.S.F. de Lima), [ggotti@utep.edu](mailto:ggotti@utep.edu) (G. Gotti).

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implementing material changes in their accounting policies. The economic consequence analysis shows that cost of capital does not seem to be related to any of the convergence measures used. However, there is a statistically significant relationship between all the market liquidity variables and the IASCI, indicating that companies that best meet the convergence requirements have lower trading costs and greater liquidity, and their share price is less susceptible to the influence of individual investors. Following the same results, Santos and Cavalcante (2014) state that the adoption of IFRS in Brazil contributed to an increase in the information relevance of accounting profits of publicly traded companies.

In the same sense, Almeida and Rodrigues (2017) examined the effects of interactions among IFRS adoption, analyst coverage, and cross-listings in the United States on the voluntary disclosure of Brazilian public companies. They found a significant positive shift on voluntary disclosure incentives among cross-listed firms from the IFRS pre-adoption period to the post-adoption period. They also found that analyst coverage has a positive association with voluntary disclosure over the IFRS adoption process; however, the interaction between IFRS adoption and analysts affects only environmental and social disclosure positively.

In turn, considering the value aspect, Sampaio, Gallucci Netto, and Silva (2017) verify that there is a positive impact on Tobin's  $q$  and market-to-book for firms that adopt IFRS in Brazil; thus, after IFRS adoption, the firm value increased. Malaquias, Cardoso, and Martins (2016) show that after IFRS adoption, the accounting numbers present a significant effect in the Brazilian financial market, because after IFRS adoption, company information reported in the financial statements seems to more adequately represent the financial position of the company and inform external users of accounting numbers, since the adjustments made in the value of stocks are lower, decreasing the volatility of stock returns.

Investigating the effects of IFRS adoption on the credit market is important for several reasons. First, debt financing is a major resource for companies worldwide; indeed, for the vast majority, it is a more important source than the capital market. Using Brazil as an example, businesses obtained approximately BRL 15.7 trillion through the National Financial System (SFN) in total financing over the period from 2005 to 2014, of which 93% was bank credit, 4% was public issuance of debt, and only 3% was issuance of equity. Even though a significant part of the loans may have been substitution for already-existing debts, firms unquestionably access debt financing more frequently than equity financing.

Second, creditors are potentially sensitive to changes in accounting regulations due to their impacts on performance evaluation and contracting. The adoption of IFRS brings with it many changes in financial reporting that potentially impact the interpretation of financial information by creditors. The credit market provides a unique opportunity for investigating the effects of IFRS adoption. In addition, if financial reports are influenced primarily by the credit market rather than the capital market, as claimed by Ball, Robin, and Sadka (2008), it is important to understand how creditors react to changes in accounting regulations.

Third, creditors and shareholders have different information needs. Accounting information is used in one way by creditors (e.g., for performance evaluation and contracting) and in another by investors (e.g. for evaluation of shares, Holthausen & Watts, 2001; Watts, 2003, 2006). Therefore, the effects of IFRS adoption on the stock market cannot be automatically applied to the credit market. Holthausen and Watts (2001) conclude that financial information may be relevant to certain types of users only and criticize what they consider a virtually exclusive reliance on equity investors. Hail and Leuz (2007) call for more research into the consequences of IFRS adoption for the credit market.

Accounting scholars have long discussed whether the IASB puts too much emphasis on investors' information demands to the detriment of creditors' performance evaluation and contractual needs (Ball, Xi, & Shivakumar, 2015; Beneish, Miller, & Yohn, 2012; Benston et al., 2007). Two schools of thought have emerged from the debate on the usefulness of IFRS to the credit market. On one hand, the adoption of IFRS can increase the usefulness of accounting information to creditors. The benefits gained from improved accounting information quality under IFRS make accounting information more relevant to assessing credit risk, resulting in a positive economic impact on the credit market. This view derives mainly from the fact that the IFRS framework is principles-based (Barth, Landsman, & Lang, 2008), with an emphasis on fair value and favoring more timely recognition of economic gains and losses. From the informational perspective, such mechanisms can help reduce the cost of monitoring and renegotiating contract terms. On the other hand, the adoption of IFRS could also hinder the usefulness of accounting information to creditors. Gains and losses in market value can include transient impacts on cash flows, thus hindering the usefulness of net income for the purpose of contracting, especially when long-term loans are involved (Christensen & Nikolaev, 2012; Li, 2010). Furthermore, fair value is not necessarily the result of transactions in high-liquidity markets but may be based on subjective evaluations, which can lead to greater agency costs and earnings management. Critics question the adequacy of IFRS for contractual purposes due to substantial differences in accounting methods allowed by IFRS and uncertainties regarding future board decisions, raising the risk of covenant violations due solely to normative changes (Deloitte, 2011). Viewed from this perspective, IFRS can reduce the reliability of accounting information, compromising its value for credit decisions.

Overall, the few studies to evaluate the relation between mandatory IFRS adoption and loan contracts yielded inconsistent results (e.g., Chen, Chin, Wang, & Yao, 2013; Florou, Kosi, & Pope, 2013; Ling-Ching, Hsu, & Lee, 2013; Wu & Zhang, 2014). Ling-Ching et al. (2013), Florou et al. (2013), and Wu and Zhang (2014) find IFRS adoption to be associated with greater sensitivity of credit ratings to accounting information, suggesting IFRS standards produce more relevant information for creditors. In contrast, Chen et al. (2013) report that IFRS adoption led to higher interest rates, greater likelihood of demand for collateral, and shorter maturities. These inconsistencies may be explained by differences in country-specific and firm-specific incentives (Ball, Robin, & Wu, 2003; Daske, Hail, Leuz, & Verdi, 2013).

Prior studies are limited in several ways: (a) they focus on the comparison of average country measures, (b) the influence of firm-level incentives is not discussed, (c) the analysis is restricted to credit operations, and (d) only generic controls are used for the institutional aspects of each jurisdiction. In our study, by focusing on a single country (Brazil), the effect of institutional incentives remains constant. Using a comprehensive sample of bank credit contracts and bonds issued by Brazilian firms, our study extends prior

research by addressing the effects of IFRS adoption in a detailed within-country analysis focused on (a) the relevance of accounting information to creditors and (b) the economic consequences for debtors, while considering the possible existence of firm-level incentives.

We first examine the relevance of accounting information to creditors. Relevance is defined as the ability of accounting information to explain corporate credit ratings (Hann, Hefflin, & Subramanayam, 2007). We obtain corporate credit ratings assigned by both financial institutions and risk assessment agencies. Moreover, we investigate the pattern of dispersion in credit ratings assigned to the same firm by different financial institutions. Secondly, we examine the effects of mandatory IFRS adoption on the cost of debt and other loan contract terms such as loan amount, time to maturity, and collateral requirements. Since IFRS can affect the quality and comparability of accounting information, we consider the possibility that IFRS adoption may have economic consequences for loan contract terms. As some of the most important and sophisticated users of financial information (Armstrong, Guay, & Weber, 2010), financial institutions and institutional investors observe with timeliness the effects of IFRS adoption on loan contract terms. In addition, we evaluate the differences in the impact of IFRS adoption on the bank credit market versus the debenture market. The literature suggests accounting information quality tends to be more important in financing decisions when the capital provider has no alternative mechanisms of mitigating agency costs (Beatty, Liao, & Weber, 2010; Biddle & Hilary, 2006). Hence, an accounting standard of higher quality would favor the development of the debenture market because—unlike financial institutions—investors in debentures are more dispersed and less willing to incur high monitoring costs and so primarily make use of publicly available financial information.

Our results suggest that the ability of accounting information to explain corporate credit ratings increased after mandatory IFRS adoption, although the effect was limited to firms displaying improvements in information quality after the transition. The evidence is similar for ratings assigned by financial institutions and risk assessment agencies (Fitch Ratings, Standard & Poor's, and Moody's). Dispersion in credit ratings assigned by financial institutions decreased following the adoption of IFRS. The results of the second part of our investigation suggest that mandatory IFRS adoption had both positive and negative consequences on the credit market. On both the bank credit market and the bond market, firms with improved information quality are associated with (a) a smaller cost of debt, (b) longer maturity, (c) larger loans, and (d) less demand for collateral, following mandatory IFRS adoption. These improvements tended to be greater for bonds than for bank loans, reinforcing the notion that dependence on accounting information is stronger in the absence of alternative mechanisms to mitigate agency costs (Bhattacharya, Daouk, & Welker, 2003; Diamond, 1991; Fama, 1985; Yosha, 1995).

The present study improves upon earlier studies in several ways. First, our investigation is based on a sizable number of credit contracts from a sample of Brazilian firms, including all (or nearly all) third-party resources obtained by these firms. Contracts were retrieved from (a) the Credit Information System (SCR) of the Brazilian Central Bank (bank credit), (b) the National Debenture System (SND) administered by the Brazilian Financial and Capital Markets Association (ANBIMA) (debentures), and (c) Dealscan® of Thomson Reuters LPC (credit contracts abroad). The scarcity of studies in this field is partly due to the fact that most credit contracts are completed in the private sector, with little or no public access to the contract terms. Hence, accounting studies on credit transactions have mostly been based on relatively small sample sizes with an average of less than 1000 credit transactions per country (e.g., Chen et al., 2013: 21,103 transactions, 39 countries; Florou et al., 2013: 19,949 transactions, 34 countries; Ball et al., 2015: 3037 transactions, 28 countries; Wu & Zhang, 2014: 1917 transactions, 18 countries). Our study includes approximately 137,000 credit transactions of 3011 individual companies controlled by 122 conglomerates traded on the stock market. Second, studies evaluating the relevance of accounting information from a credit perspective have focused entirely on external rating agencies (Florou et al., 2013; Wu & Zhang, 2014), whereas we evaluate the relevance of accounting information from the perspective of financial institutions as well, using the credit rating assigned by the lending bank itself as a proxy for default risk. Since the U.S. financial crisis in 2008–2009, confidence in the neutrality and timeliness of corporate credit risk assessments issued by traditional risk assessment agencies has been severely shaken. To increase the generalizability of our findings, we employ ratings assigned by financial institutions as well as external agencies.

Characterized as a large emerging economy, Brazil provides an ideal setting to examine the impact of mandatory IFRS adoption on the credit markets. The Brazilian institutional environment poses a challenge to the existence of economic benefits associated with IFRS adoption for several reasons: (a) a legal tradition based on civil law, characterized by active involvement of the State in the regulation of accounting, favoring a less transparent environment; (b) weak law enforcement; (c) ample use of private and subsidized sources of financing instead of initial public offerings; (d) accounting norms historically contingent on tax inspection procedures; (e) weak creditor protection (Araújo & Funchal, 2009); and (f) an inefficient legal system (Anderson, 1999).

The present study also represents a significant contribution to methodology. Unlike earlier studies using inadequate proxies to estimate the cost of debt (e.g., financial costs divided by total debts), we retrieve information on cost directly from individual loan contracts in a number of databases (Brazilian Central Bank, SND, and Dealscan® of Thomson Reuters LPC). In addition, our study shows how mandatory IFRS adoption affects contract terms other than the cost of debt. A close scrutiny of the complete loan package shows how the transition to a new accounting format affects not only the cost of debt but also the balance of alternative mechanisms used by creditors at the time of contracting. Thus, compared to earlier studies dealing exclusively with the cost of debt, we believe our approach—covering four contract terms (cost of debt, maturity, amount granted, demand for collateral)—produces a more accurate picture of the overall effect of IFRS adoption.

## 2. Review of the literature and development of hypotheses

### 2.1. IFRS and the relevance of accounting information to creditors

Evaluations of the relevance of accounting information to the credit market are based on the assumption that credit ratings reflect the borrower's economic situation. Seen in this light, if accounting information produced under IFRS is more useful to creditors than accounting information previously produced under country-level GAAP, then we would expect to see an increase in the association between accounting information and credit ratings after IFRS is adopted in a country.

Earlier studies have documented significant differences between IFRS and domestic standards with regard to methods of measurement and earnings recognition as well as practices of transparency (Bae, Tan, & Welker, 2008; Ding, Hope, Jeanjean, & Stolowy, 2007). IFRS is expected to improve accounting information quality through the disclosure of more detailed financial information, better methods of recognition and measurement, and greater comparability (Hail, Leuz, & Wysocki, 2010). However, the potential advantage of such improvement may be less important in credit risk assessment because banks and risk assessment agencies can compensate for the lack of transparency by privileged access to proprietary company information (De Franco, Vasvari, & Wittenberg-Moerman, 2009; Frost, 2007).

*Ex ante*, the impact of IFRS adoption on the relevance of accounting information to creditors is unclear. On one hand, IFRS accounting rules may be attractive to users since they are principles-based and designed to capture the economic substance of transactions upon the initial recognition and when measuring assets and liabilities. Fair value accounting is another important aspect of IFRS with potential advantages for creditors, since the use of market value and related rules (e.g., impairment and recognition of actuarial liabilities) results in timely recognition of economic losses. On the other hand, critics argue that fair value accounting may not be compatible with creditors' needs for performance evaluation and contractual information because (a) it would result in the recognition of unrealized economic gains against the creditors' wishes; (b) it would require extensive use of non-verifiable estimates and judgments about the appreciation of assets and liabilities, compromising the perceived reliability of accounting information and increasing the risk of earnings management; and (c) it would result in the recognition of transient gains and losses, potentially reducing earnings quality (Ball et al., 2015; Schipper, 2005).

