Adoption of IFRS 15 in Brazilian companies and its consequences on analysts' forecasts

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ABSTRACT

Objective: To verify the relationship between the adoption of IFRS 15 and the forecast of financial analysts for companies listed on the Brazilian stock exchange in the period from 2012 to 2021.
Method: The sample included 1,013 observations (firm-year) of non-financial companies listed on the B3 - *Brasil, Bolsa, Balcão* -, and data collection took place from the availability of forecast information from financial analysts. Data were treated through descriptive analysis, correlation analysis and multiple linear regression to verify the existence of a relationship between the adopted variables.
Originality/Relevance: The quality of data provided by companies in their reports influences the forecasts of results made by financial analysts. The implementation of IFRS 15 had impacts on several market sectors. Among the advantages of adopting International Accounting Standards (IFRS), it can be highlighted that the countries that adopt them tend to have clearer accounting information and, consequently, credibility and integration with countries and institutions that apply the same method, such as a common language.
Results: Among the results found, the mandatory adoption of the standard variables were related to the quality of profit forecasts. By adopting a progressive variable, the results obtained reveal that in relation to the application of IFRS 15, the more time has passed since the publication of the standard, the less accurate is the forecast made by financial analysts. Thus, the intended objectives of IFRS 15 formulated by the International Accounting Standards Board (IASB) were achieved, presuming the improvement of information asymmetry.
Theoretical/methodological/practical contributions: This study contributes academically with the development of the little explored theme, with managers in understanding the applicability of the norm, with analysts in the importance of specializing in sectors and developing expertise, and with the market for the perception of the importance and activities developed by financial analysts.

Keywords: IFRS 15; Accuracy of analysts' forecasts; Financial analysts.

Adoção do IFRS 15 nas empresas brasileiras e suas consequências nas projeções dos analistas

RESUMO

Objetivo: Verificar a relação entre a adoção do IFRS 15 e a previsão dos analistas financeiros para as empresas listadas na bolsa de valores Brasileira no período de 2012 a 2021.
Método: A amostra incluiu 1.013 observações (firma-ano) de empresas não financeiras listadas na B3 – Brasil, Bolsa, Balcão - , e a coleta de dados ocorreu a partir da disponibilização de informações de previsão de analistas financeiros. Os dados foram tratados por meio de análises descritivas, análises de correlação e regressão linear múltipla para verificar a existência de relação entre as variáveis adotadas.

Originalidade/Relevância: A qualidade dos dados fornecidos pelas empresas, em seus relatórios, influencia as previsões de resultados feitas pelos analistas financeiros. A implementação da IFRS 15 teve impactos em diversos setores do mercado. Dentre as vantagens da adoção das Normas Internacionais de Contabilidade (IFRSs), pode-se destacar que os países que as adotam tendem a ter informações contábeis mais claras e, conseqüentemente, credibilidade e integração com países e instituições que aplicam o mesmo método, como um linguagem comum.

Resultados: Dentre os resultados encontrados, as variáveis de adoção obrigatória da norma mostraram-se relacionadas à qualidade das previsões de lucro. Ao adotar uma variável progressiva, os resultados obtidos revelam que em relação à aplicação da IFRS 15, quanto mais tempo se passou desde a publicação da norma, menos precisa é a previsão feita pelos analistas financeiros. Assim, foram alcançados os objetivos pretendidos com a IFRS 15 formulada pelo *International Accounting Standards Board* (IASB), presumindo-se a melhoria da assimetria de informação.

Contribuições teóricas/metodológicas/práticas: Este estudo contribui academicamente com o desenvolvimento do tema pouco explorado, com os gestores na compreensão da aplicabilidade da norma, com os analistas na importância de se especializar em setores e desenvolver expertises, e com o mercado pela percepção da importância e atividades desenvolvidas por analistas financeiros.

Palavras-chave: IFRS 15; Precisão das previsões dos analistas; Analistas financeiros.

1 INTRODUCTION

The purpose of corporate disclosures is to provide investors with enough information to better understand the nature, value, timing and uncertainty of revenue and cash flows arising from the company's contracts with customers. Although the disclosure requirements are comprehensive and require the breakdown of revenue into appropriate categories, the objective is not to obscure the usefulness of the information with a large amount of trivial details (Tomi, 2018). The company needs to consider the amount of details to present in order to fulfil the purpose of the disclosures (Tomi, 2018).

For Zortea et al. (2017) International Financial Reporting Standards (IFRS) aim to regulate accounting information, standardizing already existing standards to mitigate information asymmetry between different markets. IFRS 15 - Revenue from Contracts with Costumers - issued by the International Accounting Standards Board (IASB), addresses how the revenue from contracts with clients should be recognized. Corresponding to the accounting pronouncement CPC 47 – *Receita de Contrato com Cliente* - in Brazil, this standard establishes principles that entities must apply to make accounting information useful and able to demonstrate the amount, nature, opportunity and essential uncertainties for the recognition of revenue and cash flows from customer contracts (Oliveira, Crabbi & Rodrigues, 2020). Price Waterhouse Coopers ([PWC], 2017) pointed out that the implementation of the standard brought several impacts in various sectors of the market, highlighting challenges imposed on managers to comply with the standards and financial market analysts for the correct interpretation of the equity situation and financial performance of companies.

Martinez (2004) highlights that capital market analysts, independent or parts of intermediary institutions, are attentive to the voluntary and mandatory disclosures disclosed by companies, in addition to indicators of the macroeconomic and sectorial conjuncture. When justifying the recommendations, financial analysts consolidate the information collected, assessing the company's current performance and making forecasts for the future, so as to arrive at a fair share price. The objective of financial analysts is to recommend stock purchase, sale and maintenance operations to investors through the forecasting of results (Domingues & Nakao, 2017). Therefore, the quality of data provided by companies, in their reports, influences the results forecasts made by analysts (Domingues & Nakao, 2017).

