
CONSEQUENCES OF HEDGE ACCOUNTING PRACTICES IN NONFINANCIAL COMPANIES FOR MAXIMIZING FIRM VALUE, SMOOTHING RESULTS AND VIOLATING COVENANTS

Douglas Augusto de Paula¹
Eduardo Flores²
Nelson Carvalho³

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ABSTRACT

We investigated the consequences of hedge accounting (HA), as an accounting option in the Brazilian capital market, among a sample of 187 nonfinancial companies that used derivatives or nonderivatives for risk management from 2010 to 2017 in relation to three points: whether companies that use HA have their value maximized; whether corporate profits attest to fewer income smoothing practices through HA; and whether HA is used to avoid violations of debt clauses. It was concluded that companies with a greater HA designation showed an increase in value; moreover, those that assigned more derivative instruments to HA indicated fewer income smoothing practices. Regarding the third point, however, we found no evidence that the violation of covenants determines the adoption or a higher level of designation of derivatives for HA.

Keywords: Hedge Accounting, Firm Value, Earnings Smoothing, Covenants

CONSEQUÊNCIAS DAS PRÁTICAS DE HEDGE ACCOUNTING EM EMPRESAS NÃO FINANCEIRAS NA MAXIMIZAÇÃO DO VALOR DA FIRMA, SUAUIZAAÇÃO DOS RESULTADOS E VIOLAÇÃO DE COVENANTS

¹Doutorando em Controladoria e Contabilidade pela FEA-USP. Departamento de Contabilidade e Atuária da FEA-USP. Av. Prof. Luciano Gualberto, 908 – Prédio FEA-3, CEP:05508-010 Cidade Universitária – SP. Email: douglas.paula@usp.br
<https://orcid.org/0000-0002-6786-5389>

² Professor do Departamento de Contabilidade e Atuária da FEA-USP. Doutor e Pós-doutor em Contabilidade. Endereço: Av. Prof. Luciano Gualberto, 908 – Prédio FEA-3 CEP: 05508-010 Cidade Universitária – SP. E-mail: eduardoflores@usp.br.
<https://orcid.org/0000-0002-5284-5107>

³ Professor do Departamento de Contabilidade e Atuária da FEA-USP. Doutor e Pós-doutor em Contabilidade. Endereço: Av. Prof. Luciano Gualberto, 908 – Prédio FEA-3 CEP: 05508-010 Cidade Universitária – SP. E-mail: Email: Inelson@usp.br
<https://orcid.org/0000-0001-5011-2797>

RESUMO

Investigamos consequências do hedge accounting (HA) como opção contábil no mercado de capitais brasileiro em uma amostra de 187 empresas não financeiras que utilizaram derivativos ou não derivativos para gestão de risco de 2010 a 2017, em relação a três pontos: se empresas que utilizam a HA têm seu valor maximizado; se os lucros das empresas atestam menos práticas de suavização de resultados através da HA; se a HA é utilizada para evitar violações de cláusulas de dívida. Conclui-se que: as empresas com mais designação de HA apresentaram aumento de valor; as que designaram mais instrumentos derivativos para HA indicaram menos práticas de suavização de resultados. Quanto ao terceiro ponto, não encontramos evidências de que a violação de covenants determine adoção ou um maior nível de designação de derivativos para HA.

Palavras-Chave: Hedge Accounting, Valor da Firma, Suavização de Resultados, Covenants

1 INTRODUCTION

This study analyzes the empirical indications of hedge accounting in the Brazilian market, demonstrating its relationship with the maximization of firm value, its impact on income smoothing and whether the option of hedge accounting is being used for the nonviolation of covenants.

Following a change in accounting standards, the recognition of derivative instruments began to be measured in financial statements and evidenced in complementary information through explanatory notes (Allayannis & Ofek, 2001; Judge, 2006). At the same time, the literature has evolved in terms of research on risk management, primarily as a result of the development of the theoretical framework of the determinants of corporate hedging and the availability of data generated by changes in accounting standards (Judge, 2006, Campbell, Mauller and Pierce, 2019).

In Brazil, more specifically, this topic has gained strength with the alignment of financial reports to international standards. Initially, CPC 14 – Financial Instruments: Recognition, Measurement and Disclosure was issued in 2008, establishing the main concepts related to the recognition and measurement of financial assets and liabilities. Subsequently, in 2010, with the complete adoption of international accounting standards, CPC 14 was replaced following the approval of CPCs 38, 39 and 40, based on IAS 39, 32 and IFRS 7, respectively. These standards deal with financial instruments and forms of recognition, measurement, presentation and disclosure.