In the context of our analysis—a country where the institutional environment challenges the existence of economic benefits associated with adoption of IFRS, but also where market forces allow for considerable differences in how firms adopt it—and considering the many conflicting arguments regarding the impact of IFRS on the credit market and the inconsistent empirical findings reported so far, our first hypothesis is stated as follows:

**H1.** Mandatory IFRS adoption increases the association between accounting information and corporate credit ratings.

Many firms take loans from more than one financial institution. Thus, by analyzing a firm's credit operations with different lenders, it is possible to determine the level of risk and variability across evaluations and over time. Assuming IFRS introduction is exogenous to the process of risk assessment and that IFRS helps reduce information asymmetry, we expect the dispersion of credit ratings assigned for the same borrower by different financial institutions to decrease after the adoption of IFRS. In this case, we specifically evaluate the ability of credit market-relevant accounting information in the IFRS format to reduce heterogeneity in corporate credit ratings. The second hypothesis is stated as follows:

**H2.** Dispersion in corporate credit ratings assigned to the same borrower by different financial institutions decreases following mandatory IFRS adoption.

Several authors have stressed the influence of firm-level incentives on accounting information quality (e.g., Ball et al., 2003; Leuz, Nanda, & Wysocki, 2003). Of particular relevance to the debate on IFRS adoption is the observation that information quality often differs significantly between firms using the same accounting format and operating in the same jurisdiction—a phenomenon attributable to differences in firm-level incentives (Daske et al., 2013; Lima, 2011). In other words, differences in firm-level incentives also suggest differences in the way firms adopt IFRS, and hence in the influence of IFRS on the ability of accounting information to explain corporate credit ratings.

In the international literature, positive economic consequences of the introduction of IFRS have been attributed to common law jurisdiction, strong law enforcement, and efficient investor/creditor protection; however, similar effects might conceivably be observed in countries with different institutional environments and firm-level incentives. Indeed, such has been reported in recent within-country studies on the introduction of IFRS in Brazil. Based on this, the third hypothesis is stated as follows:

**H3.** Decrease in the dispersion of corporate credit ratings following the adoption of IFRS is conditional on the improvement of accounting information quality.

### 2.2. IFRS and loan contract terms

The International Accounting Standards Board (IASB) argues that universal adoption of the same set of accounting standards can help reduce capital costs by mitigating information asymmetry between managers and external users of financial information (IASB, 2013). Prior research provides evidence of a reduction in the cost of equity following mandatory IFRS adoption (Daske et al., 2008; Li, 2010). However, the impact of IFRS adoption on the cost of debt and other economic consequences for the credit market are still not clearly understood.

Since the transition to IFRS is expected to affect accounting information quality, it is reasonable to assume it will have economic consequences for the credit market. On the other hand, the existence of arguments against the ability of IFRS to make accounting information more relevant to creditors raises questions about how or whether IFRS implementation affects the cost of debt and other loan contract terms. If it increases the relevance of accounting information to users in the credit market, for example, by allowing creditors to make more timely and accurate corporate risk assessments, then, *ceteris paribus*, other positive outcomes may be expected, such as reduced interest rate spread, longer maturity, greater credit supply, and/or less demand for collateral. That is, greater reliability of information available to creditors associated with IFRS adoption may reduce the need for periodic risk reassessments, with direct economic benefits to firms.

In the context of our analysis, and given the arguments presented above regarding (a) the potentially weaker firm-level incentives of mandatory versus voluntary IFRS adopters, (b) the peculiar market and institutional environment of Brazil, and (c) inconsistent evidence for the effects of IFRS adoption, our fourth hypothesis is stated as follows:

**H4.** Mandatory IFRS adoption has positive economic consequences for loan contract terms (lower cost of debt, longer maturity, larger loan amounts, less collateral).

Because incentives to improve accounting information quality vary from firm to firm (even within the same jurisdiction), mandatory IFRS adoption is likely to have heterogeneous economic consequences. Thus, from the perspective of the creditor, the impact of IFRS on loan contract terms depends on improvements in accounting information quality. The fifth hypothesis is stated as follows:

**H5.** The positive effects of mandatory IFRS adoption on loan contract terms (lower cost of debt, longer maturity, larger loan amounts, less collateral) are conditional on the improvement of accounting information quality.

In view of the well-established notion that the lack of alternative mechanisms to mitigate agency costs increases the importance of accounting information quality in the bond market, IFRS may be expected to have a stronger economic impact on contract terms in the bond market than in the bank credit market. Thus, the sixth hypothesis is stated as follows:

**H6.** The positive effects of mandatory IFRS adoption on loan contract terms (lower cost of debt, longer maturity, larger loan amounts, and less collateral) are stronger in the bond market than in the bank credit market.

### 3. Research design

#### 3.1. Research models

In order to isolate the impact of IFRS adoption from other economic factors affecting long-term changes in loan contract terms, we divide our data into two time periods (before vs. after IFRS adoption) and two adoption groups (mandatory vs. voluntary adopters), using interaction variables. Formal definitions of all variables are provided in Appendix 1.

##### 3.1.1. IFRS and the relevance of accounting information to creditors

We use the following base model to test H1:

$$\begin{aligned}
 P(\text{CorpRating}_{it} = 1, 2, \dots, 9) = & \varphi(\alpha_0 + \beta_1 \text{ROA}_{it} + \beta_2 \text{Lev}_{it} + \beta_3 \text{IntC}_{it} + \beta_4 \text{Post}_t + \beta_5 \text{Post}_t \cdot \text{ROA}_{it} \\
 & + \beta_6 \text{Post}_t \cdot \text{Lev}_{it} + \beta_7 \text{Post}_t \cdot \text{IntC}_{it} + \sum_{n=1}^6 \theta_n \text{ContVar}(n)_{it} \\
 & + \sum_{m=1}^m \delta_m \text{FixedEffects: Year, Sector} )
 \end{aligned} \tag{1}$$

Following prior research that groups credit risk ratings by category (Ashbaugh-Skaife, Collins, & LaFond, 2006; Jorion, Shi, & Zhang, 2009), the dependent variable  $\text{CorpRating}_{it}$  is the mean risk level assigned to firms. The mean risk levels are ordinal measures ranging from 1 to 9, with higher numbers indicating higher credit quality. The external credit ratings are obtained from Fitch, Standard & Poor's, or Moody's, in that order of preference. We use a logit model estimated by maximum-likelihood estimation with White standard errors (Petersen, 2009).  $\varphi$  represents the logistic function. Additional accounting risk indicators in the model include  $\text{ROA}_{it}$  (return on assets),  $\text{Lev}_{it}$  (leverage) and  $\text{IntC}_{it}$  (interest coverage). Consistent with prior research, we expect credit risk ratings to be positively associated with ROA and interest coverage, and negatively associated with leverage (Ashbaugh-Skaife et al., 2006; Jorion et al., 2009).  $\text{Post}_t$  is equal to 1 if financial accounting information is provided subsequent to the date of complete IFRS adoption (December 31, 2010), 0 otherwise. Assuming that the ability of accounting indicators to explain credit ratings has improved as a result of IFRS adoption, the interactive coefficients  $\text{Post}_t \cdot \text{ROA}_{it}$ ,  $\text{Post}_t \cdot \text{Lev}_{it}$ , and  $\text{Post}_t \cdot \text{IntC}_{it}$  are expected to be positively associated with credit risk ratings. Additional variables ( $\text{ContVar}(n)_{it}$ ) are included to control for credit risk sensitivity to company size ( $\text{Size}_{it}$ ), tangibility ( $\text{Tang}_{it}$ ), earnings volatility ( $\text{VolatNE}_{it}$ ), influence of a Big 4 audit firm ( $\text{Audit}_{it}$ ), corporate governance ( $\text{CGov}_{it}$ ), and cross-listing as an ADR ( $\text{CrossList}_{it}$ ). The regression also includes year and industry fixed effects. To mitigate the impact of outliers, all continuous variables are winsorized at the 1st and 99th percentiles.

The analysis of the effects of IFRS on the dispersion of credit ratings is possible because firms generally borrow from different

institutions simultaneously and therefore are assigned credit ratings by more than one financial institution. To evaluate the impact, we estimate the following model:

$$\begin{aligned} QVC_{CrpRatingit} = & \alpha_0 + \beta_1 Post_t + \beta_2 IFRS_i + \beta_3 Post_t \cdot IFRS_i + \beta_4 ROA_{it} + \beta_5 Lev_{it} + \beta_6 IntC_{it} \\ & + \beta_7 Size_{it} + \beta_8 Tang_{it} + \beta_9 VolatNE_{it} + \sum_{n=1}^3 \theta_n ContVar(n)_{it} \\ & + \sum_{m=1}^m \delta_m FixedEffects: Year, Sector + \varepsilon_{it} \end{aligned} \quad (2)$$

Using Model (2), we evaluate the effects of  $Post_t$ ,  $IFRS_i$ , and the interaction of  $Post$  with  $IFRS$ , on the dispersion of corporate credit ratings ( $QVC_{CrpRatingit}$ ).  $QVC_{CrpRatingit}$  is defined as the quartile variation coefficient of the credit risk ratings of company  $i$  in period  $t$  assigned by different financial institutions. Unlike the first analysis (in which the dependent variable was ordinal),  $QVC_{CrpRatingit}$  is a continuous variable estimated using panel data with year and industry fixed effects. Assuming the adoption of IFRS helps reduce information asymmetry in credit risk assessments, corporate credit ratings are expected to become more homogenous after mandatory IFRS adoption. Thus, we expect the coefficient  $Post_t \cdot IFRS_i$  to be negative and statistically significant in explaining the dispersion of credit risk ratings. To explore the third hypothesis, we evaluate whether the reduction in credit rating dispersion is conditional on existing firm-level incentives. To do so, the variable representing existing firm-level incentives is used as a moderating term in Model (2). Following the example of Daske et al. (2013), we measure the incentives related to the introduction of IFRS as accounting information quality at the time of transition. To quantify accounting information quality ( $AIQ_{it}$ ), we use a metric reflecting the mean estimate of three models: the model of Barth, Landsman, Lang, and Williams (2006), the modified Jones (1995) model, and the model of Kang and Sivaramakrishnan (1995). The details of the estimation of variable  $AIQ_{it}$  are shown in Appendix 2.

### 3.1.2. IFRS and loan contract terms

We perform separate regressions for bank credit contracts and bonds. Based on earlier studies on the economic consequences of IFRS adoption to the credit and capital markets (Daske et al., 2008; Kim, Song, & Zhang, 2011), we estimate the following model to evaluate temporal changes in loan contract terms related to mandatory IFRS adoption:

$$\begin{aligned} ContrT_{it} = & \alpha_0 + \beta_1 Post_t + \beta_2 IFRS_i + \beta_3 Post_t \cdot IFRS_i + \sum_{p=1}^p \mu_p CharactContr(p)_{it} \\ & + \sum_{q=1}^q \phi_q CharactFirm(q)_{it} + \sum_{r=1}^r \gamma_r CharactFI(r)_{it} + \sum_{n=1}^n \theta_n ContVar(n)_{it} \\ & + \sum_{m=1}^m \delta_m FixedEffects: Year, Sector + \varepsilon_{it} \end{aligned} \quad (3)$$

The dependent variable  $ContrT_{it}$  represents the contract term  $i$  of a loan granted in period  $t$ . Four contract terms are considered: cost of debt ( $CstDbt_{it}$ ), maturity ( $Matur_{it}$ ), amount granted ( $Amount_{it}$ ), and demand for collateral ( $Collat_{it}$ ). In accordance with earlier studies on loan contracts (Costello & Wittenberg-Moerman, 2011; Graham, Li, & Qiu, 2008; Kim et al., 2011), we incorporate loan-specific, borrower-specific, and lender-specific control variables in the models.

The loan-specific control variables ( $CharactContr(p)_{it}$ ) include the time of relationship with the financial institution up to the current contract ( $TRelat_{it}$ ), the number of loan contracts concluded with the financial institution in the preceding 12 months ( $NumbL_{it}$ ), the type/destination of resources ( $Type(x)_{it}$ ), the rating of the operation ( $RatingOp_{it}$ ), the remuneration index associated with the loan ( $Index_{it}$ ), and currency ( $Curr_{it}$ ). Variables 1 and 2 are limited to bank credit and are therefore not included in regressions of debentures. In addition, each regression includes the three loan contract terms which were not used as dependent variable (e.g., the regression using  $CstDbt_{it}$  as dependent variable included  $Amount_{it}$ ,  $Matur_{it}$ , and  $Collat_{it}$  as explanatory variables).

The borrower-specific control variables ( $CharactFirm(q)_{it}$ ) include credit risk-related factors identified in the literature (Ball et al., 2015; Bharath, Sunder, & Sunder, 2008; Nikolaev & Van Lent, 2005), namely, return on asset ( $ROA_{it}$ ), leverage ( $Lev_{it}$ ), interest coverage ( $IntC_{it}$ ), company size ( $Size_{it}$ ), tangibility ( $Tang_{it}$ ), and net earnings volatility ( $VolatNE_{it}$ ). Corporate rating ( $CrpRating_{it}$ ) is excluded to avoid potential multicollinearity with the rating of the operation ( $RatingOp_{it}$ ). Additional variables ( $ContVar(n)_{it}$ ) are included to control for the influence of external auditing on accounting information quality ( $Audit_{it}$ ), adherence to corporate governance practices ( $CGov_{it}$ ), exposure to stronger institutional environments with greater creditor protection ( $CrossList_{it}$ ), and—limited to regressions of debentures—influence of the subsidized credit market on debenture terms and access of the sampled firms to such resources, i.e., the proportion of capture of directed resources ( $PropDR_{it}$ ).