The adoption of CPC 47, following the standard IFRS 15, aims to standardize and unify the existing standards, in addition to elucidating how the revenues from contracts with clients in Brazil should be recognized, in order to standardize the statements between the different sectors of the economy. The impact of the adoption was perceived in the need to adapt the company to conform to the new standard and the financial analysts to interpret the data (Gonçalves & Gomes, 2018). This study verifies, by reflecting on the quality of market analysts' forecasts, whether the understanding and

application of IFRS 15 brought the effects it intended. The determination of the existence of a relationship between the requirement of the standard and the quality of the forecasts was verified as a determinant of the fulfilment of the objective of adopting IFRS 15 for external users. Following what was predicted by Price Waterhouse Coopers ([PWC], 2017), it was necessary to analyse the perception of how the sectors reacted and were impacted by the differences imposed for the composition of their financial reports.

Our results led to the acceptance of hypotheses 1 This study aims to answer the following question: *what is the relationship between the adoption of IFRS 15 and the forecast of financial analysts for companies listed in Brazilian Exchange?* The objective of the research was to verify the relationship between the adoption of IFRS 15 and the forecast of financial analysts for the companies listed in Brazilian Exchange in the period from 2012 to 2021.

And 3 of this study, corroborating most of the previous literature accessed. Thus, with the adoption of the IFRS 15 standard, profit forecasts became more assertive, and as was also expected, the association between the different sectors and the accuracy of the forecast shows that they were influenced by the standard in different ways.

Previous research on the subject stands out for analysing the effect of adopting the standard (IFRS 15) on the relevance and quality of financial information (e.g. Napier & Stadler, 2020; Onie et al., 2022; Piosik, 2021), however, with analysts being users of this information and intermediaries for the financial market (Venturini et al., 2022), this research contributes with academics in the development of the little explored theme, with managers in understanding the applicability of the norm, with analysts in the importance of specializing in sectors and developing expertise, and with the market for the perception of the importance and activities developed by financial analysts.

2 THEORETICAL BACKGROUND AND HYPOTHESES DEVELOPMENT

2.1 Adoption of IFRS 15 in Brazil

In the context of internationalization, Jiao et al. (2012) make it clear that, according to regulators, investors benefit from the publication of information with greater uniformity between countries and companies and from information for individual companies with higher quality. Positive capital market reactions were noted for each statement that revealed the likelihood of adopting IFRSs.

According to Zortea et al. (2017), among the advantages of adopting IFRSs, it can be highlighted that the countries that adopt them tend to have clearer accounting information, and consequently, credibility and integration with countries and institutions that apply this method, as a common language. The information must represent what is true, without manipulation or effects, and in order to give reliability to what is exposed by companies. Thus, the objective of the information is to provide support, assisting in the analysis of the risk inherent in the investment and the return it produces (Zortea et al., 2017).

As Cotter et al. (2012) found that IFRS adoption increases accuracy on analysts' forecasts. Hlel et al. (2020) reported the credibility increase of financial information and forecast accuracy after IFRS standards adoption in French financial markets. This represents the standard purpose, on the other hand, it's possible to observe several studies that verified different conclusions. In Gu et al. (2019) and Demmer et al. (2019) the adoption of IFRS standards reinforced the positive effect on forecasts of disclosures that were already mandatory, however, for items that were voluntary disclosed, the effect of adopting the standard was harmful. Thus, the standard aim is important, the complexity of each IFRS depends on the changes bringing by the new standard (Miah et al., 2023).

IASB issued IFRS 15, which deals with the recognition of revenue from contracts with customers and corresponds to accounting pronouncement CPC 47 – *Receita de Contrato com Cliente* - in Brazil. This standard establish principles that entities must apply in order to make accounting information useful and capable of demonstrating the amount, nature, timing and uncertainties inherent in the recognition of revenue and cash flows from contracts with clients (Oliveira, Crabbi & Rodrigues, 2020).

Publicly traded companies that trade in B3 stock exchange must apply CPC 47, except for publicly traded companies that are regulated concurrently by another regulatory agency to enter into an agreement with the *Comissão de Valores Mobiliários* (CVM) for the disclosure of financial statements through regulatory practices. For the accounting years ended in December 31, 2017, Brazilian publicly-held companies assess the effects that the new accounting pronouncement, CPC 47, could have on their financial statements and disclose in their explanatory notes their conclusions about their effects (Gonçalves & Gomes, 2018).

For Oliveira, Crabbi and Rodrigues (2020) the publication of this standard occurred as a result of divergences in the revenue recognition process between IASB and Financial Accounting Standards Board (FASB). Therefore, this standard was created to harmonize and achieve greater convergence between the regulations of the two bodies.

2.2 IFRS 15 adoption association with analysts' forecasts

Many investors are not as good as they should be in choosing and managing their investments. Thus, it is necessary to enlist the help of professionals, market analysts, who have specific knowledge that makes them qualified to perform their jobs efficiently (Martinez, 2004). Oliveira and Girão (2018) highlight the relevance of analysts' projections, which deserves attention and debate, as they reduce informational asymmetry and influence the decision-making of investors and other users.

Capital market analysts, whether independent or part of intermediary institutions, are attentive to the voluntary and mandatory reports and statements released by companies, in addition to the macroeconomic and sectoral indicators. To justify their recommendations, they consolidate the information collected, assessing the company's current performance and making forecasts about the future, and then calculate the fair share price. (Martinez, 2004)

For Zortea et al. (2017), it is increasingly important to identify the degree of market efficiency, given the economic importance of the relationship between investor and company. Thus, the more efficient the capital market is, the more accessible it will be for investors who do not have the tools and time to analyse information. Analysts now provide more timely forecasts that are revised more frequently than in the past. These follow fewer companies and specialize in certain sectors, tending to issue forecasts for the same companies for longer periods, becoming more experienced in these (Myring & Wrege, 2009).

Oliveira and Girão (2018) perceived as characteristics of accuracy the characteristics related to the experience and Coverage of analysts, the size of the broker, the size of the company and corporate governance. However, in a current scenario of resulting crises and constant evolution of firms, the need to identify the influence of internal and external environmental factors on the accuracy of the forecast of profit analysts is evident.