It should be noted that on January 1, 2018, IFRS 9 became effective, which, in Brazil, was translated under the aegis of technical pronouncement CPC 48 in place of CPC 38, except for small and medium-sized companies and for companies that maintain hedge accounting effectiveness tests according to CPC

38 rather than the new standard. However, there were no significant changes in the hedge concepts introduced by CPC 48 compared to CPC 38 (Flores, 2020; Gelbeck et al., 2018).

Notably, three categories of hedge accounting were maintained in IFRS 9 – CPC 48: cash flow hedge, fair value hedge and hedge of net investment abroad (Flores, 2020; Gelbeck et al., 2018; Galdi et al., 2018; Galdi et al., 2018; Galdi et al. 2018).

Due to the increase in risk management practices among companies and the availability of data, it is possible to quantify the use of hedging instruments allowed by accounting changes such as IAS 39. It is important to identify their relationship with the value of a company, income smoothing and the possible accounting choices regarding nonviolation of restrictive clauses. There is still little empirical evidence on how hedge accounting standards, such as IAS 39, SFAS 133 or IFRS 9, influence risk management in nonfinancial corporations (Glaum & Klöcker, 2011, Pierce, 2020). In addition, as suggested by Moura, Dagostini, Theis and Klann (2017), the monitoring of hedge accounting practices by Brazilian listed companies is of great importance and increasingly discussed in academia.

To contribute to this literature, this study composed a sample from the years 2010 to 2017 of companies that used derivatives or natural hedges in at least one of these years. Based on these data, three hypotheses were analyzed.

To test Hypothesis 1, the focal companies were divided into a cluster based on their average level of hedge accounting designation in relation to their total derivatives and natural hedges and by analyzing their influence on company value. The main results obtained showed that the companies in the cluster with the highest level of hedge accounting designation in the periods highlighted for the sample have a significant relationship with any increase in company value. However, this same relationship was not found regarding the simple use of a hedge accounting policy.

For Hypothesis 2, the relationship between income smoothing and hedge accounting was analyzed. The practice of hedge accounting allows for a match between a hedged object and the hedging instrument, which represents the economic essence of the relevant operation due to its risk management. This process also promotes a reduction in the volatility caused by these instruments and, consequently, favors a greater smoothing of results. In this study, it was shown that companies that adopt a lower volume or practice of hedge accounting have a greater practice of income smoothing.

Hypothesis 3 concerns whether the motivation for the accounting choice for hedge accounting could be due to the proximity of covenant breach. As widely studied in the literature on accounting choices, managers make accounting choices to improve their results due to the proximity of violations of accounting clauses (Watts & Zimmerman, 1986; Smith & Warner, 1979; Holthausen & Leftwich, 1983, Fields, Lys & Vincent, 2001). In terms of this hypothesis, based on the results obtained, it is not possible to infer that the practice of hedge accounting has been used to avoid the violation of covenant clauses.

This study contributes to the literature via its extensive manual collection of the information available in the explanatory notes of the focal companies and allows for the differentiation of the volume of hedge accounting designation by company.

The results obtained can be applied, as a contribution, by market agents—investors, creditors, preparers of financial statements—because they denote a close association between a greater adoption of hedge accounting practices and the aim of reflecting in corporate reports the specific efforts made by companies to mitigate exposure to variable factors, such as exchange rate and interest rate disparities. Thus, as these findings are interesting for regulators, they may encourage the expansion of the adoption of hedge accounting, which lies within the scope of accounting choices.

2 THEORETICAL FRAMEWORK

2.1. ECONOMIC CONSEQUENCES OF HEDGE ACCOUNTING

The objective of hedging, as defined by Hull (2005), is to use the market to reduce a certain risk to which one is exposed. The theoretical framework related to the determinants of hedging was developed from the relaxation of frictions in the seminal work of Modigliani and Miller (1958). Based on the assumptions of a perfect and frictionless market, risk management strategies are irrelevant for the maximization of the value of a firm due to the possibility of diversification of portfolios by its shareholders.