The financial performance, risk, and efficiency of the lender have been shown to influence financial and non-financial loan contract terms as well (Martins & Schechtman, 2013). The model  $CharactFI(r)_{it}$  therefore includes the following lender-specific control variables: regulatory capital ( $Capital_{it}$ ), size of financial institution ( $SizeFI_{it}$ ), return on asset of financial institution ( $ROAFI_{it}$ ), liquidity ( $Liquid_{it}$ ), bank reserve ( $Reserv_{it}$ ), default ( $Default_{it}$ ), control ( $Ctrl_{it}$ ), and specialization on the credit market ( $Spec_{it}$ ).

Finally, to remove the effect of any non-IFRS-related factors from the coefficients in the regressions, we include the contemporary variable market benchmark ( $Benchm_{it}$ ), following the example of Daske et al. (2008), Chen et al. (2013), and Florou et al. (2013). The definitions of the variables are given in Appendix 1. All the models include sector and year fixed effects. Continuous variables are winsorized at the 1st and 99th percentiles. As a robustness check, Model (3) equations are also estimated with 2SLS (Appendix 3).

When mandatory IFRS adoption is associated with lower cost of debt, longer maturity, greater loan amounts, and less demand for collateral, the  $Post_t \cdot IFRS_i$  coefficient is expected to be negative and statistically significant in regressions involving  $CstDbt_{it}$  and

$Collat_{it}$ , and positive and statistically significant in regressions involving  $Matur_{it}$  and  $Amount_{it}$ . Moreover, we evaluate whether the effect of IFRS adoption on loan contract terms is conditional on incentives to disclose accounting information of higher quality. The metric  $AIQ_{it}$  is used to indicate the presence of firm-level incentives (Appendix 2).

### 3.2. Sample selection and data collection

#### 3.2.1. Sample of firms

Our initial sample consisted of the theoretical portfolio IBrX-100 (based on the most traded stock on BM&F Bovespa between May and October 2014), a list of Brazil's top 200 conglomerates (published by Valor Econômico in December 2013) and 30 voluntary IFRS adopters (total: 330 conglomerates). We then eliminated repetitions (inclusion of organization in more than one group) ( $n = 63$ ), organizations classified in the sectors of finance and insurance ( $n = 30$ ), and privately held firms ( $n = 115$ ), in this order, leaving a final sample of 122 conglomerates (29 voluntary and 93 mandatory IFRS adopters) belonging to 15 business sectors.

The identification of voluntary IFRS adopters was facilitated by an executive order (#603/09) issued by the CVM demanding the publication of 2010 trimester reports in IFRS along with reports for the fiscal year of 2010. Thus, firms that published financial reports in the IFRS format prior to 31 December 2010 were considered voluntary adopters. The segregation into mandatory adopters (group of interest) and voluntary adopters (control group) helped minimize the influence of non-IFRS-related factors on the variables of interest (credit ratings and loan contract terms) when comparing the periods before and after mandatory IFRS adoption.

The databases of the National Registry of Legal Entities (CNPJ) and the ISIN (International Securities Identification Number) associate information on firms, loan contracts, and risk ratings. The CNPJ number is necessary to consult loan contracts in the databases of the Brazilian Central Bank and the National Debenture System. The CNPJ database stores information about all legal entities as required by national, state, and municipal tax authorities. Thus, searches were conducted for each subsidiary of each conglomerate in the sample. Information on ownership structure was obtained from Section 8 of the Reference Form (December 2013) available on the website of the CVM. After manually identifying the individual subsidiaries of each conglomerate, the respective CNPJ numbers were entered manually in the databases Infoplex<sup>1</sup> and Wooki<sup>2</sup>, which have over 28 and 26 million entries for Brazilian companies, respectively. The criterion for identifying a company as a subsidiary is the existence of total or shared control by a conglomerate, resulting in total or partial consolidation of the subsidiary in the financial reports published by the conglomerate. Equity holdings recognized with the equity pickup method or as bonds and securities were not counted as subsidiaries, since this accounting information is incorporated in the financial reports of the controlling organization (under the headings 'investments' or 'bonds and securities'). Employing this method, the selection of information on loan contracts and risk ratings is consistent with the calculated accounting indicators of the conglomerate. Altogether, 3011 CNPJ numbers were identified. As of December 2013, these companies were responsible for ~20% of the total amount of loans granted legal entities in Brazil.<sup>3</sup> In other words, although our sample of public firms is non-random, it represents a significant proportion of the Brazilian credit market.

#### 3.2.2. Corporate credit ratings

The external credit ratings used in the study were assigned by three major risk assessment agencies: Fitch, Standard & Poor's, and Moody's. Credit ratings were obtained from Thomson Reuters and subsequently complemented through manual searches of the agencies' websites. The classification used was the long-term national-scale rating (Brazil). Altogether, 1969 unique observations of ratings (company-trimesters) were made, covering all 122 conglomerates in the period 2005–2014. The ratings were converted to a scale from 1 to 9, with higher numbers indicating credit of higher quality.

Table 1 shows the distribution of external credit ratings assigned by major risk assessment agencies, according to year and circumstances of IFRS adoption (mandatory or voluntary).

Credit ratings assigned by financial institutions were retrieved from the Credit Information System (SCR) maintained by the Brazilian Central Bank. Table 2 shows the distribution of credit ratings assigned by financial institutions according to the level of risk. The sample consists of 3496 mandatory adopters  $\times$  trimesters and 1140 voluntary adopters  $\times$  trimesters.

#### 3.2.3. Bank loan contracts

Comprising 136,697 observations related to loans granted by 141 different financial institutions, the sample of loan contracts was limited to operations involving unsubsidized resources. In operations with earmarked loans, loan contracts are defined by government norms or the allocation of resources to infrastructure, housing, and agribusiness. Such operations do not meet the criterion of free negotiation of contract terms required by our study design. We believe subsidized loans are incompatible with the concept of free transactions conducted between independent parties on the free market—a necessary condition for the evaluation of the effect of mandatory IFRS adoption on the credit market.

Bank loan contract terms were accessed through the SCR database, which monitors all Brazilian loan contracts from BRL 5000 and up. Our sample of contracts covered the period 2005–2014. We chose 2005 as the starting point for two reasons: (a) to ensure symmetry between the periods before and after IFRS adoption, and (b) prior to 2005, the SCR database had not been fully implemented.

<sup>1</sup> <https://www.infoplex.com.br/>

<sup>2</sup> <https://wooki.com.br/>

<sup>3</sup> The percentage does not include resources obtained through branches of Brazilian banks in other countries.

**Table 1**  
Distribution of sample according to ratings assigned by risk assessment agencies.

Panel A: Rating according to agency									
Fitch		S&P		Moody's		Total	%	Rating	Risk
Cod	n	Cod	n	Cod	n				
AAA(bra)	53	brAAA	123	Aaa.br	96	272	13.8	9	Low
AA(bra)	334	brAA	264	Aa.br	341	939	47.7	8	Low
A(bra)	210	brA	136	A.br	190	536	27.2	7	Low
BBB(bra)	63	brBBB	37	Baa.br	76	176	8.9	6	High
BB(bra)	0	brBB	4	Ba.br	12	16	0.8	5	High
B(bra)	0	brB	0	B.br	13	13	0.7	4	High
CCC(bra)	0	brCCC	1	Caa.br	6	7	0.4	3	High
CC(bra)	0	brCC	0	Ca.br	6	6	0.3	2	High
C(bra)	0	brC	4	C.br	0	4	0.2	1	High
Total	660		569		740	1969	100		

  

Rating	Total	%	Mandatory		Voluntary	
			n	%	n	%
Panel B: Rating according to type of IFRS adopter						
9	272	13.8	109	7.6	163	31.0
8	939	47.7	761	52.7	178	33.8
7	536	27.2	418	29.0	118	22.4
6	176	8.9	134	9.3	42	8.0
5	16	0.8	13	0.9	3	0.6
4	13	0.7	7	0.5	6	1.1
3	7	0.4	1	0.1	6	1.1
2	6	0.3	0	0.0	6	1.1
1	4	0.2	0	0.0	4	0.8
Total	1969	100	1443	100	526	100

  

Panel C: Rating according to year						
2005	42	2.1	28	1.9	14	2.7
2006	110	5.6	75	5.2	35	6.7
2007	169	8.6	120	8.3	49	9.3
2008	195	9.9	147	10.2	48	9.1
2009	208	10.6	158	10.9	50	9.5
2010	221	11.2	165	11.4	56	10.6
2011	243	12.3	177	12.3	66	12.5
2012	263	13.4	190	13.2	73	13.9
2013	248	12.6	183	12.7	65	12.4
2014	270	13.7	200	13.9	70	13.3
Total	1969	100	1.443	100	526	100

Note: The table shows the distribution of credit ratings assigned by credit assessment agencies according to year and type of IFRS adopter (mandatory or voluntary). The sample of ratings comprises 1969 observations (firm-quarters) of 122 conglomerates from 2005 to 2014. We used ratings assigned by Fitch, Standard & Poor's and Moody's, in that order of preference. The classification used is the long-term national-scale rating (Brazil). The ratings were converted to a scale from 1 to 9, with higher numbers indicating credit of higher quality. Voluntary IFRS adopters are firms that did not opt for CVM Resolution #603/09 but chose to adopt IFRS fully prior to 31 Dec 2010 (deadline of mandatory migration).

Table 3 shows the distribution of bank loan contracts of mandatory and voluntary IFRS adopters according to period, index, currency, type/destination of resources, and risk level.

#### 3.2.4. Debenture contracts

Our sample consists of 587 debenture contracts issued by 122 conglomerates in the period 2005–2014. Contract terms were accessed through the SND/ANBIMA database. Resource destinations and credit ratings were obtained by manually searching deeds and distribution announcements, respectively. When ratings from more than one agency were available, preference was given to Fitch, followed by Standard & Poor's, and Moody's. The debenture contracts were organized by associating the CNPJ number of the issuing company with that of the controlling organization. The total debt volume for the period (2005–2014) was BRL 214 billion. Debentures issued by subsidiaries accounted for 43.4% of the total, highlighting the importance of distinguishing between operations conducted by subsidiaries and controllers.

Table 4 shows the distribution of debenture contracts according to type of IFRS adopter (mandatory or voluntary), period, index, destination of resources, and credit risk.



**Table 2**  
Ratings assigned by financial institutions.

Panel A: Rating according to type of IFRS adopter								
Rating scale	Total	%	Rating	Mandatory		Voluntary		
				n	%	n	%	
AA	2734	59.0	9	1959	56.0	775	68.0	
A	1227	26.5	8	997	28.5	230	20.2	
B	357	7.7	7	281	8.0	76	6.7	
C	138	3.0	6	119	3.4	19	1.7	
D	66	1.4	5	52	1.5	14	1.2	
E	56	1.2	4	44	1.3	12	1.1	
F	25	0.5	3	21	0.6	4	0.4	
G	33	0.7	2	23	0.7	10	0.9	
H	0	0.0	1	0	0.0	0	0.0	
Total	4636	100		3496	100	1140	100	

  

Panel B: Rating according to year								
Year	Total	%	Mandatory		Voluntary			
			n	%	n	%		
2005	436	9.4	325	9.3	111	9.7		
2006	431	9.3	321	9.2	110	9.6		
2007	438	9.4	328	9.4	110	9.6		
2008	468	10.1	354	10.1	114	10.0		
2009	473	10.2	358	10.2	115	10.1		
2010	476	10.3	360	10.3	116	10.2		
2011	477	10.3	361	10.3	116	10.2		
2012	477	10.3	361	10.3	116	10.2		
2013	482	10.4	366	10.5	116	10.2		
2014	478	10.3	362	10.4	116	10.2		
Total	4636	100	3496	100	1140	100		

Note: The table shows the distribution of ratings assigned by financial institutions according to type of IFRS adopter (mandatory or voluntary) and year. The sample comprises 4636 observations (firm-quarters) of 122 conglomerates from 2005 to 2014. The ratings were converted to a scale from 1 to 9, with higher numbers indicating credit of higher quality. We weighted ratings by loan amount whenever these were assigned to more than one firm within a conglomerate and/or whenever a firm was assigned two or more ratings by different financial institutions. In the absence of an issuer, we used the rating assigned to the contract.

### 3.2.5. Descriptive statistics of continuous variables

Table 5 shows the descriptive statistics of the dependent and independent continuous variables, segregated according to type of IFRS adopter (mandatory or voluntary).

## 4. Results

### 4.1. Relevance of accounting information to creditors

#### 4.1.1. Base model

The results of the model are shown in Table 6, segregated according to source of credit ratings (column 1 - financial institutions; column 2 - risk assessment agencies).