Regarding the quality of the analysts' forecast, Dechow, Hutton and Sloan (2000) realized that the long-term growth forecasts of the sell-side analysts are systematically overly optimistic about the stock offers and that the analysts employed by the main managers of the companies offers make growth forecasts more optimistic. In addition, they found a positive relationship between the fees paid to the employers of the affiliated analysts and the level of the growth forecasts of the affiliated analysts. The lower post-offer performance is more pronounced for companies with the highest growth forecasts made by affiliate analysts.

Dalmácio et al. (2013) highlight that as a consequence of internationalization process across IFRS standards, greater harmonization and quality of the data provided will affect the quality of the forecasts made by analysts, according to hypothesis 1 of this study.

Hypothesis 1 (H1): The mandatory adoption of IFRS 15 relates positively to the accuracy of the financial analysts' forecast.

Onie et al. (2022) reported that with the adoption of IFRS 15 some companies experienced a significant reduction in profits and the relevance of their value was generally lower in the pre-adoption

period compared to companies in which there was no material impact. However, after adoption there is little evidence that the standard has improved the relevance of earnings overall. However, Tutino et al. (2019) shows that earnings management practices are more adopted in the Telecommunications sector, consequently, this would be highly impacted by the introduction of IFRS 15. In view of this result and others presented in this study, the implementation of the new standard must be carefully analysed and supervised by regulatory bodies, as well as correctly adopted by managers, as the revenues calculated may impact pre-existing earnings management practices.

With regard to the effects of introducing IFRS 15 in this scenario, Napier and Stadler (2020) reported that IFRS 15 has had little impacts on the recognition and measurement of revenue. And Piosik (2021) points out that this standard significantly mitigates the increase in discretionary revenue when pre-managed operating revenue is slightly lower than the consensus on operating revenue. Thus, the author did not notice the impact of the implementation of IFRS 15 on discretionary revenue if reporting entities are unable to meet the consensus forecast of revenue and net income.

On the other hand, Domingues and Nakao (2017) investigated whether the adoption of the IFRSs standards by global oil companies led to an improvement in the quality of analysts' forecasts. Two samples were considered, one for the profit forecast error model, in which 49 companies were analysed from 2003 to 2014, totalizing 588 observations, and one for the forecast dispersion model, in which 29 companies were analysed from 2003 to 2014, totalizing 348 observations. The results indicated that it is not possible to accept the hypothesis that the adoption of IFRS increased the quality of analysts' forecasts and also pointed out that the accuracy of market analysts decreased during the period of partial adoption of IFRS in Brazil.

The quality of the analysts' forecasts and recommendations, according to Dalmácio et al. (2013), will only be perceived by the investor sometime after the investment has been made, as well as the company's capacity in relation to the expected returns. It is the previous experiences that give analysts the conditions to evaluate the information capacity of the company, considering the possible combinations of signals and indices issued to the market (Dalmácio et al., 2013).

Domingues and Nakao (2017) realized that with the adoption of IFRS, market analysts make projections in which one can perceive greater accuracy and less dispersion. On the other hand, Tomi (2018) examined the impact of IFRS 15 on the accuracy of analysts' forecasts. With a focus on sectors that normally engage in grouped contracts and long-term projects, the sample consisted of European companies listed with company and forecast data for the years 2017 and 2018. The survey results showed that IFRS 15 did not had an impact on the accuracy of analysts' earnings per share forecasts. However, for sales forecasts, the survey results showed that IFRS 15 increases forecast errors for the group of companies in the sample. The results suggest that the implementation of a new accounting standard causes at least a temporary decrease in the accuracy of analysts' forecasts.

Based on the assumption of a learning curve to work with the new standards, both from the company and from analysts in understanding the standard, Martinez and Dumer (2014) used an independent variable of progressive interest that assigns a value of 0 for the period prior to the mandatory rule and increasing from 1 to a later period. Based on the understanding that the market as a whole is gradually adapting to content altered by the application of a new standard, hypothesis 3 of the study is:

Hypothesis 2 (H2): The use of a progressive proxy for IFRS 15 adoption is positively related to the quality of financial analysts' forecast.

Haggenmuller (2019) critically evidenced that IFRS 15 is mainly addressing specific sectors, which had difficulties in applying previous IFRS revenue recognition requirements due to the absence or non-specific guidance that forced them to use standards outside of IFRS. Due to its complexity, however, IFRS 15 also affects companies with simple business models and its implementation can be unexpectedly time-consuming, laborious and difficult, without leading to material changes. Although no indication is found that earnings management or manipulation could be related to the adoption of IFRS 15 in these, the standard still requires professional interpretation and judgment that may be subject to incorrect or diverging accounting of transactions. Although IFRS 15 appears necessary, it is

anticipated that it represents a complex combination of several existing standards and, consequently, fails to assist the profession. Therefore, the predefined objectives of IFRS 15 formulated by the IASB are easily called into question with regard to the practical point of view.

Price Waterhouse Coopers ([PWC], 2017) points out that the implementation of the standard has several impacts in various sectors of the market. These impacts should be bigger in the asset management, automotive, engineering and construction, entertainment and media, industrialized products and manufacturing, pharmaceutical and biotechnology, real estate, retail and consumer, technology and telecommunications industries.

On this way, Khamis (2016) tested the perception of Egyptian preparers and auditors about IFRS 15. Focusing on the level of familiarity, standard clarity and ease of application in different business sectors in Egypt, the final sample of the study consisted of 31 auditors and 34 preparers. It turned out that, for the most part, the Egyptian accountants and auditors surveyed were not yet ready to adopt and did not have sufficient knowledge about IFRS 15, as well as, they feared the new revenue recognition requirement (which increased discretion and judgment recognition of revenue) and its potential impact in different sectors. Given perceived results and that compliance differs between the sectors (Boujelben & Kobbi-Fakhfakh, 2020), hypothesis 3 of this study is:

Hypothesis 3 (H3): The companies' sectors influence differently the quality of financial analysts' forecast before and after IFRS 15 adoption.

