BBR
BRAZILIAN BUSINESS REVIEW

ARTICLE

Impact of Goodwill Impairment on the Cost of Equity in Different Institutional Environments

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ABSTRACT

Previous studies suggested that goodwill impairment is associated with an increase in the cost of equity, however little attention has been paid to the influence of institutional environments on this association. In this study, we investigated this association in different institutional settings. Using Capital IQ, we collected data from financial statements released between 2010 and 2019 from 18,905 companies based in 42 countries. These countries were classified into two groups: those with a high level of enforcement and audit and those with a low level of enforcement and audit. An association model was developed between the cost of equity and goodwill impairment, tested using the panel data. Regression coefficients were estimated individually for each group and compared using the Wald test. Based on the results, we concluded that the increase in the cost of equity associated with goodwill impairment is observed more intensely in countries with low levels of enforcement and auditing. This reveals that the application of IAS 36 in different environments can entail different economic consequences, which need to be taken into account when discussing the quality of standards.

KEYWORDS

Impairment of goodwill, Cost of equity, and Institutional environments

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Received: 12/15/2022.
Revised: 05/17//2023.
Accepted: 08/30/2023.
DOI: https://doi.org/10.15728/bbr.2022.1463.en

Impacto do *Impairment* do *Goodwill* no custo de capital próprio em diferentes ambientes institucionais

RESUMO

Estudos anteriores sugerem que o *impairment* do *goodwill* esteja associado a um aumento no custo de capital próprio. No entanto, pouca atenção tem sido dada à influência dos ambientes institucionais nessa associação. No presente estudo, essa associação foi investigada em diferentes ambientes institucionais. Usando a *Capital IQ,* foram coletados dados de demonstrações contábeis divulgadas entre 2010 e 2019 de 18.905 empresas sediadas em 42 países. Esses países foram classificados em dois grupos: alto nível de *enforcement* e auditoria e baixo nível de *enforcement* e auditoria. Foi desenvolvido um modelo de associação entre o custo de capital próprio e o *impairment* do *goodwill* testado com os dados organizados em painel. Os coeficientes da regressão foram estimados individualmente para cada um dos grupos e comparados pelo teste de Wald. Os resultados permitem concluir que o aumento no custo de capital próprio associado ao *impairment* do *goodwill* é observado com maior intensidade em países de baixo nível de *enforcement* e auditoria. Isso revela que a aplicação da IAS 36 em diferentes ambientes pode ter consequências econômicas diferentes, o que deve ser levado em consideração quando se discute a qualidade das normas.

PALAVRAS-CHAVE

Impairment do *goodwill,* Custo de Capital Próprio e Ambientes Institucionais

1. INTRODUCTION

There is much debate about the accounting treatment of goodwill in the scientific environment (Appleton et al., 2023; Durocher & Georgiou, 2022). To date, this subject has been debated with different approaches, such as the quality of accounting information, earnings management, and capital markets, however the results do not allow us to affirm that the recoverability test is the most appropriate accounting technique to treat goodwill.

Regarding the quality of accounting information, Knauer and Wöhrmann (2016) demonstrated that, in countries with low institutional strength and a low level of legal protection for investors, opportunistic information management can be facilitated. They point out that the reliability of goodwill impairment is lower in countries with low institutional strength.

In the earnings management literature, Jahmani et al. (2010) showed that companies use goodwill impairment to smooth out the results, while Nguyen (2019) points out that the recognition of loss by goodwill impairment can be done late, and as a result of accounting information manipulation.

This possibility of earnings management, added to the worsening in the quality of accounting information (Knauer & Wöhrmann, 2016), can increase information users' perceived risk. Risk, in turn, can be reflected in the cost of equity. Some studies have already investigated this relationship, such as Iatridis and Senftlechner (2014), who found a positive association between goodwill impairment and cost of equity in Austria, i.e. the recognition of the loss due to goodwill impairment increases the cost of equity; Sun and Zhang (2016) indicated that, in North America, disclosure of loss due to goodwill impairment is associated with a lower credit score and that,

therefore, there is also a positive relationship with the cost of capital of third parties. Meanwhile, Mazzi et al., (2017) demonstrated there is a negative relationship between the disclosure about goodwill impairment and the cost of equity in Europe—i.e. more detailed accounting information on goodwill impairment can lower the cost of equity.

These studies considered countries with similar institutional environments, except for Europe. In addition, other institutional differences, such as enforcement and the level of capital market development, may limit these surveys concerning the conclusions obtained for countries with different institutional environments (Pirveli & Zimmermann, 2019).

Although the study by Knauer and Wöhrmann (2016) considers countries with different institutional environments, the authors analyzed the effect of goodwill impairment on the reliability of accounting information and not on the cost of equity. The studies by Iatridis and Senftlechner (2014) and Mazzi et al. (2017) observed the effect of goodwill impairment on the cost of equity but considered countries with similar institutional environments. This offers a research opportunity, given that the evidence Iatridis and Senftlechner (2014) and Mazzi et al. (2017) provided cannot be directly inferred for other countries with different institutional environments.