In the analysis of credit ratings assigned by financial institutions (column 1),  $ROA_{it}$  is the only one of the three accounting risk indicators ( $ROA_{it}$ ,  $Lev_{it}$  and  $IntC_{it}$ ) to yield a statistically significant coefficient, as expected from the literature, suggesting ROA already had an explanatory power for such ratings before IFRS adoption. On the other hand, the three interaction coefficients of interest ( $Post_t \cdot ROA_{it}$ ,  $Post_t \cdot IntC_{it}$  and  $Post_t \cdot Lev_{it}$ ) display statistical significance and signs consistent with the hypothesis that accounting information has become more relevant for creditors (financial institutions) after IFRS adoption. This finding supports the notion that by capturing the economic bases of business more reliably, IFRS provides a better explanation for variations in corporate credit risk than the previous accounting format (GAAP). The control variables indicate that firms with greater investments in tangible assets ( $Tang_{it}$ ) and audited by the Big Four ( $Audit_{it}$ ) obtain better credit ratings.

Column 2 shows the result of the estimation of Model (1) for ratings assigned by risk assessment agencies. The variables  $Lev_{it}$  and  $IntC_{it}$  are statistically significant and display signs consistent with the literature, indicating that such ratings were already sensitive to these indicators before IFRS adoption. However,  $Post_t \cdot ROA_{it}$  and  $Post_t \cdot Lev_{it}$  are also significant, suggesting that their ability to explain credits ratings improved after IFRS adoption. In contrast, despite the consistent positive sign, the coefficient of  $Post_t \cdot IntC_{it}$  is

**Table 3**

Descriptive statistics of loan contracts according to year, index, currency, and allocation.

Panel A: According to year								
Year	# of contracts	%	Financial volume (BRL MM)	%	Mandatory adoption		Voluntary adoption	
					# of contracts	%	# of contracts	%
2005	23,996	17.6	40,502	8.0	19,655	17.4	4341	18.1
2006	23,419	17.1	50,672	10.1	18,771	16.7	4648	19.3
2007	20,885	15.3	58,885	11.7	16,663	14.8	4222	17.6
2008	13,430	9.8	73,835	14.6	10,926	9.7	2504	10.4
2009	9895	7.2	45,456	9.0	8330	7.4	1565	6.5
2010	11,946	8.7	54,870	10.9	10,452	9.3	1494	6.2
2011	7746	5.7	59,338	11.8	6654	5.9	1092	4.5
2012	9721	7.1	43,723	8.7	8156	7.2	1565	6.5
2013	8094	5.9	49,679	9.9	6722	6.0	1372	5.7
2014	7565	5.5	27,115	5.4	6330	5.6	1235	5.1
Total	136,697	100	504,076	100	112,659	100	24,038	100

  

Panel B: According to index								
Index	# of contracts	%	Financial volume (BRL MM)	%	Mandatory adoption		Voluntary adoption	
					# of contracts	%	# of contracts	%
Reference rate	96,712	70.7	150,298	29.8	81,356	72.2	15,356	63.9
CDI	13,959	10.2	239,295	47.5	11,432	10.1	2527	10.5
Libor	1057	0.8	7952	1.6	617	0.5	440	1.8
TR	423	0.3	8009	1.6	348	0.3	75	0.3
TJLP	63	0.0	870	0.2	50	0.0	13	0.1
SELIC	62	0.0	204	0.0	56	0.0	6	0.0
IGPM	61	0.0	1107	0.2	58	0.1	3	0.0
IPCA	14	0.0	613	0.1	10	0.0	4	0.0
Others	24,346	17.8	95,728	19.0	18,732	16.6	5614	23.4
Total	136,697	100	504,076	100	112,659	100	24,038	100

  

Panel C: According to currency								
Currency	# of contracts	%	Financial volume (BRL MM)	%	Mandatory adoption		Voluntary adoption	
					# of contracts	%	# of contracts	%
Brazilian Real	118,605	86.8	384,081	76.2	98,615	87.5	19,990	83.2
US Dollar	17,287	12.6	115,643	22.9	13,272	11.8	4015	16.7
Euro	682	0.5	1004	0.2	664	0.6	18	0.1
Yen	106	0.1	3345	0.7	91	0.1	15	0.1
Pound	17	0.0	4	0.0	17	0.0	0	0.0
Total	136,697	100	504,076	100	112,659	100	24,038	100

  

Panel D: According to type of credit								
Type of credit	# of contracts	%	Financial volume (BRL MM)	%	Mandatory adoption		Voluntary adoption	
					# of contracts	%	# of contracts	%
Working capital	7531	5.5	145,365	28.8	6154	5.5	1377	5.7
Working capital turnover	8375	6.1	33,226	6.6	6819	6.1	1556	6.5
Foreign trade	19,862	14.5	148,352	29.4	15,350	13.6	4512	18.8
Investments	8480	6.2	70,860	14.1	6928	6.1	1552	6.5
Securitization	53,343	39.0	43,667	8.7	47,831	42.5	5512	22.9
Others	39,106	28.6	62,607	12.4	29,577	26.3	9529	39.6
Total	136,697	100	504,076	100	112,659	100	24,038	100

(continued on next page)

Table 3 (continued)

Panel E: According to risk								
Rating	# of contracts	%	Financial volume (BRL MM)	%	Mandatory adoption		Voluntary adoption	
					# of contracts	%	# of contracts	%
AA	63,437	46.4	313,097	62.1	51,448	45.7	11,989	49.9
A	41,873	30.6	131,169	26.0	33,545	29.8	8328	34.6
B	20,593	15.1	43,140	8.6	18,580	16.5	2013	8.4
C	8634	6.3	11,230	2.2	7467	6.6	1167	4.9
D	1264	0.9	3137	0.6	1144	1.0	120	0.5
E	510	0.4	219	0.0	291	0.3	219	0.9
F	245	0.2	152	0.0	68	0.1	177	0.7
G	28	0.0	1727	0.3	20	0.0	8	0.0
H	113	0.1	205	0.0	96	0.1	17	0.1
Total	136,697	100	504,076	100	112,659	100	24,038	100

Note: The sample comprises 136,697 bank loan contracts granted by 141 different financial institutions from 2005 to 2014. The sample is restricted to non-earmarked loans, i.e., loan contracts involving unsubsidized resources. We considered only operations granted by financial institutions, i.e., contracts transferred or acquired from other banks were excluded. Contracts with invalid interest rate, post-fixed operations with no identification of indexes, contracts in unidentified foreign currencies, loan amounts with 0 value in the database, loans with grant and final payment on the same date, renegotiated or written-off loans, and off-balance guarantees were also excluded from the sample. We also pooled loans taken by the same borrower from the same bank on the same date. Pooled operations had identical firm CNPJ, bank CNPJ, grant date (day, month, and year), maturity date (day, month, and year), credit rating, destination of resources, type of credit, collateral, indices, currency, and interest rate.

not significant. In line with previous studies, the finding of significant control variables indicates that larger firms ( $Size_{it}$ ) with smaller net earnings volatility ( $VolatNE_{it}$ ) and audited by the Big Four ( $Audit_{it}$ ) tend to receive better credit ratings from risk assessment agencies.

In short, the combined results from Table 6 (columns 1 and 2) indicate that accounting information has become more relevant to risk assessment after IFRS adoption, regardless of whether the ratings are assigned by financial institutions or risk assessment agencies. Thus, IFRS adoption appears to have benefited users of accounting information. Because they are based on principles, IFRS standards seek to capture the economic substance of transactions through recognition, measurement, and disclosure of accounting processes (Barth et al., 2008).

#### 4.1.2. Explanatory model for dispersion of credit ratings

Table 7 shows the result of the regression of the impact of mandatory IFRS adoption on the quartile variation coefficient ( $QVC_{it}$ ) of the ratings.

As shown in column 1, none of the variables related to IFRS adoption ( $Post_t$ ,  $IFRS_t$ , and  $Post_t \cdot IFRS_t$ ) have a statistically significant coefficient, suggesting that, overall, mandatory IFRS adoption had no impact on the dispersion of corporate credit ratings. In other words, the analysis suggests  $H_2$  should be rejected. The signs of the control variables in column 1 are compatible with the literature and with the statistically significant coefficients. Thus, companies with higher returns ( $ROA_{it}$ ), smaller leverage ( $Lev_{it}$ ), greater interest coverage ( $IntC_{it}$ ), greater tangibility ( $Tang_{it}$ ), and smaller net earnings volatility ( $VolatNE_{it}$ ) display smaller dispersion in credit ratings.

Exploring the analysis further, column 2 shows the result of the re-estimation of the explanatory models of the quartile variation coefficient, including the multiplication term representing incentives to improve accounting information quality. The sign is positive for the coefficient of  $Post_t \cdot IFRS_t$  and negative for the coefficient of  $Post_t \cdot IFRS_t \cdot AIQ_{it}$ , and both are significant at 1% level, suggesting that the impact of mandatory IFRS adoption on the contractual relationship between lenders and borrowers depends on whether companies made efforts to improve accounting information quality at the time of transition. Firms displaying reduced discretionary accruals after IFRS adoption also present less dispersion of credit ratings assigned by financial institutions. That is, credit ratings were more uniform for these firms despite being assigned independently by risk assessment agencies and financial institutions. Thus,  $H_3$  cannot be rejected, i.e., IFRS adoption helps reduce information asymmetry between lenders and borrowers only when accounting information quality was improved.

## 4.2. Effect of mandatory IFRS adoption on loan contract terms

### 4.2.1. Base model

Table 8 shows the results of the equations estimating the effect of mandatory IFRS adoption on loan contract terms (Model (3)). The coefficient for  $Post_t$  (column 1) is positive and significant, suggesting the cost of debt increased in the control group after the transition. The coefficient of  $IFRS_t$  is negative and significant at 1%, indicating that before the transition, the cost of debt was lower for voluntary adopters than for mandatory adopters.

To isolate the effect of IFRS adoption, we analyzed the interactive term  $Post_t \cdot IFRS_t$ . The coefficient is positive and significant at 1%, suggesting that after the transition, the cost of debt increased for mandatory adopters compared to the control group. The regression of debenture contracts (column 2) yielded no significant coefficients for IFRS-related variables ( $Post_t$ ,  $IFRS_t$ , and

**Table 4**

Descriptive statistics of corporate debts (debentures) according to year, index, destination of resources and risk.

Panel A: According to year									
Year	# of contracts	%	Financial volume (BRL MM)	%	Mandatory adoption		Voluntary adoption		
					# of contracts	%	# of contracts	%	
2005	21	3.6	5894	2.8	18	3.5	3		4.3
2006	29	4.9	18,833	8.8	22	4.2	7		10.1
2007	30	5.1	8689	4.1	28	5.4	2		2.9
2008	29	4.9	6270	2.9	26	5.0	3		4.3
2009	55	9.4	18,050	8.4	48	9.3	7		10.1
2010	70	11.9	28,403	13.3	66	12.7	4		5.8
2011	77	13.1	25,984	12.1	70	13.5	7		10.1
2012	95	16.2	40,939	19.1	85	16.4	10		14.5
2013	94	16.0	33,707	15.7	81	15.6	13		18.8
2014	87	14.8	27,433	12.8	74	14.3	13		18.8
Total	587	100	214,201	100	518	100	69		100

  

Panel B: According to index									
Index	# of contracts	%	Financial volume (BRL MM)	%	Mandatory adoption		Voluntary adoption		
					# of contracts	%	# of contracts	%	
DI	480	81.8	183,328	85.6	426	82.2	54		78.3
IPCA	80	13.6	21,897	10.2	66	12.7	14		20.3
IGPM	12	2.0	2154	1.0	12	2.3	0		0.0
TR	9	1.5	4015	1.9	8	1.5	1		1.4
Reference rate	4	0.7	2343	1.1	4	0.8	0		0.0
US dollar	2	0.3	463	0.2	2	0.4	0		0.0
Total	587	100	214,201	100	518	100	69		100

  

Panel C: According to destination of resources									
Destination	# of contracts	%	Financial volume (BRL MM)	%	Mandatory adoption		Voluntary adoption		
					# of contracts	%	# of contracts	%	
Investment in or acquisition of equity holdings	78	13.3	33,715	15.7	64	12.4	14		20.3
Projects and fixed assets	56	9.5	16,635	7.8	44	8.5	12		17.4
Other destinations	24	4.1	6676	3.1	19	3.7	5		7.2
Working capital	122	20.8	43,473	20.3	106	20.5	16		23.2
Extension of debt profile/reduction of liabilities	233	39.7	82,553	38.5	217	41.9	16		23.2
Repurchase or redemption of prev. issued debentures	74	12.6	31,148	14.5	68	13.1	6		8.7
Total	587	100	214,201	100	518	100	69		100

  

Panel D: According to risk operation									
Ratings assigned by Fitch/S&P/Moody's	# of contracts	%	Financial volume (BRL MM)	%	Mandatory adoption		Voluntary adoption		
					# of contracts	%	# of contracts	%	
AAA/AAA/Aaa	32	5.5	12,766	6.0	19	3.7	13		18.8
AA/AA/Aa	237	40.4	96,441	45.0	206	39.8	31		44.9
A/A/A	225	38.3	71,588	33.4	221	42.7	4		5.8
BBB/BBB/Baa	9	1.5	2293	1.1	7	1.4	2		2.9
BB/BB/Ba	2	0.3	140	0.1	2	0.4	0		0.0
B/B/B	0	0.0	0	0.0	0	0.0	0		0.0
CCC/CCC/Caa	0	0.0	0	0.0	0	0.0	0		0.0
CC/CC/Ca	0	0.0	0	0.0	0	0.0	0		0.0
C/C/C or worse	0	0.0	0	0.0	0	0.0	0		0.0
No rating	82	14.0	30,972	14.5	63	12.2	19		27.5
Total	587	100	214,201	100	518	100	69		100

Note: The corporate debt sample consists of 587 contracts of debentures issued by 122 firms from 2005 to 2014. The terms of the debentures were obtained from the National Debenture System (SND), administered by ANBIMA. The destination of resources and the ratings assigned by Fitch, Standard & Poor's, and Moody's, in that order of preference, were manually collected from each prospectus.