3 RESEARCH DESIGN

The population adopted in the study is composed of the companies participating in the portfolio of B3 exchange. The sample includes companies with analysts' forecasts data for the period from 2012 to 2021, excluding financial institutions, given that BACEN (Brazilian Central Bank) did not approve the adoption of CPC 47 for these. The collection of economic and financial data was carried out by consulting the Refinitiv Eikon database.

Table 1 shows the dependent and independent variables of the research used for descriptive statistics, correlation analyzes and in the multiple regression model with panel data in order to relate the adoption of IFRS 15 standard with precision of the projections of financial analysts.

Following Martinez and Dumer (2014), the dependent variable adopted in the study measures the accuracy of the projections, obtaining the absolute value of the expression in terms of the real earnings per share. Thus, all errors are considered, in contrast to the measurement of the error, in which positive errors cancel negative errors of the same magnitude. If the independent variable has a negative relationship, it indicates more accurate and better quality forecasts. This proxy has been used in several studies (e.g. Martinez & Dumer, 2014; Domingues & Nakao, 2017; He et al., 2019; Venturini et al., 2022)

The independent variable of interest adopted *IFRS15*, follows the proposal of Martinez and Dumer (2014), where a progressive variable was assigned, indicating the years. The choice is due to the assumption of a learning curve to work with the new standards, both of the company and of the published content, and of the analysts in understanding the standard. Therefore, we assign a value of zero to 2016, the year in which the standard was published in Brazil, value one to 2017, a period for which companies should assess the effects of the new pronouncement on their financial statements and disclose in an explanatory note, value two for 2018, first year of publication of the statements in accordance with CPC 47, adding one for each year subsequently. The variable of adoption of CPC 47 by companies (*AdCPC47*), in agreement with the one proposed by Tomi (2018), is dummy and assumes a value of 1 in a period in which the standard is effectively applied in business reports, since it is mandatory, and a value of 0 must be assigned in the period prior to the application of the standard.

Control the number of estimates (*ESTIM*) in necessary, once evidenced by Wang and Yu (2021), there was a decrease on analysts' estimates after an standard adoption. In the study by Jiao et

al. (2012), the number of analysts' estimates proved to be significant in all tested models, showing a negative relationship with error and a positive relationship with dispersion.

Table 1
Variables used in the research.

Variable	Acronym	Metric	Theoretical Support	E.S.
Panel A - Dependent Variable				
Accuracy of projections	PPA	Module of the difference between the real result and the result predicted by the analysts, divided by the absolute value of the real result for the period [│(LPA$_{real}$ − LPA) /Price$_{t-1}$│].	Martinez and Dumer (2014), Domingues and Nakao (2017), Venturini et al. (2022)	N.A.
Panel B - Independent Variables of Interest				
Mandatory adoption of CPC 47	AdCPC47	Dummy variable that assumes a value of 1 when the company is required to apply CPC 47 and 0 in other cases.	Gonçalves and Gomes (2018), Tomi (2018)	-
Learning IFRS 15	IFRS15	Progressive variable, assigning a value of 0 for 2016 and increasing by 1 for each subsequent year.	Martinez and Dumer (2014), Gonçalves and Gomes (2018)	-
Panel C - Independent Control Variables				
Estimates	ESTIM	Number of analysts who made the predictions.	Domingues and Nakao (2017), Gu et al. (2019), Jiao et al. (2012)	-
Company size	SIZ	Natural logarithm of total assets.	Jiao et al. (2012), Martinez and Dumer (2014), Domingues and Nakao (2017)	+
Return on Assets	ROA	Net income before extraordinary items relative to total assets.	Domingues and Nakao (2017), Venturini et al. (2022)	-
Book-to-market	BTM	Relationship between the market value and the equity value of the company.	Domingues and Nakao (2017), Gu et al. (2019)	-
Company result	RESULT	Dummy variable that presents a value of 1 when the company's result is negative and 0 when positive.	Domingues and Nakao (2017)	+
Big four auditor	Big4	Dummy variable that presents a value of 1 when the company is audited by one of the biggest audit firms and 0 when not.	Gu et al. (2019), Iatridis (2012), Lawrence et al. (2011)	-
COVID-19 impact	COV	Dummy variable that presents a value of 1, for the years 2020 and 202, and 0 otherwise.	Alberola et al. (2021)	+
Life Cycle Stage	LCS	Combination of cash flow patterns, represents the firm's resource allocation and operating capabilities interacted with the firm's choice of strategy.	Dickinson (2011), Venturini et al. (2022)	+/-
Company sector	Sectors	Set of dummy variables that have a value of 1 when the sector occurs and 0 of the others.	Jiao et al. (2012), Khamis (2016)	+/-

Note: E.S.: Expected signal; N.A.: Not applicable. **Source:** Based on previous literature (2023).

The variable adopted for size control (*SIZ*) proved to be significant in the models for dispersion of the forecast. Domingues and Nakao (2017), in the study of the dispersion of the forecast made by analysts, realized that the larger the size of the company, the smaller the dispersion. Martinez and Dumer (2014) concluded that with the growth of the size of the company, there was a trend towards less accurate forecasts.

Financial proxy for profitability *ROA* – Return on Assets - was adopted based on perceptions from Velte (2019) that reported positive association with earnings management, proxies from audit

quality in this study. Following the trend that analysts make projections with less error when companies report positive results, given the greater interest in Covering profitable companies, Domingues and Nakao (2017) also highlight the occurrence of worsening estimates in periods of negative results (*RESULT*), with evidence that if the result is a loss, the error is greater.

The ratio of the book value of equity to the market value of equity (*BTM*) was adopted in studies like Domingues and Nakao (2017) and Gu et al. (2019) bringing the expectation that lower *BTM* are also more likely to issue forecasts. Used in this study as a control for a firm's growth opportunity set.