Therefore, this study aims to investigate whether the increase in the cost of equity associated with goodwill impairment is higher in countries with low levels of enforcement and audit when compared to countries with high levels of enforcement and audit. The enforcement level includes issues aimed at market regulation, while auditing involves the regulation of the auditing profession, and other aspects. Both can provide a better understanding of the relationship between goodwill impairment and cost of equity, especially when considering different institutional environments. This study intends to answer the following research question**: Is the increase in the cost of equity associated with goodwill impairment higher in countries with low levels of enforcement and audit when compared to that of countries with high levels of enforcement and audit?** Forty-two countries from different continents—except Antarctica—were investigated, whose institutional environments differ by the levels of enforcement and audit, according to a study by Brown et al. (2014).

In countries with low enforcement and audit levels, the quality of the financial statements may be lower (Knauer & Wöhrmann, 2016), and it can be established that the reliability of the goodwill impairment test may also be lower, which may be associated with an increase in the investor's perceived risk and ultimately be reflected in the cost of equity (Sharpe, 1994).

The results of this study may contribute to the understanding of the effects caused by international standards, particularly IAS 36, and its application at different levels of enforcement and audit. For example, the current literature has identified a positive association between goodwill impairment and the cost of capital (Iatridis & Senftlechner, 2014; Sun & Zhang, 2016; Mazzi et al., 2017). The conclusion as to whether this increase in the cost of capital is associated with the level of enforcement and audit cannot be reached directly. Thus, this research aims to include the dimension of enforcement and audit by examining the relationship between goodwill impairment and cost of equity. In this sense, the findings of this study can provide empirical evidence that contributes to this discussion, especially in the face of the debate focused on more fit accounting for the reduction of the goodwill – *vide* Discussion Paper Business Combinations-Disclosures, Goodwill and Impairment (IFRS Foundation, 2020).

In addition, the globalization of investments is an increasingly observed phenomenon. Hence, the standardization of financial statements by IFRS can benefit investors, through the comparability

of companies from different countries, for example. The application of the goodwill impairment test can happen differently in countries with different institutional environments though, which can generate information that, despite having been prepared following the same principles, has different qualities (Knauer & Wöhrmann, 2016). Thus, investors from different countries can also benefit from the findings of this research.

2. LITERATURE REVIEW AND DEVELOPMENT OF THE RESEARCH HYPOTHESIS

The institutional differences that have been investigated in the literature include the legal systems: Code Law and Common Law. In countries with legal systems based on Code Law, or Roman law, concerning accounting, it is common that the legal form prevails over the economic essence of the facts, contrary to what is observed in countries with legal systems based on Common Law (Martins et al., 2007).

About the institutional environment, the authors La Porta et al. (1997) investigated the level of legal protection measured by both legislation and enforcement in the application of these laws, and showed a less developed capital market in countries where levels of legal protection are low. This study provides country rankings based on the origin of the legal system, level of protection of minority investors, level of protection of creditors, level of enforcement, size of the capital market, and adoption or non-adoption of international accounting standards. The method used was based on empirical research involving 49 countries.

Similar to the study by La Porta et al. (1997), Brown et al. (2014) focused on the classification of institutional environments. Applying a questionnaire, the researchers developed an index that considers the level of enforcement and auditing. For the first aspect, the authors considered the level of market regulation, whether the legal authorities take enforcement measures for the disclosure of financial statements, apply sanctions in cases of non-compliance by companies and others; the second aspect involves the requirement for auditor licensing, regulation of the auditing profession, mandatory turnover and others. The index of Brown et al. (2014) can be used to classify countries in terms of institutional environment and was used as a more recent alternative compared to the study by La Porta et al. (1997).

Further understanding of the impairment of goodwill can be achieved through the combined analysis of the standards IFRS 3-Business Combination, IAS 36-Impairment of Assets, and IFRS 13-Fair Value Measurement. In this sense, goodwill is an asset that can arise in a business combination situation. Initially, the acquiring company should measure the assets and liabilities of the company to be acquired at fair value rather than at their historical cost. Thus, the amount of goodwill, measured by the difference between the amount paid and the net value of assets and liabilities, measured at fair value, is disclosed in the intangible asset account of the consolidated balance sheet.

After the initial recognition of goodwill, under IAS 36-Impairment of Assets, the application of the impairment test is periodically necessary. The objective of the impairment test is to ensure that the assets disclosed in the financial statements are recorded at a value that does not exceed their impairment value, determined by the use or sale of that asset (CPC 01, 2010). In this sense, after identifying that the value recorded in the balance sheet is greater than the recoverable amount, the entity has to proceed with the adjustment of the goodwill, the difference being recorded as an expense in the profit or loss for the year.