**Table 5**  
Descriptive statistics of continuous variables.

Variables	Adoption	N	Mean	St. Dev.	P1	P25	Median	P75	P99
Panel A: Dependent variable – rating									
QVC <sub>it</sub>	Mandatory	3,496	0.08	0.08	0.00	0.06	0.06	0.10	0.42
	Voluntary	1,140	0.07	0.06	0.00	0.05	0.06	0.09	0.28
Panel B: Dependent variables – loan contracts									
Cost of debt	Mandatory	112,657	2.467	4.511	0.075	1.018	1.391	1.994	25.300
	Voluntary	24,032	2.984	5.708	0.075	0.997	1.375	1.978	25.300
Amount (%)	Mandatory	88,635	0.040	0.102	0.000	0.000	0.003	0.019	0.488
	Voluntary	22,485	0.040	0.101	0.000	0.000	0.002	0.015	0.488
Maturity	Mandatory	110,787	4.165	1.053	1.946	3.434	4.111	4.644	6.999
	Voluntary	23,451	4.076	1.269	1.946	3.296	3.807	4.779	6.999
Panel C: Dependent variables – corporate debts									
Cost of debt	Mandatory	517	1.168	0.179	0.898	1.083	1.122	1.182	1.800
	Voluntary	68	1.127	0.144	0.898	1.059	1.100	1.173	1.800
Amount (%)	Mandatory	513	4.180	4.200	0.151	1.340	2.710	5.560	18.200
	Voluntary	68	4.310	4.570	0.151	1.300	2.900	5.440	18.200
Maturity	Mandatory	517	7.425	0.558	5.903	7.154	7.510	7.846	8.364
	Voluntary	68	7.621	0.514	5.903	7.510	7.692	7.881	8.364
Panel D: Independent variables – accounting indicators and firm-specific characteristics									
Size	Mandatory	3,272	15.32	1.27	12.34	14.50	15.28	16.32	18.61
	Voluntary	1,075	15.69	1.78	11.94	14.28	15.46	17.07	20.26
Return on assets	Mandatory	3,250	0.05	0.08	-0.15	0.01	0.05	0.08	0.26
	Voluntary	1,071	0.09	0.12	-0.25	0.03	0.08	0.14	0.54
Leverage	Mandatory	3,272	30.15	16.40	0.00	18.60	30.60	41.30	65.90
	Voluntary	1,075	28.16	15.89	0.00	16.60	26.90	39.50	70.90
Interest coverage	Mandatory	2,853	0.72	1.10	-2.30	0.10	0.74	1.28	4.12
	Voluntary	962	1.04	1.30	-2.30	0.34	1.07	1.81	4.30
Tangibility	Mandatory	3,272	0.30	0.24	0.00	0.07	0.29	0.45	0.87
	Voluntary	1,075	0.30	0.19	0.00	0.16	0.26	0.41	0.70
Earnings volatility	Mandatory	3,214	11.26	1.40	7.71	10.38	11.29	12.15	14.23
	Voluntary	1,087	11.83	1.85	7.69	10.52	11.77	13.15	16.31
Proportion of capture of directed resources	Mandatory	2,995	0.492	0.340	0	0.176	0.502	0.814	1
	Voluntary	1,042	0.549	0.335	0	0.234	0.553	0.887	1
Panel E: Independent variables – loan-specific characteristics									
Number of loans	Mandatory	112,659	4.93	1.66	0.69	3.89	5.15	6.22	7.61
	Voluntary	24,038	4.24	1.65	0.00	3.18	4.25	5.30	7.08
Time of relationship	Mandatory	112,656	8.17	1.07	5.27	7.65	8.49	9.01	9.48
	Voluntary	24,034	7.96	1.08	5.27	7.51	8.10	8.71	9.48
Panel F: Independent variables – bank-specific characteristics									
Capital	Mandatory	1,565	23.9	45.8	11.0	14.4	17.3	24.1	93.9
	Voluntary	931	23.8	20.9	11.6	14.2	16.6	20.6	108.1
Size of financial institution	Mandatory	1,569	22.7	2.5	16.3	21.2	22.8	24.4	27.6
	Voluntary	926	23.4	2.7	15.5	22.2	23.4	25.2	27.7
Return on assets of financial institution	Mandatory	1,610	2.1	14.0	-9.9	0.3	1.1	2.1	24.7
	Voluntary	952	2.0	9.0	-13.0	0.4	1.1	2.0	30.2
Liquidity (%)	Mandatory	1,569	31.1	18.6	0.2	19.0	29.6	41.7	78.8
	Voluntary	926	29.4	17.7	0.1	19.2	29.3	37.8	79.1
Bank reserves (%)	Mandatory	1,569	2.7	4.5	0.0	0.0	0.4	3.8	18.6
	Voluntary	926	3.1	4.1	0.0	0.0	0.8	5.6	17.0
Default (%)	Mandatory	1,568	4.8	4.5	0.0	1.8	4.2	6.7	20.3
	Voluntary	926	4.4	3.3	0.0	1.8	4.3	6.1	16.9
Specialization (%)	Mandatory	1,569	46.2	21.6	2.4	32.8	45.0	59.1	96.3
	Voluntary	926	48.9	22.8	2.8	37.7	44.6	60.3	97.7

Note: The sample of ratings comprises 4636 observations (firm-quarters) of 122 conglomerates from 2005 to 2014. The sample of corporate debt consists of 587 debenture contracts issued by 122 firms from 2005 to 2014. The sample of bank loan contracts comprises 136,697 contracts granted by 141 financial institutions from 2005 to 2014. The definition of each variable is given in Appendix 1.

$Post_t \cdot IFRS_i$ ), suggesting the cost of issuance of debentures was not affected by the transition. This contradicts the notion that mandatory IFRS adoption results in economic benefits for borrowers.

As observed in columns 3 and 4, mandatory IFRS adoption is apparently not associated with maturity in the case of both bank loans and debentures ( $Post_t \cdot IFRS_i$ ).  $Post_t$  and  $IFRS_i$  are significant in some cases, but these variables are merely controls for differences i) between the periods before and after IFRS adoption in the control group, and ii) between the group of interest and the control group prior to the transition. In other words, the analysis does not suggest that mandatory IFRS adoption is associated with longer maturity. Columns 5 and 6 show the explanatory regressions for the loan-to-total-assets ratio. The coefficient of  $Post_t \cdot IFRS_i$  is

Table 6

Base model: credit ratings.

(Dependent variable: credit ratings: 1–9)	Expected sign	Model 1: Sensitivity of credit ratings	
		Column 1 assigned by financial institutions	Column 2 assigned by credit risk assessment agencies
Independent variables			
ROA	+	4.187*** (1.448)	0.735 (3.368)
Lev	–	0.295 (0.286)	–0.798** (0.400)
IntC	+	0.901 (0.732)	0.085* (0.050)
Post	+ / –	3.674*** (1.346)	5.066*** (1.803)
Post * ROA	+	4.137** (1.726)	11.768*** (4.297)
Post * Lev	–	–1.199*** (0.328)	–1.024** (0.489)
Post * IntC	+	1.784* (0.949)	0.019 (0.081)
Control variables			
Size	+	–0.101 (0.083)	1.161*** (0.262)
Tang	+	1.335*** (0.363)	–1.516* (0.796)
VolatNE	–	–0.541 (0.409)	–0.904*** (0.140)
Audit	+	0.827*** (0.184)	1.003** (0.398)
CGov	+	0.239 (0.179)	–0.763 (0.525)
CrossList	+	–0.047 (0.153)	0.642* (0.338)
Year		YES	YES
Industry		YES	YES
# Observations		3,136	1,309
Wald test		276.6	240
Prob > chi <sup>2</sup>		0.000	0.000

Note: The sample of ratings assigned by financial institutions comprises 4160 observations (firms-quarters) of 122 conglomerates from 2005 to 2014 (except 2010). We weighted ratings by loan amount whenever these were assigned to more than one firm within a conglomerate and/or whenever a firm was assigned two or more ratings by different financial institutions. The ratings were converted to a scale from 1 (H) to 9 (AA), with higher numbers indicating credit of higher quality. The sample of ratings assigned by credit risk assessment agencies comprises 1969 observations (firm-quarters) of 122 conglomerates from 2005 to 2014 (except 2010). We used ratings assigned by Fitch, Standard & Poor's, and Moody's, in that order of preference. The classification used was the long-term national-scale rating (Brazil). The ratings were converted to a scale from 1 (C (bra)/BRC/C.br) to 9 (AAA (bra)/brAAA/Aaa.br), with higher numbers indicating credit of higher quality. The definition of each variables is given in Appendix 1. We include fixed effects by sector based on the sector classification of the CVM (Brazilian Securities Commission). The equations were estimated with a logistic model fitted with panel data (xtologit).

\*\*\*, \*\*, and \* indicate statistical significance at 1%, 5%, and 10% (two-tailed), respectively.

negative and significant in both equations (bank loans and debentures), contradicting the notion that IFRS helps firms obtain larger loans as a result of reduced information asymmetry between lenders and borrowers. In column 7, the coefficient of  $Post_t \cdot IFRS_t$  is positive and significant, suggesting that following the introduction of IFRS, collateral or surety upon contracting was more likely to be demanded of mandatory adopters. In the regression of debentures (column 8), the interactive variable is not significant at the usual levels.

Our findings partially match the results of [Chen et al. \(2013\)](#), although the latter went further and claimed mandatory IFRS adoption could have negative economic consequences for loan contracts as well (higher interest rates, shorter maturity, more demand for collateral, and reduced use of accounting-based covenants).

We then evaluated whether the inclusion of the multiplication term associated with incentives to improve information quality affects the inferences of the model shown in [Section 3.1.2](#).

[Table 9](#) presents the estimation of [Model \(3\)](#) for each of the contract terms (cost of debt, maturity, amount granted, demand for collateral), with the term  $AIQ_i$  included. Column 1 shows that the coefficient of  $Post_t \cdot IFRS_t \cdot AIQ_i$  was negative and significant, suggesting that firms displaying improved earnings quality had lower cost of debt after the transition. After controlling for loan-specific, firm-specific, and lender-specific variables, the results indicate that cost of debt decreased by ~44 base points (mean reduction: 17.8%) in the post-adoption period. In our sample of debenture contracts (column 2),  $Post_t \cdot IFRS_t \cdot AIQ_i$  is also negative and significant, indicating that the cost of issuance decreased by ~20 base points (mean reduction: 17.2%) following the transition.

**Table 7**

Model: dispersion of corporate credit ratings.

(Dependent variable: dispersion of corporate credit ratings)	IFRS effect on QVC	
	Column 1 Base model	Column 2 Conditional on information quality
<b>Independent variables</b>		
Post <sub>t</sub>	−0.892 (0.726)	−1.810** (0.827)
IFRS <sub>i</sub>	0.207 (0.946)	−0.045 (1.276)
Post <sub>t</sub> * IFRS <sub>i</sub>	0.082 (0.524)	1.497** (0.698)
AIQ <sub>i</sub>		−1.206 (1.624)
Post <sub>t</sub> * AIQ <sub>i</sub>		2.929*** (0.914)
IFRS <sub>i</sub> * AIQ <sub>i</sub>		1.798 (1.884)
Post <sub>t</sub> * IFRS <sub>i</sub> * AIQ <sub>i</sub>		−3.116*** (1.058)
<b>Control variables</b>		
ROA <sub>it</sub>	−12.386*** (2.916)	−16.415*** (3.022)
Lev <sub>it</sub>	2.403* (1.240)	−2.415* (1.233)
IntC <sub>it</sub>	−2.596** (1.102)	−3.328*** (1.131)
Size <sub>it</sub>	−0.128 (0.294)	−0.253 (0.310)
Tang <sub>it</sub>	−2.052** (0.873)	−2.227** (0.897)
VolatNE <sub>it</sub>	0.417** (0.193)	0.523*** (0.201)
Audit <sub>it</sub>	0.250 (0.521)	0.358 (0.530)
CGov <sub>it</sub>	−1.134 (0.743)	−1.125 (0.761)
CrossList <sub>it</sub>	−0.585 (0.418)	−0.763* (0.433)
Constant	6.947 (4.481)	9.767** (4.787)
Year	YES	YES
Sector	YES	YES
# Observations	4160	4160
Adjusted R-square	7.7%	8.4%
Wald test	276.6	286.4
Prob > chi <sup>2</sup>	0.000	0.000
Hausman test	19.51	20.88
Prob > chi <sup>2</sup>	5.3%	5.2%

Note: The sample of quartile variation coefficients of corporate credit ratings ( $CrpRating_{it}$ ) assigned by different financial institutions comprises 4160 observations (firm-quarters) of 122 conglomerates from 2005 to 2014 (except 2010). The quartile variation coefficient ( $QVC_{it}$ ) captures the degree of dispersion of the credit ratings assigned by different financial institutions.  $QVC_{it}$  is determined by the ratio of the interquartile range (3rd quartile minus 1st quartile) and the sum of the third and first quartiles (3rd quartile + 1st quartile). We required a minimum of 10 observations to calculate the quartile variation coefficient. The definition of each variable is given in Appendix 1. The regressions are estimated with fixed-effects panel models with robust standard errors. In both scenarios, the Hausman test suggests choosing the fixed-effects model.