Following prior research, we controlled for Big4 Auditor (*Big4*): whether the auditor is a big four firm (Ernst & Young, Deloitte, PWC, KPMG), several studies had documented a positive effect on accounting information quality (e.g. Gu et al., 2019; Iatridis, 2012; Lawrence et al., 2011). Besides these, Miah et al. (2023) documented that the quality of auditor moderates positively the association between IFRSs standards adoption and financial analysts' forecast quality, mainly for complex rules. Thus, the authors consider big four auditors as a proxy for audit quality.

The COVID-19 pandemic (*COV*) effects on international markets was measured in this study as a dummy proxy that assumes value 1 for 2020 and 2021, 0 otherwise. This proxy was necessary based on the argument reported in Alberola et al. (2021), assuming that the sanitary crisis affected in different ways economies and financial markets around the world.

Life cycle stage (*LCS*) was measured as a proxy developed by Dickinson (2011), based on cash flow signals determining five distinct stages (Introduction, Growth, Mature, Turbulence, Decline), and reported in Venturini et al. (2022) influencing on analysts' forecasts accuracy. As Hlel et al. (2020) highlights, in the initial stages, IFRS standards bring more credibility to company financial information. On the other hand, for Gu et al. (2019, p.39) "firms in the growth stage have more uncertainty and higher information asymmetry, and investors may thus have higher demand for voluntary disclosure".

Descriptive analysis was the main phase in the process of studying the collected data. The use of descriptive statistics methods occurred in this research to organize, summarize and describe important aspects of the set of characteristics observed, and then compare those characteristics between the sets of variables (Reis & Reis, 2002).

The dependent variable *PPA* was transformed by Box-Cox to treat outliers and improve normal distribution in the data. This procedure was necessary and reduces our sample for correlation and regression analyses to the needed data for a representative model. For continuous independent variables, outliers were treated with winsorization at 1% and 99%, and then proceeded with their descriptive statistics. The Shapiro-Wilk test was performed to determine normality, in which p-value> 0.01 reveals the presence of normal distribution for the variables, after the presence of normal and non-normal distribution for the study variables was evident, the data were observed by Spearman (non-parametric) and Pearson (parametric) correlation at 1%, 5% and 10% significance. The Variance Inflation Factor Test (VIF) was performed, in which VIF <10 indicated absence of multicollinearity, the Breusch-Pagan Test for heteroscedasticity, and the RESET Test to verify the omission of significant variables at 1%, 5% and 10% (Fávero & Belfiore, 2017).

Regarding the data regression, it was evaluated how the independent variables affect the accuracy of the forecast of financial analysts, using the model for the dependent variable, according to Equation 1.

$$PPA_{i,t} = \beta_0 + \beta_1 AdCPC47_t + \beta_2 IFRS15_t + \sum_{k=1}^{9} \beta_k Controls_{i,t} + \varepsilon_{i,t} \qquad (1)$$

Where: β_0: Intercept; PPA: Accuracy of projections; IFRS15: Learning IFRS 15; AdCPC47: Mandatory adoption of CPC 47; ESTIM: Estimates; SIZ: Company size; ROA: Return on Assets; BTM: Book-to-market; Big4: Statement audited by big four audit firm; RESULT: Negative company result; COV: Period affected by COVID-19; LCS: Life cycle stages; Sectors: Company Sector according to Refinitiv/Thomson (Academic and Educational Services, Basic Materials, Consumer Cyclicals,

Consumer Non-Cyclicals, Energy, Healthcare, Industrials, Real Estate, Technology, and Utilities; ε_{it} is the error term.

Following Cotter et al. (2012) we tested this equation (1) for (i) the total period, pre and post IFRS 15 adoption – Mod. 1 – (ii) the period pre standard adoption, without independent interest variables to understand control variables association with *PPA* – Mod. 2 – (iii) the period post the adoption of IFRS 15, considering from interest variables, just the progressive one *IFRS15* – Mod. 3. These variables' exclusions in models 2 and 3 were necessary because of the time operationalization of that.

For both models (1, 2 and 3): the Pooled model were estimated, the model with data in the Fixed Effects panel and then the Chow Test to determine which was the most significant, after that, the model was estimated with data in the Random Effects panel, and then the Breusch and Pagan Lagrangian (LM) to determine which is more significant in relation to the Pooled model. If both fixed and random effects are better than Pooled, the Hausman Test is performed to decide which panel data model to use (Fávero & Belfiore, 2017). Thus, Fixed Effects were the most adequate for all.

4 ANALYSIS OF RESULTS

This section presents the descriptive analysis of the variables that were the object of study (4.1), the correlation matrix (4.2) and the regression of the panel data (4.3).

4.1 Descriptive Analyses

The purpose of this section is to highlight descriptive statistics, comparing from t-test (p-value) the means difference between the periods pre and post IFRS 15 adoption, and by sector of companies' operations for *PPA*. In this analysis, the mean, the standard deviation, and the median values of the variables were verified. In order to analyse the behavior of the research variables as a whole, Table 2 was constructed, in which the results for the dependent and independent variables Cover the entire sample during the analysed period.

Table 2
Descriptive statistics of variables.

Variables	N	Pre IFRS15 N = 521	Post IFRS15 N = 492	p-value[3]
Panel A – Quantitative Variables[1]				
PPA	1,013	0.26 (0.60), 0.05	0.11 (0.29), 0.03	**<0.001**
ESTIM	1,013	7.52 (4.18), 8.00	6.14 (3.59), 6.00	**<0.001**
SIZ	1,013	21.40 (1.32), 21.27	21.39 (1.38), 21.46	>0.9
ROA	1,013	2.68 (10.14), 3.26	3.84 (8.59), 4.58	0.050
BTM	1,012	2.04 (2.22), 1.36	2.79 (3.97), 1.78	**<0.001**
Panel B – Qualitative Variables[2]				
IFRS15	1,013			**<0.001**
0		521 (100%)	0 (0%)	
1		0 (0%)	99 (20%)	
2		0 (0%)	100 (20%)	
3		0 (0%)	101 (21%)	
4		0 (0%)	110 (22%)	
5		0 (0%)	82 (17%)	
Big4	1,011	486 (93%)	441 (90%)	0.059
RESULT	1,013	133 (26%)	91 (18%)	**0.007**
COV	1,013	0 (0%)	192 (39%)	**<0.001**
LCS	1,013			0.7
Introduction		42 (8.1%)	45 (9.1%)	
Growth		150 (29%)	137 (28%)	
Mature		249 (48%)	242 (49%)	
Turbulence		59 (11%)	57 (12%)	
Decline		21 (4.0%)	11 (2.2%)	