Concerning the cost of equity literature, published models for estimating the cost of equity can be classified into two approaches: ex-post and ex-ante. According to the ex-post approach, the cost of equity is estimated empirically, based on historical data. In this approach, a fairly widespread model is the Capital Asset Pricing Model (CAPM). Proposed by Sharpe (1994), the CAPM establishes a positive linear relationship between the return expected by the shareholder and the risk incurred in the investment. Thus, the return expected by a shareholder can be calculated by the return obtained in "risk-free " operations, plus a premium for the specific risk of investing in that company (Sharpe, 1994).

In the ex-ante approach, the cost of equity, commonly treated as implicit cost of capital, can be estimated by the rate of return that equalizes a sequence of results predicted by analysts, at the current market price of the stock. In this approach, a widely applied model is that of Easton (2004), which is based on the growth of profits, and the future residual return is different from zero if the market price of the stock is not equal to the equity value per stock (Easton, 2004).

There is no consensus on which approach, ex-ante or ex-post, would provide the best estimated cost of equity (Alencar, 2007). As a result, some research has been developed. For example, Savoia et al. (2019) compared the results of applying ex-ante and ex-post models to estimate the shareholder cost of capital of infrastructure companies in Brazil. Analyzing the period from 2002 to 2014, the researchers proposed a linear relationship between the observed return on assets and the cost of equity measured by the CAPM and using the implicit cost of capital based on Easton (2004). These research results indicate that an ex-ante approach presents more consistent results for estimated shareholder cost of capital.

This discussion about the most appropriate approach to measure the cost of equity was fundamental for the choice of the model to be applied in this work, which adopts Easton (2004). Next, the relationship between the cost of equity and goodwill impairment was explored. For example, the loss due to goodwill impairment may be associated with a worsening in the reliability of accounting information (Knauer & Wöhrmann, 2016). The worsening of accounting information reliability can cause an increase in investors ' perceived risk (Easley & O'hara, 2004), and risk is directly associated with the cost of equity (Sharpe, 1994). Therefore, it is expected that the recognition of the loss, due to goodwill impairment, is associated with an increase in the cost of equity. Iatridis and Senftlechner (2014) confirmed this relationship, as the recognition of the loss due to goodwill impairment increases the cost of capital. Sun and Zhang (2016) found the same relationship but for the cost of third-party capital.

In addition, Mazzi et al. (2017) observed a negative relationship between the disclosure about goodwill impairment and the cost of equity. That is, the lower the disclosure about loss due to impairment, the higher the cost of equity, which is consistent with a scenario of greater information asymmetry.

Therefore, we initially evaluated the statistical association between goodwill impairment and the cost of equity for the sample data. This analysis was done by investigating the following research hypothesis:

- **H1:** There is a positive relationship between the recognition of loss by goodwill impairment and the cost of equity.

Additionally, as the loss in the reliability of accounting information is greater in institutional environments with lower levels of enforcement and auditing (Knauer & Wöhrmann, 2016), in these countries, a higher increase in the cost of equity associated with goodwill impairment is

expected. In addition, more recent studies, such as Alshehabi et al. (2021), underline the influence of institutional environments on the consequences of goodwill impairment. This study showed that the loss due to goodwill impairment is more relevant in countries with more developed institutional environments (Alshehabi et al., 2021).

To investigate the reaction of goodwill impairment in the cost of equity in different institutional environments, according to studies by Knauer and Wöhrmann (2016), La Porta et al. (1997), Brown et al. (2014) and Pirveli and Zimmermann (2019), the following research hypothesis is proposed:

- **H2:** The relationship between the recognition of loss due to goodwill impairment and the cost of equity capital is more pronounced in companies that belong to countries whose institutional environments reveal lower levels of enforcement and auditing.

To test these hypotheses, data were collected from companies based in different institutional environments, which adopt the accounting standard established by IFRS and whose financial statements were disclosed in the period from 2010 to 2019, as detailed below.

3. DATA AND METHOD

The data were collected from the financial statements disclosed in the period from 2010 to 2019, available in the database of Capital IQ by Standard & Poor's® for 42 countries around the world. The choice of the countries studied was based on the availability of institutional environment indices in the study by Brown et al. (2014). Of the 51 countries in the original study, nine did not adopt IFRS during the period of this study and were disregarded. These countries were organized into two groups through a cluster analysis, the criterion being applied to the index of the study by Brown et al. (2014). Table 1 shows the classification of these countries.

Table 1
Institutional Environments

Low level of enforcement and auditing		High level of enforcement and auditing	
Country	**Brown et al. (2014)**	**Country**	**Brown et al. (2014)**
Argentina	11	Australia	52
Austria	27	Belgium	44
Brazil	23	Canada	54
Chile	9	Denmark	49
Croatia	22	France	45
Czech Republic	19	Germany	44
Finland	32	Hong Kong	52
Greece	26	Ireland	41
Hungary	18	Israel	48
Jordan	11	Italy	46
Mexico	11	Malaysia	40
Pakistan	18	The Netherlands	43
Peru	16	New Zealand	43
Philippines	27	Norway	47
Poland	28	Spain	42

Table 1
Cont.