\*\*\*, \*\*, and \* indicate statistical significance at 1%, 5%, and 10% (two-tailed), respectively.

Matching the results presented in Table 8, the control variables behaved as described in the literature.

Columns 3 and 4 show the estimates of the regressions of bank loans and debentures using  $Matur_{it}$  as dependent variable. In both columns, the coefficients of the interactive terms  $Post_t \cdot IFRS_i \cdot AIQ_i$  are positive and significant (at 1% and 5% significance levels, respectively), suggesting mandatory IFRS adoption is associated with longer maturity for firms with improved accounting information quality. In the sample of bank loans, the coefficient of  $Post_t \cdot IFRS_i \cdot AIQ_i$  indicates ~31% longer maturity ( $\% \Delta \ln(Matur_{it}) = 100 * \beta$ ) following the transition. In the sample of debentures, the coefficient of  $Post_t \cdot IFRS_i \cdot AIQ_i$  shows that the maturity of debentures issued by mandatory adopters with improved accounting information quality was approximately 96 months following the transition—a 42-month increase ( $0.79 * \exp(7.425) / 31$ ) in relation to the mean maturity of debentures of mandatory adopters (54 months).

As shown in columns 5 and 6, mandatory IFRS adoption is associated with the amount obtained by borrowers who presented improved accounting information quality. In both columns, the coefficient of  $Post_t \cdot IFRS_i \cdot AIQ_i$  is positive and significant, suggesting that the loan-to-

**Table 8**  
Effects of mandatory IFRS adoption on loan and corporate debt contracts.

(Dependent variable: loan and corporate debt contract terms)	Effects							
	Cost of debt		Maturity		Amount		Collateral	
	Column 1 Loan contract	Column 2 Corporate debt	Column 3 Loan contract	Column 4 Corporate debt	Column 5 Loan contract	Column 6 Corporate debt	Column 7 Loan contract	Column 8 Corporate debt
<i>Independent variables</i>								
Post <sub>t</sub>	0.370*** (0.071)	0.067 (0.044)	0.175*** (0.021)	-0.378** (0.165)	0.269*** (0.022)	4.015*** (1.311)	-1.877*** (0.114)	-1.873** (0.770)
IFRS <sub>t</sub>	-0.097*** (0.027)	0.024 (0.032)	0.012 (0.010)	-0.325** (0.150)	-0.002 (0.011)	3.506*** (1.214)	-0.247*** (0.043)	0.461 (0.639)
Post <sub>t</sub> * IFRS <sub>t</sub>	0.166*** (0.053)	0.038 (0.037)	0.001 (0.015)	0.201 (0.164)	-0.099*** (0.015)	-2.775*** (1.044)	0.436*** (0.081)	0.319 (0.728)
<i>Control variables</i>								
CstDbt <sub>it</sub>			0.001 (0.001)	0.171* (0.100)	-0.016*** (0.001)	1.969 (1.368)	0.002*** (0.001)	1.918*** (0.721)
Matur <sub>it</sub>	0.024** (0.012)	0.061*** (0.016)			0.129*** (0.005)	1.160*** (0.297)	0.106*** (0.013)	0.455** (0.225)
Amount <sub>it</sub>	-0.166*** (0.008)	-0.004 (0.003)	0.143*** (0.005)	0.036*** (0.010)			-0.031*** (0.006)	0.039 (0.034)
Collat <sub>it</sub>	-0.046** (0.023)	0.068** (0.029)	0.117*** (0.010)	0.276*** (0.088)	0.050*** (0.008)	0.086 (0.432)		
TRelat <sub>it</sub>	-0.026*** (0.003)		0.002*** (0.001)		0.007*** (0.001)		-0.085*** (0.007)	
NumbL <sub>it</sub>	0.003 (0.008)		-0.037*** (0.003)		-0.111*** (0.003)		-0.182*** (0.011)	
ROA <sub>it</sub>	-0.005 (0.219)	-0.164 (0.163)	-0.646*** (0.058)	1.509** (0.667)	-1.464*** (0.096)	8.101** (4.061)	-2.217*** (0.295)	2.874 (3.267)
Lev <sub>it</sub>	0.033** (0.015)	-0.264*** (0.059)	-0.011** (0.005)	-0.360* (0.208)	-0.121*** (0.026)	-1.386** (0.543)	0.921*** (0.098)	0.671 (0.434)
IntC <sub>it</sub>	-0.011* (0.006)	-0.017*** (0.005)	0.001*** (0.000)	-0.017 (0.022)	0.015*** (0.002)	0.007** (0.003)	-0.001 (0.001)	-0.001 (0.004)
Size <sub>it</sub>	-0.094*** (0.017)	-0.048*** (0.015)	0.012*** (0.004)	0.181*** (0.048)	-0.229*** (0.006)	-1.697*** (0.280)	-0.246*** (0.022)	-0.037 (0.261)
Tang <sub>it</sub>	0.551*** (0.093)	-0.018 (0.046)	0.078*** (0.026)	0.104 (0.134)	0.253*** (0.026)	2.067* (1.113)	-0.112 (0.093)	1.034* (0.607)
VolatNE <sub>it</sub>	-0.099*** (0.014)	0.018* (0.010)	-0.007* (0.004)	-0.045 (0.038)	0.032*** (0.005)	-0.312 (0.210)	0.481*** (0.114)	0.213 (0.198)
PropDR <sub>it</sub>		-0.045* (0.026)		-0.119 (0.104)		-0.662 (0.752)		-0.293 (0.400)
Audit <sub>it</sub>	-0.080*** (0.030)	-0.031 (0.027)	-0.148*** (0.011)	0.225* (0.126)	0.048*** (0.011)	1.018* (0.550)	0.235*** (0.047)	0.315 (0.567)
CGov <sub>it</sub>	-0.010 (0.032)	-0.034* (0.019)	0.126*** (0.011)	-0.104 (0.092)	0.054*** (0.008)	-0.429 (0.436)	-0.148*** (0.046)	-0.116 (0.313)
CstDbt benchmark	0.039 (0.037)	0.130** (0.053)						
Matur benchmark			-0.005 (0.005)	0.147** (0.066)				
Amount benchmark					69.298*** (14.824)	4.126 (3.917)		
Collat benchmark							2.058*** (0.195)	0.215 (0.374)
Constant	20.709*** (0.471)	1.391*** (0.244)	2.217*** (0.124)	4.157*** (0.838)	5.627*** (0.145)	18.524*** (5.135)	-0.821 (0.759)	-12.025** (4.822)
Control modalities	YES	YES	YES	YES	YES	YES	YES	YES
Control operation risk	YES	YES	YES	YES	YES	YES	YES	YES
Control indexes	YES	YES	YES	YES	YES	YES	YES	YES
Control currency	YES	-	YES	-	YES	-	YES	-
Control financial inst. indicators	YES	-	YES	-	YES	-	YES	-
Control year	YES	YES	YES	YES	YES	YES	YES	YES
Control sector	YES	YES	YES	YES	YES	YES	YES	YES
# Observations	124,751	517	124,751	517	124,751	517	124,751	517

(continued on next page)



Table 8 (continued)

(Dependent variable: loan and corporate debt contract terms)	Effects							
	Cost of debt		Maturity		Amount		Collateral	
	Column 1 Loan contract	Column 2 Corporate debt	Column 3 Loan contract	Column 4 Corporate debt	Column 5 Loan contract	Column 6 Corporate debt	Column 7 Loan contract	Column 8 Corporate debt
Adjusted R-square	72.9%	40.5%	57.9%	47.1%	40.5%	54.0%	33.7%	33.1%

Note: The sample of bank loans comprises 136,697 contracts granted by 141 different financial institutions from 2005 to 2014 (except 2010). The sample of corporate debt consists of 587 debenture contracts issued by 122 firms from 2005 to 2014 (except 2010). Cost of debt (CstDbt) is the ratio between the interest rate of the contract (considering all financial expenses for the company) and the basic interest rate of the Brazilian economy (Selic). Maturity (Matur) is the natural logarithm of the number of days from the granting of the loan to the final payment date. Amount (Amount) is the loan amount in relation to total assets. Collateral (Collat) equals 1 if the contract requires collateral (regardless of value), 0 otherwise. Post equals 1 if the fiscal year is after the time of mandatory complete IFRS adoption (2011 and 2014), 0 otherwise (2005 and 2009). IFRS equals 1 if the company is a mandatory IFRS adopter, 0 otherwise. Firms voluntarily adopting full IFRS prior to 31 Dec 2010 are considered voluntary adopters; the remainder are mandatory adopters. The definition of each variable is given in Appendix 1. We include fixed effects according to type of credit, credit rating, indices, currency, year, and sector (based on the sector classification of the CVM (Brazilian Securities Commission)). The results presented in Columns 7 and 8 are estimated by logistic regression because the dependent variable is dichotomous, and the parameters are reported in the log-odds format. The equations are estimated with White robust errors.

\*\*\*, \*\*, and \* indicate statistical significance at 1%, 5%, and 10% (two-tailed), respectively.

total-assets ratio is greater for mandatory IFRS adopters with improved accounting information quality following the transition. In the sample of bank loans, the coefficient of  $Post_t \cdot IFRS_i \cdot AIQ_i$  indicates that the average loan-to-total-assets ratio of mandatory adopters with improved accounting information quality rose from 0.04% to 0.06% ( $0.04\% + 0.171 / 1000$ ) following the transition. In the sample of debentures, the coefficient of  $Post_t \cdot IFRS_i \cdot AIQ_i$  indicates an increase from 4.2% to 9.4% ( $4.2\% + 5.184 / 100$ ) in the loan-to-total-assets ratio obtained by mandatory adopters with improved accounting information quality following the transition.

In column 7, the coefficient of the interactive term  $Post_t \cdot IFRS_i \cdot AIQ_i$  is negative and significant (at 1%), suggesting mandatory IFRS adoption is associated with less demand for collateral in the sample of borrowers presenting improved accounting information quality. In fact, the coefficient indicates that collateral was  $\sim 43\%$  less likely to be demanded ( $\exp(-0.566) - 1$ ) following the transition. In contrast, the coefficient of  $Post_t \cdot IFRS_i \cdot AIQ_i$  is not significant for the sample of debentures and, thus, cannot be said to be different from zero.

Overall, our results suggest mandatory IFRS adoption had heterogeneous (firm-specific) consequences on the credit market—some positive, others negative. Hence, H5 cannot be rejected. As a robustness check and due to the potential interaction between loan contract terms, Model (3) equations were also estimated with 2SLS (Appendix 3). Results are very similar to those presented in Tables 8 and 9, supporting the conclusions regarding H4 and H5.

#### 4.2.2. Differential impact between bond market and bank credit market (H6)

In this section, we analyze the differential impact on the equations estimated in Table 9, centered on the interactive term  $Post_t \cdot IFRS_i \cdot AIQ_i$ . The following is a summary of the effects on the contract terms in each sample (bank loans vs. debentures) after controlling for loan-specific, firm-specific and lender-specific variables:

- Cost of debt (columns 1 and 2): The coefficients are negative and significant. IFRS adoption is associated with an average reduction of 43 base points (bank loans) and 21 base points (debentures) in cost of debt after the transition, corresponding to 17.4% and 18.0%, respectively.
- Maturity (columns 3 and 4): The coefficients are positive and significant. IFRS adoption is associated with an average increase in maturity of  $\sim 0.6$  months ( $0.30 * \exp(.4.17)/31$ ) for bank loans and  $\sim 44$  months ( $0.81 * \exp(.7.43)/31$ ) for debentures after the transition, corresponding to  $\sim 30\%$  and  $\sim 81\%$  ( $\% \Delta \ln(\text{Matur}_{it}) = 100 * \beta$ ), respectively.
- Amount granted (columns 5 and 6): The coefficients are positive and significant. IFRS adoption is associated with an increase in the loan-to-total-assets ratio from 0.04% to 0.06% ( $0.04\% + 0.177/1000$ ) for bank loans and from 4.18% to 9.6% ( $4.18\% + 5.40/100$ ) for debentures after the transition, corresponding to 44% and 129%, respectively.
- Demand for collateral (columns 7 and 8): The coefficients are negative and significant. IFRS adoption is associated with an average reduction of  $\sim 3.6\%$  ( $\exp(-0.04) - 1$ ) (bank loans) and  $\sim 39.7\%$  ( $\exp(-0.51) - 1$ ) (debentures) in the likelihood of credit being conditional on collateral.

Our analysis of the impacts of IFRS adoption on financial and non-financial contract terms indicates that economic benefits tended to be greater for debentures than for bank loans. Hence, H6 cannot be rejected. As a robustness check, we also evaluated the differential impact between bond and bank credit market using Model (3) equations estimated with 2SLS method. The direction and magnitude of the effects are similar to what is presented above.

Table 9

Effects of mandatory IFRS on loans and corporate debt contracts conditional on incentives.