Note: [1]Mean (SD), Median; n (%). [2]Events occurred (%event) [3]Welch Two Sample t-test; Kruskal-Wallis rank sum

test. PPA: Accuracy of projections; IFRS15: Learning IFRS 15; AdCPC47: Mandatory adoption of CPC 47; ESTIM: Estimates; SIZ: Company size; ROA: Return on Assets; BTM: Book-to-market; Big4: Statement audited by big four audit firm; RESULT: Negative company result; COV: Period affected by COVID-19; LCS: Life cycle stag. **Source:** Research's data (2023).

The dependent variable of *PPA* for forecast accuracy showed a significantly different mean at 0.1% after the adoption of the standard, less than half of the mean and median perceived for observations prior to 2017, thus, on average, the forecasts are more assertive for the period after adoption of the IFRS 15.

The average number of estimates (*ESTIM*) after adoption dropped by more than one, disagreeing with the prediction by Gu et al. (2019) that it would increase, and corroborating the statement by Wang and Yu (2021), this finding may be a consequence of the need for analysts to specialize after changes in the structure and content of financial reports.

For the variable *RESULT*, which assumes a value of 1 when the company presents a negative result, had a significant difference in proportion, representing 26% of the data prior to the adoption of the standard, against only 18% of the subsequent ones. This finding may be reflected in the regression analysis, since, as Domingues and Nakao (2017) highlighted, earnings forecasts tend to have greater errors when the company has a negative result.

Table 3 addresses the results of the descriptive analysis of the *PPA* variable (forecast accuracy) by sector. The sectoral classification adopted in this analysis comprises the divisions of Thomson Reuters.

Table 3
Descriptive statistics of the PPA variable by sector.

Sector	Obs.	Mean	Median	Standard-deviation	Minimum	Maximum
Academic and Educational Services	37	0.076	0.031	0.184	0.0008290	1.105
Basic Materials	93	1.025	0.078	6.575	0.0029000	62.412
Consumer Cyclicals	171	0.159	0.027	0.389	0.0000172	3.133
Consumer Non-Cyclicals	128	0.101	0.024	0.178	0.0005516	1.048
Energy	52	2.942	0.066	17.238	0.0004600	123.851
Healthcare	48	0.015	0.009	0.016	0.0000806	0.075
Industrials	140	1.919	0.029	19.144	0.0000300	226.295
Real Estate	153	0.409	0.062	1.594	0.0000830	16.843
Technology	42	0.099	0.022	0.170	0.0000202	0.839
Utilities	149	0.158	0.053	0.375	0.0001402	3.024

Source: Research's data (2023).

The Academic and Educational Services, Consumer Non-Cyclicals, Healthcare and Technology sectors presented more accurate profit forecasts for the applied sample. At the other hand are the Basic Materials, Energy and Industrials sectors with less accurate forecasts. The findings, since they are not related to the information content changed by IFRS 15, suggest that, according to Myring and Wrege (2009), analysts specialize in certain sectors, tending to issue forecasts for the same companies for longer periods, becoming more experienced in these.

4.2 Correlation Analyses

Given the result of the Shapiro-Wilk test for normality, it was possible to notice that part of the variables had a normal distribution, while the others showed a non-normal distribution (categorical data). The Table 4 addresses the results of Spearman's correlation analysis for non-continuous variables and the results of Pearson's correlation analysis for data with normal distribution, thus, both analyses were considered.

The high and significant correlation at 1% between the independent variables of interest in the two models is within the expected range, since they occur with the attribution of fixed values (independent of the application of the standard by the company) in a determined period according to the theoretical basis. Among the explanatory variables *IFRS15*, and *AdCPC47*, both variables for adopting the standard showed a negative

and significate correlation with the *PPA* response variable, evidenced by the Spearman Correlation test. This significant at 0.1% corroborates what is proposed by the standard when it demonstrates that the forecasts have become more accurate concurrently with the application of the standard.

Table 4

Correlation analyses.

Pearson\Spearman	IFRS15	AdCPC47	PPA	ESTIM	SIZ	ROA	BTM	Big4	RESULT
IFRS15		0.93****	-0.17****	-0.18****	-0.01	0.07*	0.17****	-0.06	-0.09**
AdCPC47	0.84****		-0.19****	-0.16****	0.01	0.07*	0.18****	-0.06	-0.08**
PPA	-0.13****	-0.15****		0.16****	0.07*	-0.41****	-0.47****	-0.19****	0.43****
ESTIM	-0.19****	-0.17****	-0.14****		0.45****	0.15****	0.24****	0.14****	-0.17****
SIZ	-0.03	0.00	-0.05	0.42****		-0.04	-0.03	0.01	-0.06
ROA	0.05	0.06	-0.57****	0.14****	0.06		0.42****	0.15****	-0.71****
BTM	0.09**	0.12***	-0.15****	0.18****	-0.05	0.15****		0.09**	-0.29****
Big4	-0.06	-0.06	-0.12***	0.14****	0.02	0.15****	0.02		-0.17****
RESULT	-0.09**	-0.08**	0.44****	0.16****	-0.06	-0.63****	-0.08**	-0.17****	

Note: ****, ***, **, * is significant at the level of 0.1%, 1%, 5% and 10%, respectively. PPA: Accuracy of projections; IFRS15: Learning IFRS 15; AdCPC47: Mandatory adoption of CPC 47; ESTIM: Estimates; SIZ: Company size; ROA: Return on Assets; BTM: Book-to-market; Big4: Statement audited by big four audit firm; RESULT: Negative company result. **Source:** Research's data (2023).