Low level of enforcement and auditing		High level of enforcement and auditing	
Country	**Brown et al. (2014)**	**Country**	**Brown et al. (2014)**
Portugal	29	United Kingdom	54
Romania	15		
Russia	28		
Russian Federation	28		
Singapore	32		
Slovenia	19		
South Africa	19		
South Korea	28		
Sweden	34		
Turkey	20		
Ukraine	6		
Count	**26**	**Count**	**16**
Maximum	**34**	**Maximum**	**54**
Minimum	**6**	**Minimum**	**40**

***Source*:** own elaboration.

Some adjustments to the database were required. For example, we chose to exclude cases in which it was not possible to observe the stock price, as this information is used in the construction of study variables. Therefore, 52,237 observations were excluded from the base that did not include information on the stock price. This and other exclusions are shown in Table 2.

Table 2
Data exclusions

Description	Observations
Initial	214,060
(-) Absence of country	6,629
(-) Duplicity	30
(-) Absence of stock price	52,237
(-) negative equity*	9,669
(-) Decrease in profit	25,228
(-) Impairment of positive goodwill	1,279
(=) Final	118,988

Source: own elaboration.
Notes: The cases of negative equity and decrease in earnings per share were based on Mazzi et al. (2017) and Easton (2004), respectively. The observations of positive goodwill impairment may be related to the year the host country of the company that produced the financial statements adopted IFRS. For example, Ukraine mandatorily adopted IFRS as of a law in 2017, which means that before the adoption of IFRS, companies disclosed their financial statements following local GAAP, which may lead to differences in the treatment of goodwill impairment.

After the exclusions, 118,988 observations were obtained from 18,904 companies. The 18,904 companies were classified into 70 economic sectors in the database. About 30% of the sample is concentrated in the sectors of capital markets, metals and mining, and Real Estate Management

and Development. The above-mentioned sector represented by the rubric "Capital Markets", refers to investment companies such as banks and funds.

After determining the sample, the following equation presents the model developed in this study:

$$COE_{i,t} = \alpha + \beta_1 Imp_{i,t} + \beta_2 Enfor + \beta_3 BtM_{i,t} + \beta_4 Lev_{i,t} + \beta_5 Liq_{i,t} + \beta_6 Roa_{i,t} + \beta_7 Siz_{i,t} + \varepsilon \quad (1)$$

Where:

COE is the company's cost of equity I in t calculated according to Easton (2004); Imp is the loss due to goodwill impairment of company I in t; Imp is calculated by dividing the loss due to goodwill impairment by the company's total assets, allowing the comparison of losses due to goodwill impairment between companies with different asset values. This calculation is in line with previous studies in the literature, such as Iatridis and Senftlechner (2014), Sun and Zhang (2016), and Mazzi et al. (2017); the institutional environment variable (Enfor) is equal to the enforcement and audit index according to the study by Brown et al. (2014); the variable Book-to-Market (BtM) is calculated by dividing the market value by the book value according to the study by Beatty and Weber (2006). This variable can help capture possible effects of market factors; Leverage (Lev), calculated by dividing current and non-current liabilities by equity; Liquidity (Liq), calculated by dividing total liabilities by total assets, according to the studies of Kisgen (2006; 2009), Liu (2011), Ahmed and Ali (2015); Return On Assets (Roa), calculated by dividing net income by total assets; and Size (Siz), given by the natural logarithm of the total asset according to studies by Ashbaugh-Skaife, Collins and LaFond (2006). (2006). ε and α represent the error term and constant of the regression.

The cost of equity was estimated using the method developed by Easton (2004), which departs from the growth of projected profits. Companies for which profit projections are made tend to have more intense monitoring of the market, which can interfere with their administrative practices. In addition, the profit growth scenario may be related to the expected profitability of the business, which may be somewhat related to the goodwill impairment, and can interfere in the results.

Subsequently, the coefficients for the model variables were estimated. Initially, the model was applied to all data in the database without dividing by clusters. In this case, the institutional environment was controlled by a control variable that corresponds to the levels of enforcement and auditing from the study by Brown et al. (2014), divided between 0 and 1. The estimated coefficient for the goodwill impairment variable (Imp) permits analyzing the effect of loss due to goodwill impairment on the cost of equity, revealing evidence for the first research hypothesis. To analyze the second research hypothesis, the same model was applied to each of the clusters. In these cases, as the institutional environment is controlled by the clusters, the Enfor variable was removed from the model and the validation of the research hypothesis was given by comparing the coefficients of goodwill impairment in each model, using the Wald test.

The tests of omission of a relevant variable, heteroscedasticity, multicollinearity, and normality of the residues were also applied. In common, the Ramsey test indicated the omission of a relevant variable in the model for the general test and for the tests of the two clusters, with a 1% significance level. The objective of the Ramsey test is to evaluate the functional adequacy of the proposed model, as the indication of variable omission may mean that other control variables may be more suitable for the estimated models. No additional variables were identified though, applied in similar studies in the literature, which would allow a possible correction.