(Dependent variable: loan contract terms)	Effects							
	Cost of debt		Maturity		Amount		Collateral	
	Column 1 Loan contract	Column 2 Corporate debt	Column 3 Loan contract	Column 4 Corporate debt	Column 5 Loan contract	Column 6 Corporate debt	Column 7 Loan contract	Column 8 Corporate debt
<i>Independent variables</i>								
Post <sub>t</sub>	0.414*** (0.090)	-0.011 (0.057)	0.234*** (0.025)	-0.014 (0.217)	0.409*** (0.027)	5.750*** (1.248)	-2.171*** (0.164)	-1.601* (0.931)
IFRS <sub>t</sub>	-0.074 (0.046)	-0.008 (0.052)	0.171*** (0.016)	-0.275 (0.248)	-0.006 (0.018)	5.164*** (1.199)	-0.266*** (0.058)	-5.930*** (1.383)
Post <sub>t</sub> * IFRS <sub>t</sub>	0.282*** (0.076)	0.138** (0.056)	-0.116*** (0.022)	-0.123 (0.253)	-0.219*** (0.023)	-4.104*** (1.063)	1.047*** (0.141)	0.420 (0.879)
AIQ <sub>it</sub>	0.293*** (0.053)	-0.093 (0.066)	0.214*** (0.019)	0.109 (0.302)	0.011 (0.020)	4.652** (2.274)	-0.217*** (0.076)	-6.764*** (1.607)
Post <sub>t</sub> * AIQ <sub>it</sub>	-0.137 (0.088)	0.208** (0.084)	-0.150*** (0.027)	-0.663* (0.340)	-0.260*** (0.026)	-6.407** (2.567)	0.951*** (0.172)	-2.882* (1.667)
IFRS <sub>t</sub> * AIQ <sub>it</sub>	0.139** (0.057)	0.109 (0.075)	-0.269*** (0.022)	-0.179 (0.331)	-0.033 (0.024)	-3.417 (2.371)	-0.071 (0.091)	7.621*** (1.700)
Post <sub>t</sub> * IFRS <sub>t</sub> * AIQ <sub>it</sub>	-0.438*** (0.106)	-0.201** (0.097)	0.311*** (0.031)	0.791** (0.380)	0.171*** (0.030)	5.184** (2.569)	-0.566*** (0.187)	2.388 (1.721)
<i>Control variables</i>								
CstDbt			0.002 (0.001)	0.190* (0.099)	-0.016*** (0.001)	1.758 (1.416)	0.002*** (0.001)	1.620** (0.734)
Matur <sub>it</sub>	0.024** (0.012)	0.060*** (0.017)			0.126*** (0.005)	0.887*** (0.273)	0.095*** (0.013)	0.497** (0.223)
Amount <sub>it</sub>	-0.166*** (0.008)	-0.004 (0.003)	0.142*** (0.005)	0.014* (0.008)			-0.030*** (0.006)	0.034 (0.036)
Collat <sub>it</sub>	-0.046** (0.023)	0.059* (0.030)	0.120*** (0.010)	0.257*** (0.094)	0.039*** (0.008)	0.069 (0.443)		
TRelat	-0.026*** (0.003)		0.001 (0.001)		0.005*** (0.001)		-0.077*** (0.007)	
NumbL	0.003 (0.008)		-0.040*** (0.003)		-0.115*** (0.003)		-0.186*** (0.011)	
ROA <sub>it</sub>	-0.005 (0.219)	-0.386 (0.246)	-0.579*** (0.060)	1.300 (1.081)	-1.417*** (0.097)	9.144* (5.119)	-2.240*** (0.307)	1.095 (3.583)
Lev <sub>it</sub>	0.033** (0.015)	-0.300*** (0.076)	-0.014*** (0.005)	-0.309 (0.275)	-0.093*** (0.027)	-2.199*** (0.592)	0.851*** (0.100)	0.876* (0.485)
IntC <sub>it</sub>	-0.011* (0.006)	-0.017*** (0.006)	0.001*** (0.000)	-0.005 (0.025)	0.014*** (0.002)	0.009*** (0.003)	-0.001 (0.002)	-0.002 (0.004)
SizeFi <sub>it</sub>	-0.094*** (0.017)	-0.056*** (0.019)	0.019*** (0.004)	0.117* (0.060)	-0.237*** (0.006)	-1.703*** (0.331)	-0.313*** (0.024)	-0.217 (0.255)
Tang <sub>it</sub>	0.551*** (0.093)	-0.003 (0.054)	0.086*** (0.027)	0.070 (0.163)	0.381*** (0.028)	0.854 (1.193)	0.055 (0.099)	0.993 (0.664)
VolatNE <sub>it</sub>	-0.099*** (0.014)	0.023* (0.013)	-0.008* (0.004)	-0.011 (0.054)	0.033*** (0.005)	-0.618** (0.261)	0.688*** (0.118)	0.217 (0.213)
PropDR		-0.060** (0.028)		-0.211* (0.108)		-1.572** (0.735)		-0.622 (0.411)
Audit <sub>it</sub>	-0.080*** (0.030)	-0.036 (0.031)	-0.126*** (0.011)	0.220 (0.145)	0.052*** (0.011)	1.078* (0.578)	0.328*** (0.050)	0.497 (0.663)
CGov <sub>it</sub>	-0.010 (0.032)	-0.035* (0.020)	0.128*** (0.012)	-0.105 (0.106)	0.043*** (0.009)	-0.479 (0.561)	-0.138*** (0.048)	0.189 (0.320)
CstDbt benchmark	0.039 (0.037)	0.118** (0.055)						
Matur benchmark			-0.003 (0.005)	0.166** (0.068)				
Amount benchmark					67.979*** (14.963)	6.349* (3.517)		
Collat benchmark							2.027*** (0.197)	0.256 (0.395)
Constant	20.709*** (0.471)	1.491*** (0.285)	1.914*** (0.135)	4.599*** (1.003)	5.542*** (0.153)	23.119*** (5.421)	-0.481 (0.788)	-3.877 (5.122)
Control modalities	YES	YES	YES	YES	YES	YES	YES	YES
Control operation risk	YES	YES	YES	YES	YES	YES	YES	YES
Control indexes	YES	YES	YES	YES	YES	YES	YES	YES
Control currency	YES	-	YES	-	YES	-	YES	-
Control financial inst. indicators	YES	-	YES	-	YES	-	YES	-

(continued on next page)

Table 9 (continued)

(Dependent variable: loan contract terms)	Effects							
	Cost of debt		Maturity		Amount		Collateral	
	Column 1 Loan contract	Column 2 Corporate debt	Column 3 Loan contract	Column 4 Corporate debt	Column 5 Loan contract	Column 6 Corporate debt	Column 7 Loan contract	Column 8 Corporate debt
Control year	YES	YES	YES	YES	YES	YES	YES	YES
Control sector	YES	YES	YES	YES	YES	YES	YES	YES
# Observations	124,751	517	124,751	517	124,751	517	124,751	517
Adjusted R-square	72.7%	42.1%	58.0%	45.4%	40.9%	58.1%	34.2%	34.5%

Note: The sample of bank loans comprises 136,697 contracts granted by 141 different financial institutions from 2005 to 2014 (except 2010). The corporate debt sample consists of 587 debenture contracts issued by 122 firms from 2005 to 2014 (except 2010). Cost of debt (CstDbt) is the ratio between the interest rate of the contract (considering all financial expenses for the company) and the basic interest rate of the Brazilian economy (Selic). Maturity (Matur) is the natural logarithm of the number of days from the granting of the loan to the final payment date. Amount (Amount) is the loan amount in relation to total assets. Collateral (Collat) equals 1 if the contract requires collateral (regardless of value), 0 otherwise. Post equals 1 if the fiscal year is after the time of mandatory complete IFRS adoption (2011 and 2014), 0 otherwise (2005 and 2009). IFRS equals 1 if the company is a mandatory IFRS adopter, 0 otherwise. Firms voluntarily adopting full IFRS prior to 31 Dec 2010 are considered voluntary adopters; the remainder is mandatory adopters. The definition of each variable is given in Appendix 1. We include fixed effects according to type of credit, credit rating, indices, currency, year and sector, based on the sector classification of the CVM (Brazilian Securities Commission). The results presented in Columns 7 and 8 are estimated by logistic regression because the dependent variable is dichotomous, and the parameters are reported in the log-odds format. The equations are estimated with White robust errors.

\*\*\*, \*\*, and \* indicate statistical significance at 1%, 5%, and 10% (two-tailed), respectively.

## 5. Conclusion

In this study, we investigate the effects, at various levels, of mandatory IFRS adoption on the Brazilian credit market. Whereas much has been published on the impact of IFRS adoption on capital markets, the present study is, to our knowledge, the most comprehensive to date to evaluate the impact of IFRS adoption on (a) credit risk, (b) financial and non-financial loan contract terms, and (c) access of Brazilian firms to international credit markets. Earlier studies on the potential consequences of IFRS adoption for credit markets have yielded inconsistent results. Thus, we conducted an empirical analysis of a very large sample of credit operations (bank loans, debentures, and contracts abroad) and corporate credit ratings in a single country, while controlling for the influence of country-level and firm-level incentives on accounting information.

The results of the first part of our analysis suggest that the ability of accounting information to explain corporate credit ratings increased after mandatory IFRS adoption. The evidence was the same regardless of whether the corporate credit ratings were assigned by financial institutions or risk assessment agencies (Fitch, Standard & Poor's, and Moody's). In other words, banks and risk assessment agencies are sensitive to IFRS adoption; this is not surprising since they are among the most sophisticated users of accounting information (Armstrong et al., 2010). Consistent evidence shows that dispersion in credit ratings assigned by lenders was reduced for firms with improved accounting information quality after the time of transition. The results of the second part of our analysis suggest that mandatory IFRS adoption may have positive or negative consequences for firms on the credit market depending on the presence of incentives. In both credit scenarios (bank loans and debentures), firms with incentives to improve earnings quality display (a) reduced cost of debt, (b) longer maturity, (c) greater loans, and (d) less demand for collateral after the transition. In addition, for such firms, the effects (a–d) tended to be stronger on the debenture market than on the bank credit market, supporting the notion that the weaker the alternative mechanisms of mitigating agency costs (e.g., access to proprietary information, such as managerial reports, budgets, and forecasts), the greater the reliance on accounting information (Bhattacharya et al., 2003; Diamond, 1991; Fama, 1985; Yosha, 1995).

Our study makes an important contribution to the literature. In all the aspects of our analysis, the evidence indicates that the existence of economic benefits associated with the transition to IFRS does not depend solely on the publication of financial reports in the mandatory format, but also on how earnestly firms adopt recommended disclosure practices. Unlike voluntary adoption—which is generally driven by a desire to reduce information asymmetry, improve corporate governance mechanisms (Wu & Zhang, 2014), or strengthen communication with foreign investors (Ashbaugh, 2001; Leuz & Verrecchia, 2000)—mandatory adoption does not come with enforcement mechanisms and is not necessarily an expression of the adopter's endogenous preferences, and so may result in heterogeneous incentives to improve earnings quality (Ernst & Young, 2006). Indeed, our results cogently contradict the notion that the adoption of a government-mandated accounting format is in itself enough to ensure economic benefits for the credit market, especially in the absence of firm-level incentives to improve information quality. Along with evidence from earlier studies on the capital market (e.g., Brochet et al., 2013; Byard et al., 2011; Daske et al., 2008; DeFond et al., 2011; Li, 2010; Lima, 2011; Tan et al., 2011), our findings confirm the crucial role of firm-level incentives in the evaluation of potential economic benefits of changes in accounting format.

By providing evidence against the notion that IFRS-related economic benefits are limited to countries with specific institutional characteristics, our study contributes to the debate on the relation between country-level and firm-level incentives in the context of IFRS adoption. Although Brazil is considered an emerging economy with an institutional framework challenging the existence of IFRS-related economic benefits, opportune market forces in Brazil make mandatory IFRS adoption a highly heterogeneous process. In

fact, our investigations suggest that in countries like Brazil, firm-level incentives can compensate for the lack of a strong institutional framework, favoring the emergence of positive economic effects associated with mandatory IFRS adoption. This has not always been acknowledged in cross-country studies due in part to (a) difficulties in creating controls to maintain constant the institutional characteristics of different political and legal frameworks, (b) difficulties in reducing bias from endogeneity, (c) lack of market-specific controls (e.g., proportion of subsidized loans, profile of lenders), and (d) insufficient sample size.

Finally, our evidence counters the notion that financial reports in IFRS put emphasis on abstract models of measurement and contemporary information to the detriment of contractibility of the accounting information (Ball et al., 2015). Although accounting information certainly plays a direct role in the making of covenants (a fact established since Jensen & Meckling, 1976), it is also highly relevant to pricing, negotiation, and credit risk assessment, especially in economies where IFRS represents an improvement over GAAP. Satisfying the informational needs of highly diverse groups of stakeholders, such as investors and creditors, often involves a trade-off between relevance and objectivity. Ultimately, the usefulness of IFRS to creditors depends on the ability of accounting information to simultaneously satisfy performance-evaluating and contractual needs—or, as Ball, Bushman, and Vasvari (2008) put it, on its debt-contracting value. In this lies an important challenge for future research.