The determinants of hedging are generally studied through market imperfections that would increase the value of a firm. These include the costs of managerial risk aversion (Smith & Stulz, 1985; Stulz, 1984); bankruptcy costs (Smith & Stulz, 1985; Mayers & Smith, 1982); progressiveness of a tax burden (Smith & Stulz, 1985); costs of external financing (Froot, Scharfstein, & Stein, 1993); and any area more related to the informative degree of results and managerial reputation (Breedon & Viswanathan, 1998; DeMarzo & Duffie, 1995).

According to Lopes, Galdi and Lima (2011), hedge accounting aims to reflect an operation within its economic essence to resolve the problem of comparing revenues/gains and expenses/losses. The application of this accounting method changes the measurement basis of the hedged items or hedging instruments.

Thus, hedge accounting allows for a reduction in the volatility of results due to its change in the accounting of hedged instruments and derivatives, representing the economic essence of an operation. It is an optional methodology; however, for a company to be entitled to use it, it must meet certain criteria set forth in the standards for adopting hedge accounting, such as effectiveness tests or designation documentation.

According to IAS 39 and IFRS 9, CPC 38 and CPC 48, respectively, three types of hedge accounting are established: cash flow hedge, fair value hedge and hedge of net investment abroad.

Fair value hedge allows, as a way of correcting mismatch, a hedged item to be measured at fair value, whereby it offsets the variations in the instrument used for hedging.

Cash flow hedge allows protection against exposure to variability in the cash flow of assets and liabilities. Changes in the fair value of the hedging instrument are initially recognized in equity, in the equity valuation adjustments account, and transferred to profit or loss when an impact on profit or loss occurs to offset the mismatch. Ineffective installments are charged directly to income.

It is noteworthy that in addition to the use of derivatives, companies have the possibility of designating debt instruments as cash flow hedges. This option is provided only to hedge against exchange rate variation. This is a tool used by many exporting companies in Brazil through debt instruments in foreign currency as a form of natural hedge (Silva, 2014).

Finally, hedge of net investment abroad is accounted for similarly to cash flow hedge, while the gains and losses resulting from these hedging instruments are recorded in equity and remain until the time of disposal of an investment transaction. The ineffective hedge portion is also recognized directly in profit or loss.

These requirements incur additional costs for protection. As a result, some companies decide not to apply hedge accounting and accept greater volatility in their results (Glaum & Klöcker, 2011). Studies show that hedge accounting has the power to influence companies' hedging strategies (DeMarzo & Duffie, 1995).

Glaum and Klöcker (2011) clarify that the propensity of companies to use hedge accounting is associated with their frequency of the use of derivatives, their experience with the International Financial Reporting Standards (IFRS) and their perception of the importance of reducing the volatility of results. Finally, companies can also indicate the main motivations for hedge accounting: reduction in earnings volatility and reduction in cash flow volatility, in that order of importance.

The accounting of derivative instruments presents a level of complexity for analysts to evaluate. Chang, Donohoe and Sougiannis (2016) have investigated a sample from 1998 to 2011 and found that analysts misjudge the implications of derivative activities for a company's results; however, those with changes in their accounting standards show improvement in their projections. Antônio, Lima, Santos and Rathke (2018) have found evidence that indicates a lower estimate bias among analysts in companies that use derivative financial instruments. Trinity, Magnani, Ambrozini and Antônio, (2020) have shown that derivative instruments can be used for hedging and thus reducing a company's risk.

Other studies have found evidence of the application of hedge accounting and a consequent reduction in earnings volatility (Zhang, 2009; Glaum & Klöcker, 2011; Silva, 2014; Beneda, 2016, Pierce, 2020). Panaretou, Shackleton and Taylor (2013) have shown that hedge accounting under IFRS reduces analysts' forecasting errors and dispersion, entailing their results become more predictable.

Martinez, Reinoso, Antônio and Santos (2020) have demonstrated that in Brazil, companies that have adopted hedge accounting become more tax aggressive.

Pierce (2020) warns that although hedge accounting reduces volatility, the author finds no evidence of a reduction in the risk perceived by investors, which would cast doubt on its adoption, as it carries implementation costs. In this sense, in Brazil, Antônio, Ambrozini, Magnani and Rathke (2020) do not identify any relationship of the use of derivative financial instruments for hedging with improved risk classification scores by rating agencies.

Chioeran (2016) has found real effects on risk management on US companies following a change in the SFAS 166 accounting standard. The author reports a reduction in the use of derivatives for hedging and speculation in addition to an accounting effect on managers who prefer to avoid hedge accounting. Tessema (2016) demonstrates that following the implementation of SFAS 133, companies tend to engage in more prudent risk management activities to mitigate the potential cost of earnings volatility resulting from the implementation of the standard.