Spearman and Pearson Correlation Matrix showed a similar result, there are correlations between the independent control variables *ESTIM, SIZ, ROA, BTM, Big4*, and *RESULT* with the dependent variable *PPA*. The company's natural asset logarithm (*SIZ*) correlated with the precision variable (*PPA*) in the analysis. When presenting a positive sign, it is evident that, according to Jiao et al. (2012) and Martinez and Dumer (2014), the larger the company, the less accurate the profit forecasts.

Regarding the *ESTIM* variable, the correlation perceived at 0.1% of significance and with a negative sign follows what was found by Domingues and Nakao (2017) and Jiao et al. (2012), leading to the understanding that in 14% of the sample, the more analysts make profit estimates, the more accurate the average profit forecast will be.

The *RESULT* variable showed a positive and significant correlation with *PPA* at the level of 0.1%. The results of Domingues and Nakao (2017) followed, which also highlight the occurrence of worsening in the quality of the estimates in periods of negative result, with evidence that if the result is a loss, the error is greater, on average, in 44% of the cases.

4.3 Regression Analysis

From the data collected, panel data regression was performed in order to analyse the relationship between the adoption of IFRS 15 and the accuracy of the forecast of financial analysts of the companies listed in B3. The Table 5 presents the results of the regression for data with treatment for outliers (winsorized between 1% and 99%) of non-categorical variables. The results from the three regression tests performed based on the equation 1 of this study are in Table 5.

Fixed Effects were adopted for all models, with F (p.value) statistics that suggest general significance of the models. The dummy control variables were not treated for outliers because they were binary. The variance inflation factor (VIF) test revealed a tendency towards the absence of multicollinearity for the variables treated in the analysis. The adjusted multiple determination coefficient (adj.R^2: R-squared) indicates that the models for the PPA variable explain around 63%, 70%, and 43% of the variability of the response data around its mean for models 1, 2, and 3, respectively.

Table 5
Results of regression analyses.

| | E.S. | Mod. PPA | | |
		Total period (Mod. 1)	Pre IFRS15 (Mod. 2)	Post IFRS15 (Mod. 3)
Intercept		**-3.5693 * (1.4534)**	0.3409 (1.3983)	**-5.5954 ** (1.8541)**
AdCPC47	(-)	**-2.0349 ** (0.6188)**		
IFRS15	(-)	**0.4839 (0.2692)**		**0.4646 (0.2530)**
ESTIM	(-)	-0.0276 (0.0279)	-0.0259 (0.0225)	-0.0371 (0.0355)
SIZ	(+)	0.0868 (0.0695)	-0.0971 (0.0650)	0.1311 (0.0856)
ROA	(-)	**-0.0370 * (0.0160)**	**-0.0633 *** (0.0137)**	**-0.0341 (0.0193)**
BTM	(-)	-0.0547 (0.0373)	**-0.1058 * (0.0474)**	-0.0551 (0.0365)
RESULT	(+)	**1.7491 *** (0.3740)**	**1.4770 *** (0.2986)**	**1.3884 ** (0.4801)**
Big4	(-)	-0.1163 (0.2779)	-0.2110 (0.3208)	**-0.5100 (0.2860)**
COV	(+)	**-1.9361 * (0.8986)**		**-2.4961 ** (0.8152)**
LCS	(+/-)			
Growth		**-0.6480 * (0.3071)**	-0.2380 (0.4162)	-0.4606 (0.3553)
Mature		-0.4533 (0.3448)	0.0358 (0.4126)	-0.1685 (0.3593)
Turbulence		-0.0602 (0.4853)	0.4636 (0.4738)	-0.1332 (0.4906)
Decline		-0.7331 (0.7312)	-0.5257 (0.6181)	0.1465 (0.9790)
Sectors	(+/-)			
Basic Materials		0.3215 (0.4936)	-0.1740 (0.4574)	0.3285 (0.6034)
Consumer Cyclicals		-0.0927 (0.4352)	**-0.9786 * (0.4116)**	0.0549 (0.5183)
Consumer Non-Cyclicals		-0.1102 (0.4608)	-0.5497 (0.4346)	0.0138 (0.5507)
Energy		0.3459 (0.5155)	-0.4246 (0.5105)	0.4105 (0.6043)
Healthcare		-0.3901 (0.5035)	**-1.2513 * (0.4976)**	-0.2588 (0.6142)
Industrials		-0.2572 (0.4449)	-0.6046 (0.4218)	-0.3249 (0.5368)
Real Estate		0.3709 (0.4556)	0.0164 (0.4204)	0.1477 (0.5458)
Technology		-0.3689 (0.5003)	-0.5279 (0.5041)	-0.4105 (0.5920)
Utilities		0.3776 (0.4705)	0.1504 (0.4241)	0.2435 (0.5693)
Model		Fixed Effects[1]	Fixed Effects[1]	Fixed Effects[1]
N		170	127	153
R^2		0.6823	0.7494	0.5093
adj.R^2		0.6348	0.7049	0.4306
p.value		0.0000	0.0000	0.0000

Note: *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$; Bold $p < 0.05$. [1]Fixed effects controlled by firm and year. N: Observations; E.S.: Expected signal; PPA: Accuracy of projections; IFRS15: Learning IFRS 15; AdCPC47: Mandatory adoption of CPC 47; ESTIM: Estimates; SIZ: Company size; ROA: Return on Assets; BTM: Book-to-market; Big4: Statement audited by big four audit firm; RESULT: Negative company result; COV: Period affected by COVID-19; LCS: Life cycle stages; Sectors: Company Sector according to Thomson Reuters. **Source**: Research's data (2023).

From the regression analysis by the Pooled model, it was not possible to perceive the relationship between the independent control variables *ESTIM, SIZ*, and *BTM* with the dependent variable *PPA*. As Hlel et al. (2020) mentions, in the early stages of a company, the introduction of an IFRS standard brings more credibility and, as a consequence, forecasts are more assertive. This statement corroborates the findings in this research and disagrees with Gu et al. (2019). So we were able to check in Mod. 1, in a negative and significant coefficient at 5%, that companies in the growth stage receive earnings forecasts that are closer to the realized value.