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## Appendix 1. Operational definition of study variables

Variable	Symbol	Description	Source	
<i>Adoption of IFRS</i>				
IFRS	$IFRS_t$	Equals 1 if the company is a mandatory IFRS adopter, 0 otherwise.	Published financial reports	
Post-complete adoption	$Post_t$	Equals 1 if the fiscal year is after the time of mandatory complete IFRS adoption (2011 and 2014), 0 otherwise (2005 and 2009)	–	
<i>Dependent variables</i>				
Dimension 1	Corporate credit rating	$CrpRating_{it}$	Corporate ratings assigned by financial institutions expressed on a scale from H (1) to AA (9). External ratings obtained from Fitch or Standard & Poor's or Moody's, in that order of preference, expressed on a scale from C(bra)/brC/C.br (1) to AAA(bra)/brAAA/Aaa.br (9)	BCB; Thomson Reuters; sites of risk assessment agencies
	Dispersion of corporate credit ratings	$QVC_{CrpRatingit}$	Quartile variation coefficient in corporate credit ratings ( $CrpRating_{it}$ ) assigned by different financial institutions. At least 10 observations in each period are required to calculate the variable.	BCB
Dimension 2	Contract terms	$ContrT_{it}$	Ratio between the interest rate of the contract (considering all financial expenses for the company) and the basic interest rate of the Brazilian economy - Selic $[(1 + IntRate_{it})(1 + Index_{it})(1 + Exchange_{it}) / Ref_t]$	BCB; SND
	Cost of debt	$CstDbt_{it}$		
	Maturity	$Matur_{it}$	Natural logarithm of the number of days from the granting of the loan to the final payment date	BCB; SND
	Amount	$Amount_{it}$	Loan amount in relation to total assets	BCB; SND
	Collateral	$Collat_t$	Equals 1 if the contract requires collateral (regardless of value), 0 otherwise	BCB; SND
<i>Accounting indicators and firm-specific characteristics</i>				
Return on assets	$ROA_{it}$	Net earnings per trimester divided by the mean total assets of the period (annualized)	Economática©	
Leverage	$Lev_{it}$	Total gross debt divided by total assets	Economática©	
Interest coverage	$IntC_{it}$	Natural logarithm of earnings before interest and tax divided by gross financial expenses	Economática©	
Size	$Size_{it}$	Natural logarithm of total assets	Economática©	
Tangibility	$Tang_{it}$	Fixed, intangible and deferred assets divided by total assets	Economática©	

Net earnings volatility	$VolatNE_{it}$	Standard deviation of net earnings in the preceding 16 trimesters	Economática©
<i>Loan-specific characteristics</i>			
Time of relationship	$TRelat_{it}$	Natural logarithm of the number of days from conclusion of the first contract to conclusion of the current contract	BCB; SND
Number of loans	$NumbL_{it}$	Natural logarithm of number of loan contracts between the company and the bank in the 12 months preceding the conclusion of the current contract	BCB; SND
Type of operation/ destination of resources	$Type(x)_{it}$	Bank loans: a) working capital, b) working capital turnover, c) operations with receivables, d) investment, e) foreign trade, f) others. Debentures: a) working capital, b) extension of debt profile/reduction of liabilities, c) project implementation and investment in fixed assets and infrastructure, d) investment in or acquisition of equity holdings, e) repurchase or redemption of previously issued debentures, f) other destinations.	BCB; SND
Rating of operation	$RatingOp_{it}$	Defined by the same criteria as $CrpRating_{it}$ but represents the credit risk of the operation rather than the company.	BCB; SND
Index	$Index_{it}$	The following indices were considered: reference rate (TR), long-term interest rate (TJLP), LIBOR, CDI, Selic, general market price index (IGPM), and extended national consumer price index (IPCA).	BCB; SND
Currency	$Curr_{it}$	The following currencies were considered: USD, CHF, JPY, GBP and EUR; otherwise 0.	BCB; SND
<i>Bank-specific characteristics</i>			
Capital	$Capital_t$	Basel index. Reference equity divided by risk-weighted assets. Calculated as specified by the BCB.	BCB
Size of financial institution	$SizeFI_t$	Natural logarithm of total assets of financial institution (10,000,007 + 20,000,004) <sup>a</sup>	BCB
Liquidity	$Liquid_t$	Sum of marketable (11000006) and negotiable securities and assets - available for sale (30340008) and for negotiation (30330001) - divided by total assets of financial institution (10,000,007 + 20,000,004)	BCB
Bank reserve	$Reserv_t$	Credits linked to the BCB (14200009) divided by total assets (10,000,007 + 20,000,004)	BCB
Default	$Default_{it}$	Operations classified E–H (31,600,008 + 31,700,001 + 31,800,004 + 319,000,007) divided by the total credit portfolio of the financial institution (31000000)	BCB
Return on assets of financial institution	$ROAFI_{it}$	Net earnings in the preceding 12 months (70000009–80,000,006) divided by mean total assets (10,000,007 + 20,000,004)	BCB
Control	$Ctrl_{it}$	Equals 1 if the institution is publicly traded, 0 if control is private	BCB
Specialization in credit market	$Spec_{it}$	Ratio between credit portfolio (31000000) and total assets of financial institution (10,000,007 + 20,000,004)	BCB
<i>Firm-level incentives</i>			
Accounting information quality	$AIQ_{it}$	Estimated using the model of Barth et al. (2006), the modified Jones (1995) model, and the model of Kang and Sivaramakrishnan (1995)	Economática©
Previous exposure to international market	$CrossList_{it}$	Dummy variable equal to 1 if the company issued any number of ADRs, 0 otherwise	DR Directory BNYM
<i>Other control variables</i>			
External audits	$Audit_{it}$	Dummy variable equal to 1 if external audits are performed by one of the Big Four (Deloitte, Ernst & Young, KPMG or PwC), 0 otherwise	CVM
Corporate governance	$CGov_{it}$	Equals 1 if the firm is included in a corporate governance listing segment of BM&FBovespa, 0 otherwise	BM&FBovespa

Domestic risk-free rate	$DomRFR_{it}$	Selic rate, equivalent to the Selic reference rate for federal bonds	BCB
EMBI + Br	$EMBI_{it}$	Emerging markets bond index plus, a weighted index measuring the return on Brazilian external debt instruments	BCB
Dollar	$Dollar_{it}$	Closing exchange rate of BRL in relation to USD	Thomson Reuters
Proportion of capture of directed resources	$PropDR_{it}$	Stock of directed credit divided by the total credit portfolio	BCB
Contemporary variable	$Benchmark_{it}$	Trimester average of dependent variable of voluntary IFRS adopters	

<sup>a</sup> Codes in parentheses represent items in the chart of accounts of the financial institutions (COSIF) instituted by the Brazilian Central Bank. At <http://www.bcb.gov.br/?COSIF>. SND = National Debenture System. BCB = Brazilian Central Bank.

## Appendix 2. Estimation of Accounting Information Quality (AIQ<sub>it</sub>)

Accounting information quality (AIQ<sub>it</sub>) is determined by averaging estimates obtained using three models: Barth et al. (2006), modified Jones (1995) and Kang and Sivaramakrishnan (1995). Following the example of Daske et al. (2013) and Chen et al. (2013), earnings discretion before and after IFRS adoption are compared, using reduced discretionary accruals as a proxy for improvement in earnings quality. The models are estimated for a period of 4 years before the year of IFRS adoption (−4 to −1) and 4 years after adoption (1 to 4). The year 2010 is excluded from the analysis because the models estimate discretionary accruals in lagged periods to avoid the use of two different accounting formats in the same variable. The accounting information was retrieved from the database Economática©. For each firm, the proxies of accounting information quality are calculated for the periods before and after IFRS adoption. In the model of Barth et al. (2006), the estimate of accounting information quality is based on the variance of the residues of the regression. In the modified Jones (1995) model and the Kang and Sivaramakrishnan (1995) model, information quality is extracted directly from the residues, a proxy for discretionary accruals. Then, for each measure and period, the firms are ranked (higher classifications indicating greater earnings smoothing) by averaging the results of the three models for each period (before and after IFRS). The average ranking is considered the aggregated measure of accounting information quality. Finally, the difference between the aggregated scores of the periods before and after IFRS is calculated for each firm. A positive difference indicates improved accounting information quality (classified as “1”), while a negative difference indicates deteriorated accounting information quality (classified as “0”).

$$AIQ_{it} = \left\{ \begin{array}{l} \text{Barth et al. (2006):} \\ \text{Modified Jones (1995):} \\ \text{Kang and Sivaramakrishnan (1995):} \end{array} \right. \left. \begin{array}{l} \text{mean} \left[ \begin{array}{l} AIQ_{postIFRS} \\ AIQ_{postIFRS} \\ AIQ_{postIFRS} \end{array} \right] - \text{mean} \left[ \begin{array}{l} AIQ_{exIFRS} \\ AIQ_{exIFRS} \\ AIQ_{exIFRS} \end{array} \right] \end{array} \right\} \quad (f.1)$$

### Panel A: Model of Barth et al. (2006)

$$\Delta NI_{it} = \varphi_0 + \varphi_1 MVE_{it} + \varphi_2 Growth_{it} + \varphi_3 Eissue_{it} + \varphi_4 Debt_{it} + \varphi_5 Dissue_{it} + \varphi_6 Turn_{it} + \varphi_7 FC_{it} + \varphi_8 Aud_{it} + \varphi_9 ADR_{it} + \sum_{m=1}^m \delta_m FixedEffects: Sector + \varepsilon_{it}$$

Description of the model:

The model of Barth et al. (2006) evaluates the sensitivity of variation in net earnings based on the premise that a smaller variance in the change of the net result is evidence of earnings smoothing. The measure of Barth et al. (2006) is based on the variance of the residues of the regression which models the change in net earnings from control variables previously identified in the accounting literature (Ashbaugh, 2001; Barth et al., 2006; Lang, Raedy, & Wilson, 2006; Lang, Raedy, & Yetman, 2003; Pagano, Roell, & Zechner, 2002).

### Panel B: The modified Jones (1995) model

$$\frac{AccT_{it}}{AT_{it}} = \varphi_0 + \varphi_1 \frac{1}{AT_{it}} + \varphi_2 \frac{(\Delta Rec_{it} - \Delta CR_{it})}{AT_{it}} + \varphi_3 \frac{Imob_{it}}{AT_{it}} + \varepsilon_{it}$$

Description of the model:

The modified Jones model is based on the segregation of discretionary and nondiscretionary components of total accruals. The model assumes nondiscretionary accruals depend on variation in revenues and fixed assets. Thus, based on the estimated equation, discretionary accruals may be calculated using the residues of the regression.

## Panel C: Model of Kang and Sivaramakrishnan (1995)

$$AccT_{it} = \varphi_0 + \varphi_1 \left[ \frac{CR_{it-1}}{Rec_{it-1}} \times Rec_{it} \right] + \varphi_2 \left[ \frac{CGL_{it-1}}{DOper_{it-1}} \times DOper_{it} \right] + \varphi_3 \left[ \frac{DeprAmort_{it-1}}{Imob_{it-1}} \times Imob_{it} \right] + \varepsilon_{it}$$

Description of the model:

In the model proposed by Kang and Sivaramakrishnan (1995), the residues of the regression are also used as a proxy for discretionary accruals. The authors included operational costs to minimize omitted variable bias and pretreat receivables to prevent problems associated with the manipulation of revenues.

## Appendix 3. Joint estimation of contract terms: instrumental variables

Agency theory suggests that loan contract terms may be determined jointly (Smith & Warner, 1979). In fact, estimating each term independently may result in the econometric problem of simultaneity. Many earlier studies ignored the potential interaction between financial and non-financial loan contract terms. Melnik and Plaut (1986) modeled bank credit as a package with n terms that cannot be isolated and negotiated individually. Banks offer a matrix with n contract dimensions, and firms choose the most attractive combination available. This approach assumes that cost of debt, maturity, loan amount, and collateral may be inter-related. Hence, in addition to the approach employed in the main text, we re-estimated (using a set of three regressions with instrumental variables for each of the four models: a) cost of debt, b) maturity, c) amount granted and d) demand for collateral. This method is often referred to as 2-stage least squares (2SLS) estimation. In other words, in each model, the three remaining contract terms are treated like endogenous variables and are estimated separately by way of instruments (first stage) and then included in the main regression (second stage).

For endogenous variables (cost of debt, maturity, loan amount and collateral), the instruments are defined in accordance with the theory of loan contracts: using the sample mean of loan contracts of the same a) type/destination of resources, b) trimester, and c) sector, according to the classification of the CVM (Brazilian securities and exchange commission). The use of sector and period mean values as instrumental variables is consistent with earlier studies (e.g., Ball et al., 2015; Hanlon, Rajgopal, & Shevlin, 2003; Lev & Sougiannis, 1996) and with the notion that the mean market trend affects the demand for credit (Bharath, Dahiya, Saunders, & Srinivasan, 2009; Costello & Wittenberg-Moerman, 2011; Ivashina & Sun, 2011). The mean market trend reflects the dynamics and evolution of cost of debt and other loan contract terms and is a determining factor in the negotiation of new contracts.

We therefore re-estimated all the equations with 2SLS. Along with the regression equations, we evaluated endogeneity with the Durbin-Wu-Hausman test, Shea's adjusted partial R2, the Kleibergen-Paap Lm statistic, and the Anderson-Rubin Wald test (Anderson & Rubin, 1949). The result of the Durbin-Wu-Hausman test highlighted the importance of using instrumental variables to correct bias from simultaneity (in the sample of bank loans). The other tests indicated that a) the instruments were relevant to explain the contract terms in the first stage of the regression, b) no under-identification of the endogenous variables occurred, and c) the hypothesis that the instruments are potentially weak may be rejected.

Using instrumental variables yielded results very similar to those presented in Tables 8 and 9 (not shown). Thus, H4 can be rejected, but H5 cannot. In other words, our results indicate that only firms with improved accounting information quality were likely to display reduced cost of debt, longer maturity, greater loans, and less demand for collateral after the transition.

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