To identify the best technique for estimating the coefficients, the following tests were applied: Chow's test, to compare the coefficients estimated by fixed effects and POLS (Pooled Ordinary Least Squares); Breusch-Pagan test, to compare the coefficients estimated by random effects and POLS, and the Hausman test to compare the coefficients estimated by the random and fixed effects. The tests indicated: i) for the general model, the best estimator of the coefficients is the fixed effects model, ii) for the cluster high level of enforcement and auditing, fixed effects are also indicated, iii) for the cluster low level of enforcement and auditing, the coefficients estimated by the random effects prevailed statistically over the others.

Additionally, to correct endogeneity problems pointed out in the tests and use a robust method for the estimates, the coefficient estimation method proposed in the work of Arellano and Bond (1991) was also applied. This method, also known as a dynamic panel, applies a one-period lag to the dependent variable, which can minimize the effects of relevant variable omission and serial autocorrelation of residuals (Arellano & Bond, 1991). Still, it is worth mentioning that Breush-Pagan pointed out problems of heteroscedasticity of the residues, the models being estimated with the matrix of variance and robust covariance. Finally, the estimated coefficients in the result tables follow Arellano and Bond's model, while the estimated coefficients for fixed effects, random effects, and POLS were not reported in this study.

4. DESCRIPTIVE STATISTICS

The first analysis of descriptive statistics indicated the presence of outliers. To minimize the effect of these outliers in the analysis, the winsorization technique was applied, with a 10% cut of the variables at the minimum and maximum ends of the distributions. After this adjustment, descriptive statistics were prepared. These results can be observed in the following tables, starting with the high level of enforcement and auditing in Table 3:

Table 3

Count, mean, standard deviation, minimum, and maximum statistics for high-level enforcement and auditing variables from 2010 to 2019

Variable	# Obs.	Mean	Dev. P	Min.	Max.
COE	16,888	0.1660	0.0992	0.0534	0.3693
Imp	735	0.1780	0.0239	0.0001	0.0715
BtM	55,856	1.9204	1.5506	0.3996	5.0382
Lev	55,990	0.3664	0.2515	0.0547	0.7792
Liq	55,985	0.3665	0.2515	0.0552	0.7794
Roa	55,985	-0.0575	0.1481	-0.3281	0.1089
Siz	55,985	4.0678	2.1031	1.2162	7.5623

Obs.: **COE** is the cost of equity estimated using Easton's model (2004), **Imp** is the goodwill impairment expense divided by total assets, **BtM** is the book-to-market ratio calculated by the market value (stock price multiplied by the amount of stock) divided by equity, **Lev** it is the leverage ratio calculated by dividing the sum of current and non-current liabilities by the sum of current, non-current liabilities and equity, **Liq** it is the liquidity ratio calculated by dividing total liabilities by total assets, **Roa** is the ratio of return on assets calculated by dividing net income by total assets and **Siz** is the size variable of the company, calculated by the natural logarithm of the total assets.
***Source*:** own elaboration.

The means are positive and lower than one for all variables except **Btm** and **Siz**, whose means are higher than one, and **Roa** which is negative. The standard deviations are also somewhat

similar, in that **Btm** and **Siz** have larger standard deviations (1.55 and 2.10 respectively), while the other variables have standard deviations smaller than one. The independent variable and the variable of interest also stand out, with means and standard deviations of 0.16 and 0.09 (cost of equity) and 0.17 and 0.02 (goodwill impairment), respectively. Next, the same statistics are presented for the low level of enforcement and auditing cluster in Table 4.

Table 4

Count, mean, standard deviation, minimum, and maximum statistics for low-level enforcement and auditing variables from 2010 to 2019

Variable	# Obs.	Mean	Dev. P	Min.	Max.
COE	9,319	0.1864	0.1061	0.0534	0.3693
Imp	540	0.0142	0.0213	0.001	0.0715
BtM	46,281	1.5687	1.3489	0.3996	5.0382
Lev	46,291	0.4496	0.2230	0.0547	0.7792
Liq	46,186	0.4505	0.2225	0.05529	0.7794
Roa	46,183	0.0050	0.0954	-0.3281	0.1089
Siz	46,186	4.6518	1.8090	1.2162	7.5623

Obs.: **COE** is the cost of equity estimated using Easton's model (2004), **Imp** is the goodwill impairment expense divided by total assets, **BtM** is the book-to-market ratio calculated by the market value (stock price multiplied by the amount of stock) divided by equity, **Lev** it is the leverage ratio calculated by dividing the sum of current and non-current liabilities by the sum of current, non-current liabilities and equity, **Liq** it is the liquidity ratio calculated by dividing total liabilities by total assets, **Roa** is the ratio of return on assets calculated by dividing net income by total assets and **Siz** is the size variable of the company, calculated by the natural logarithm of the total assets.
***Source*:** own elaboration.