Having the statements audited by big four firms (*Big4*) was only relevant, and corroborated with Iatridis (2012), Lawrence et al. (2011) and Miah et al. (2023), after 2017 with the adoption of IFRS 15, so from then on, with a negative and significant coefficient of 10%, companies audited by the four largest audit firms receive more accurate profit forecasts. This finding leads to the theoretical support that addresses audit quality as an important factor for reducing information asymmetry.

As Hlel et al. (2020) mentions, in the early stages of a company, the introduction of an IFRS standard brings more credibility and, as a consequence, forecasts are more assertive. This statement corroborates the findings in this research and disagrees with Gu et al. (2019). So we were able to check in Mod. 1, in a negative and significant coefficient at 5%, that companies in the *growth* stage (*LCS*) receive earnings forecasts that are closer to the realized value.

The results of the correlation analysis (Table 4) were confirmed in the multiple regression

analysis (Table 5) with respect to the independent variable *AdCPC47*. This, in addition to presenting a significant positive correlation at 0.1% with *PPA*, was also significant to predict PPA at 1% of significance in the model with panel data Mod. 1. These results confirm hypothesis 1 based on Demmer et al. (2019), Gu et al. (2019), Hlel et al. (2020) and contradict some previous research that did not perceive a relationship between the adoption of the IFRS 15 standard and the quality of the forecasts of financial analysts (e.g. Gonçalves & Gomes, 2018, Onie et al., 2022, Tomi, 2018)

At the same time, for models that include the IFRS15 variable (Mod. 1 and Mod. 3), the proposition of the existence of a positive learning curve proposed by Martinez and Dumer (2014) falls apart, going in the opposite direction to that proposed by hypothesis 2 adopted in this study. With a positive and significant coefficient of 10%, the results lead to the understanding that the more time elapsed since the adoption of the standard, the greater the distance between the predicted profit and the realized profit, that is, the less accurate the forecast made by the financial analysts.

To analyse the data referring to hypothesis 3 of this study, it is necessary to observe the results of models 2 and 3. Thus, in Mod. 2, which addresses the moment prior to the adoption of the standard, it is noticed that the sectors of Consumer Cyclicals and Healthcare are significant at 5% and with negative coefficients, thus, they presented more accurate forecasts by analysts. However, after the adoption of the standard (Mod. 3) these are no longer significant, while the others maintain the assertion that they are not relevant to the PPA. Thus, the adoption of the standard had a differentiated impact on the accuracy of forecasting earnings in different sectors, confirming hypothesis 3 of this study and corroborating the statements by Boujelben and Kobbi-Fakhfakh (2020), Miah et al. (2023), Tutino et al. (2019) and Khamis (2016).

5 CONCLUSION

The objective of the research was to verify the relationship between the adoption of IFRS 15 and the forecast of financial analysts for the companies listed in Brazilian Exchange in the period from 2012 to 2021. The sample included 1,013 observations (firm-year) from non-financial companies listed on B3, with analyst forecast data for the period.

Adopted a methodology based on descriptive analysis, correlation analysis, and multiple linear regression with fixed effects, it was possible to specify the mathematical relationship between the accuracy of the financial analysts' forecast (*PPA*) and the mandatory adoption of CPC 47 (*AdCPC47* and *IFRS15*), as well as other control variables indicated by the literature necessary for analysis. The control variables Return on Assets (*ROA*), Book-to-market *(BTM)*, Result (*RESULT*), big four auditor (*Big4*), COVID-19 incidence (*COV*), Life cycle stages (*LCS*) and Sector were important for determining profit forecasts, corroborating the findings of Jiao et al. (2012), Khamis (2016) and Domingues and Nakao (2017).

Our hypothesis 1 was confirmed from correlation and regression analyses. Despite the recent literature on the subject being divided into two opposing perspectives, this study was based on the delimitation of its hypothesis, not only such studies (e.g. Demmer et al., 2019, Gu et al., 2019, Hlel et al., 2020), but also the purpose of regulators to implement the norm: namely, to reduce information asymmetry and increase the quality of accounting information.

With the adoption of a progressive variable, according to the methodology proposed by Martinez and Dumer (2014) and which addresses a "learning curve", the results led to the understanding that the more time that has passed since the adoption of the standard, the greater the distance between predicted and realized profits, that is, less accurate is the forecast made by financial analysts. Thus, hypothesis 2 was contradicted, the existence of a relationship was perceived, however, differently from what was proposed by the literature, the proposed learning curve was negatively related to the quality of the forecasts made by analysts.

The sectors of the economy were impacted in different ways by the adoption of IFRS 15, confirming hypothesis 3. In the investigation, the relationship between Thomson Reuters sectors and the dependent variable was analysed. Descriptive statistics revealed that there is a considerable difference between the accuracy of the forecasts for the sectors analysed. In the regression analysis,

the sectors of consumer non-cyclical and healthcare, significant at 5%, revealed a positive relationship with accuracy on the period pre- IFRS 15 adoption, therefore, in the occurrence of the sectors, the forecasts were more accurate.

Thus, these findings contribute academically with the development of the little explored theme, with managers in understanding the applicability of the norm, with analysts in the importance of specializing in sectors and developing expertise, and with the market for the perception of the importance and activities developed by financial analysts.

This study was a pioneer in using a progressive variable for the application of the IFRS 15 standard, and from this analyses were found not yet identified results by the related literature. Results close to those found by the related studies were noticed when variables with identical metrics were also adopted, even for different samples. The analysis presented limitations regarding the availability of analyst forecast data, the impact of adopting the standard could not be analysed in sectors for which there was no defined data.

As a suggestion for future research, extend the analyses performed here to sample for other countries, specific with different legal system. Considering the limitations mentioned above, it is worth checking the effective adoption of IFRS 15 in the context of the research. The application of this research after approval by BACEN (Brazilian Central Bank) of CPC 47 is necessary to understand how the financial sector will react when it comes to the quality of the forecasts of financial analysts.

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