For the dependent variable and the variable of interest (cost of equity and goodwill impairment, respectively), the following means are observed: 0.18 and 0.01. Comparing these figures with the averages of the same variables in Table 3, one can notice a higher average cost of equity in the cluster for low level of enforcement and auditing while, for goodwill impairment, the opposite is observed, that is, the average is higher in the cluster for high level of enforcement and auditing. Regarding the standard deviation in both clusters and for both variables, figures lower than one and positive are observed, and always higher in the high level of enforcement and auditing cluster than in the other cluster.

These statistics were also analyzed year by year. The analysis of the statistics by year shows that the observations are fairly distributed over the years, without extreme concentrations. The scarcity of data in a cluster or a year could hamper the analysis, due to the poverty of data in an institutional environment or a period. In general, the data do not reveal very extreme changes over time, neither for the count nor for the standard deviation.

Concerning the means, in the high level of enforcement and auditing cluster, the highest and lowest cost of equity stand out: 20% for 2019 and 16% for 2014, respectively. In the case of the low level of enforcement and auditing, the maximum and minimum were for the years 2012 and 2019 respectively, with 23% and 19% also for the cost of equity variable. For the goodwill impairment variable, the situation is similar for the high level of enforcement and auditing cluster, with the highest observation for the year 2014 (12%), and the lowest for 2019 (3%). In the cluster low level of enforcement and auditing, the highest observation was found for the year 2016 (8%), and the lowest for the year 2015 (2%).

Finally, the box plot is presented for each variable, which displays the data after the treatment for outliers in figure 1.

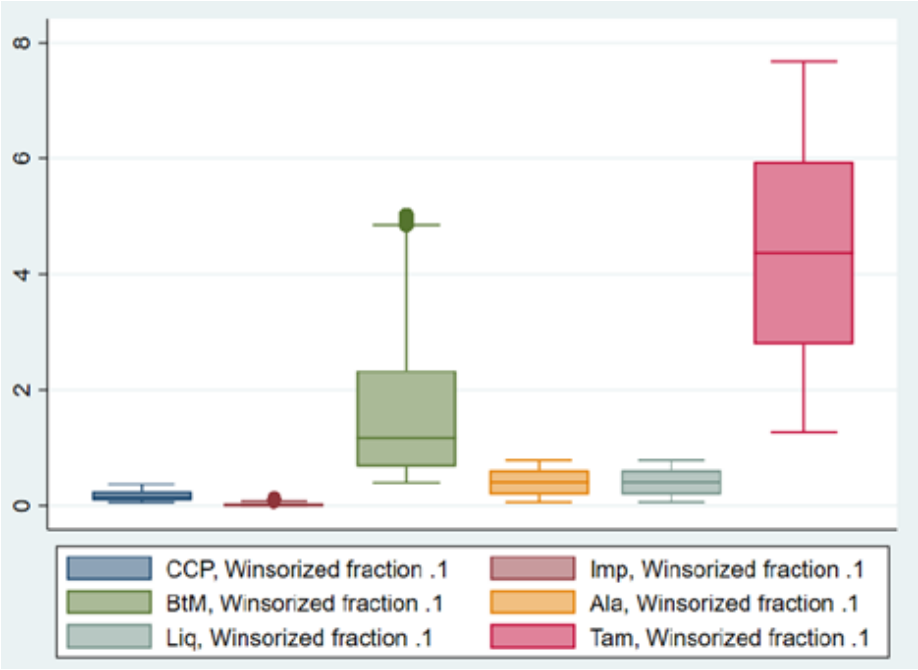

Figure 1. Box plots for the model variables after the winsorization
Source: own elaboration.

Then, statistical tests were applied, not reported in this study, to evaluate the statistical difference between the cost of equity in the groups with high and low levels of enforcement and auditing. As it cannot be affirmed, based on the tests applied, to evaluate the normality of the distribution that the data come from a normal distribution, we opted for the application of a nonparametric test to evaluate the difference between the groups. The Mann-Whitney test was used, and applied to two independent samples, with an ordinal measurement level of the variables (Fávero et al., 2014, p. 163).

For a confidence level $\alpha = 5\%$, based on Mann-Whitney's U-test, the null hypothesis that there is no difference between institutional environments can be rejected. This evidence strengthens hypothesis 2 in this research as, if there were no statistical difference between the institutional environment groups in terms of the cost of equity, the different effects in each group caused by the goodwill impairment could not be established.

5. RESULTS

This section presents the estimated coefficients after applying the model. These coefficients were estimated thrice. First, the model was applied considering all the sample data and these results are displayed in Table 5. Subsequently, the data were separated into two groups according to each cluster, low and high levels of enforcement and auditing. The model was applied individually for each of these groups, which resulted in different estimated coefficients. The estimated coefficients for the data in the high level of enforcement and auditing cluster are presented in Table 6. The estimated coefficients for the low level of enforcement and auditing cluster are presented in

Table 7. Finally, the estimated coefficients for the variable of interest Imp of each cluster were compared using the Wald Test.

The following tables present the coefficients estimated using Arellano and Bond's method (1991) for the model applied to the complete data, for the high level of enforcement and auditing, and then for the data of the low level of enforcement and institutional auditing cluster.

Table 5
Results of the general model (Arellano and Bond)

Variable	sign	Coefficient	t	P>t	Signif.
Impw	-	0.18140097	2.06	0.0392	**
Enfor	-	0.00078965	-4.42	0.0000	***
BtMw	-	0.02180285	-14.24	0.0000	***
Levw	+	0.03781511	3.03	0.0024	***
Roaw	-	0.24009035	-8.61	0.0000	***
Sizw	-	0.01978966	-11.57	0.0000	***
Cons.	+	0.34946898	24.11	0.0000	***

***Source*:** own elaboration.
Note: **Impw**: Goodwill impairment variable, **BtMw**: Book to Market variable, **Levw**: Leverage variable. **Roaw**: Return on Total Assets variable. **Sizw**: Size variable, all winsorized, and cons: constant of the model. *10%, **5% and * * * 1% is the statistical significance level.

The coefficients estimated using Arellano and Bond's (1991) method corroborate the signs found by the other methods inherent in the panel data method. Tables 6 and 7 present the application of Arellano and Bond's (1991) method for the models applied to the environment groups separately.

Table 6
Results of the High Level of Enforcement and Auditing Model (Arellano and Bond)

Variable	sign	Coefficient	t	P>t	Signif.
Impw	+	0.17714343	0.73	0.4638	
BtMw	-	0.02866433	-6.95	0.0000	***
Levw	+	0.08113962	1.13	0.2602	
Roaw	-	0.04331191	-0.39	0.6996	
Sizw	-	0.10434813	-4.24	0.0000	***
Cons.	+	0.85124123	4.73	0.0000	***

***Source*:** own elaboration.
Notes: **Impw**: Goodwill impairment variable, **BtMw**: Book to Market variable, **Levw**: Leverage variable. **Roaw**: Return on Total Assets variable. **Sizw**: Size variable, all winsorized, and cons: constant of the model. *10%, **5% and * * * 1% is the statistical significance level.

The estimated coefficients are similar to the coefficients estimated by the methods previously presented for the high level of enforcement and auditing, except for the goodwill impairment, which showed a negative sign for the variable of interest. This coefficient, estimated for this model, however, is not statistically significant. The statistical non-significance is persistent when compared to the coefficients estimated using the other methods in the panel data literature.

Table 7
Results of the Low Level of Enforcement and Auditing Model (Arellano and Bond)

Variable	sign	Coefficient	t	P>t	Signif.
Impw	+	1.2231722	5.17	0.0000	***
BtMw	-	0.05656778	-13.29	0.0000	***
Levw	-	0.29138319	-1.49	0.1373	
Roaw	-	0.37507487	-1.89	0.0582	*
Sizw	-	0.0929242	-4.98	0.0000	***
Cons.	+	1.0933484	5.59	0.0000	***

***Source*:** own elaboration.
Note: **Impw**: Goodwill impairment variable, **BtMw**: Book to Market variable, **Levw**: Leverage variable. **Roaw**: Return on Total Assets variable. **Sizw**: Size variable, all winsorized, and cons: constant of the model. *10%, **5% and * * * 1% is the statistical significance level.

For the low level of enforcement and auditing, the coefficient of the goodwill impairment variable is positive and statistically significant, which corroborates research hypothesis 1 of this work. Nevertheless, hypothesis 1 is rejected considering the total sample (Table 5); a possible explanation is due to the heterogeneous sample with different countries, which have different characteristics in terms of enforcement and auditing. When the sample is clustered though, it becomes homogeneous, and the results tend to corroborate research hypothesis 1, at least for the low-level scenario of enforcement.

5.1. Wald tests

The variable of interest, goodwill impairment, was individually estimated for the data of the high and low levels of enforcement and auditing. The comparison of these coefficients reveals that the coefficients of the low level of enforcement and auditing are higher relative to the high level (POLS: -0.15 + 0.42= 0.27, fixed effects: 0.03 + 0.55 = 0.58 and random effects: -0.14 + 0.43 = 0.29). This difference can provide intuitive evidence that the goodwill impairment is associated with the cost of equity more intensively for the low level of enforcement and auditing. This cannot be concluded though, as the distributions of the betas come from different estimates, which may mean that the arithmetic comparison of the mean betas is not as fit as the application of a parametric test. Therefore, the Wald test was used to compare the estimated betas for the clusters.

For the high level of enforcement and auditing, the beta of the variable of interest was not statistically significant in any of the estimation methods tested (POLS, Fixed effects, random effects, and Arellano and Bond). Therefore, it was chosen to consider the coefficient estimated by the fixed effects method, which has a positive sign. For the low level of enforcement and auditing, the beta of the variable of interest, goodwill impairment, estimated using the method of Arellano and Bond (1991) showed statistical significance and a positive sign.

The comparison of the distributions of betas using the Wald test allows us to conclude about the differences in a more thoughtful way than the simple and arithmetic differences. It is expected that the estimated coefficient for the goodwill impairment in the association model with the cost of equity in the Low Level of Enforcement and Auditing (LLEA) is greater than the coefficient estimated for the High Level of Enforcement and Auditing (HLEA) ($\beta_{LLEA} > \beta_{HLEA}$). The result of this test is displayed in Table 8.

Table 8
Wald tests

High level of Enforcement and auditing/Low level of Enforcement and auditing	T	Degrees of freedom	p-value
Fixed effects/Arellano and Bond	-1.e+02	2469	0.0000

Note: $_{\text{alternative}}$ H: diff ($\beta_{LLEA} > \beta_{HLEA}$) <0
***Source*:** own elaboration.

The result of the Wald test, presented in Table 10, indicated that the coefficient of the variable of interest (*Imp*) for the cluster low level of enforcement and auditing is statistically greater than the coefficient of the high enforcement and auditing level cluster, as the alternative hypothesis that the difference between these betas is zero cannot be accepted. This evidence allows us to confirm research hypothesis 2 of this study, that is, it can be affirmed that the recognition of the goodwill impairment is associated with a higher increase in the cost of equity in countries with low levels of enforcement and auditing when compared to countries with high levels of enforcement and auditing.

In other words, in countries with lower levels of enforcement and auditing of accounting information, managers' opportunistic behavior may occur more markedly than observed in other countries, interfering in the association between goodwill impairment and cost of equity. This result is also consistent with other evidence from the literature that has analyzed accounting in different institutional environments, such as Knauer and Wöhrmann (2016) for example.

More specifically, the evidence from this study confirms the findings of Iatridis and Senftlechner (2014) for Austria, which in this study was classified as a country belonging to the low level of enforcement and auditing cluster; and Mazzi et al. (2017), which studied a group of countries in Europe and identified a similar association between goodwill impairment and cost of equity. Regarding the study by Sun and Zhang (2016), no assertions are possible as the United States of North America (USA) adopts an accounting standard different from IFRS.

6. FINAL CONSIDERATIONS

The tests performed for the data set, without the separation by cluster of institutional environments, do not permit confirming research hypothesis 1, that the loss due to goodwill impairment is associated with an increase in the cost of equity. When the sample was segregated between strong and weak institutional environments, however, hypothesis 1 was confirmed for the institutional environment with a low enforcement and auditing level.

The model was applied for each group of institutional environments and allowed for the estimation of different betas for the goodwill impairment variable. Then, the Wald test was applied to compare the magnitude of the parameters. This test considers each of the distributions of the betas and demonstrated that the goodwill impairment is associated with a higher increase in the cost of equity of companies from countries with low levels of enforcement and auditing when compared to high levels of enforcement and auditing. Thus, research hypothesis 2 was confirmed by statistical tests.

These findings may benefit the discussion around the validity of the application of the goodwill impairment test, as it demonstrates that the effects observed for the application of this technique are associated with the institutional environment where the rule is applied. In summary, the pros and cons of the application of goodwill impairment can be more pronounced when considering

the different institutional environments. The levels of enforcement and auditing, which can determine the institutional environment, are not the responsibilities of the board though.

In addition, the results of this study can benefit users of accounting information. For example, investors with investments in different countries can also benefit from the results, as the comparability of information from different institutional environments may require some care, such as the effect of goodwill impairment on the cost of equity. In addition, this study reveals that the application of IAS 36 at different levels of enforcement and auditing can have different economic consequences, which should be taken into account when discussing the quality of standards, for example, the IASB Post-Implementation Reviews. In this sense, the study also contributes to enabling standard setters to evaluate the effectiveness of standards, as it demonstrates the different consequences of applying the same accounting practice in different environments.

Comparison of this effect of goodwill impairment on the cost of equity without taking countries' institutional environment into account can lead to misleading conclusions, which can be avoided with the result of this research. This difference between institutional environments can be so strong that it may require the application of different models for each environment. That hypothesis went beyond this study though.

Therefore, the evidence obtained in this study may favor the continued application of goodwill impairment if we consider that part of the criticisms directed at the application of this technique are associated with the institutional environment and not with the technique itself. On the other hand, with the findings of this study, one cannot assess whether another technique, such as amortization, would bring better benefits or less harm to accounting. Future studies can focus on exploring, developing, and answering this question. Also, future studies can consider other dimensions of the institutional environment, for example: political stability and absence of violence, government effectiveness, regulatory quality, rule of law, and corruption control.

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AUTHOR'S CONTRIBUTION

The authors contributed at all stages, with writing being conducted by the corresponding author.

FINANCIAL SUPPORT

This study was carried out with the support of the Coordination for the Improvement of Higher Education Personnel – Brazil (CAPES) Funding Code 001.

CONFLICTS OF INTEREST

We declare no conflict of interest.