Beneda (2016), with a sample of companies in the oil and gas sector in the United States in the period from 2003 to 2011, finds evidence that hedge accounting increases firm value. In contrast, Santos, Lima, Gatsios and Almeida (2017) have investigated the relationship between financial risk management and shareholder value creation in nonfinancial Brazilian companies from 2006 to 2014. These authors find that most companies use derivatives to manage cash flow without adding any value. They also analyze the effect of hedge accounting on company value; however, they find no evidence of this. The justification for these results is that their sample of companies performing hedge accounting is limited due to the complex documentation needed. In this context, the present study investigates the following hypothesis:

H1: Companies that designate a greater volume of instruments for hedge accounting have a higher firm value.

2.2. SMOOTHING OF RESULTS

The practice of hedge accounting allows for a match between a hedged object and the hedging instrument, which represents the economic essence of the operation due to its risk management. This process also promotes a reduction in the volatility caused by these instruments and, consequently, favors a greater smoothing of results.

Income smoothing can be defined as the intentional reduction in fluctuations to a level currently considered normal for a company (Beidleman, 1973). The practice of smoothing has numerous benefits, such as more informative stock prices (Tucker & Zarwin, 2006), improved earnings persistence and predictability (Subramanyam, 1996), reduced costs of bankruptcy (Trueman & Titman, 1988), and lower returns and risks (Michelson, Jordan -- Wagner, & Wootton, 1995).

The literature review by Dechow, Ge and Schrand (2010) presents smoothing as a proxy for earnings quality. The proxy used for its representation is the variation in the accounting result divided by the cash flow result, whereby a lower percentage indicates milder results. This metric, as presented by these authors, has advantages, and thus it is a common practice in many countries worldwide. However, its disadvantages include the difficulty of distinguishing what is fundamental to the results process, its accounting rules and the intentional manipulation of results.

Graham, Harvey and Rajgopal (2005) report that executives believe that earnings smoothing improves earnings predictability; more than 75% of their respondents would be willing to sacrifice economic earnings to obtain such smoothing. However, they would be much less likely to perform some type of earnings management discretion according to accounting standards.

Barton (2001) finds that companies use derivatives as partial substitutes in earnings management strategies for earnings smoothing. This author shows that derivatives, in addition to reducing the volatility of cash flows, have an indirect effect on accruals. Pincus and Rajgopal (2002) have analyzed the oil and gas sector to determine whether companies use hedging and abnormal accruals as substitutes to smooth the volatility of results. The authors find evidence that while managers take hedging positions regardless of abnormal accrual decisions, in the 4th quarter, they mainly switch between abnormal accruals and hedging and derivatives to control for volatility in this period. In addition, Choi, Mao, and Upadhyay (2015) analyze SFAS 133 for the period 1996 to 2006 and present evidence that material changes in an accounting rule on derivatives can influence the level and volatility of earnings, as well as the income smoothing method.

In Brazil, Martinez and Castro (2011) have found evidence that companies that smooth results have a lower level of risk and higher annual abnormal returns.

Rountree, Weston and Allayannis (2008) have also found evidence of a risk premium paid by investors, but only for a reduction in cash flow volatility. Income smoothing, through the manipulation of accruals, does not add value to a company. In this context, a possible inference is that while the hedging operation could have a significant effect on the risk premium, hedge accounting, which focuses on reducing the volatility of the accounting result, would not have the same effect.

In Brazil, Silva (2014) has analyzed the impact of the adoption of hedge accounting on the volatility of the results of the companies that compose the Ibovespa index. The author finds strong evidence that the adoption of hedge accounting results in a decrease in volatility.

Tessema and Deumes (2018) have analyzed the impact of SFAS 133 on the practice of income smoothing through discretionary accruals and on the ineffectiveness of hedge accounting. These authors find that companies with full hedge effectiveness use less income smoothing practices and are less affected by

market volatility; in contrast, companies with a total ineffectiveness of hedge accounting experience the opposite situation.

The present study seeks to identify, in the context of CPC 38, whether the adoption or level of designation of hedge accounting impacts companies' income smoothing practices.

H2: Income smoothing via discretionary accruals is greater among companies that designate a lower volume of instruments for hedge accounting.

2.3. ACCOUNTING CHOICES

Hedge accounting is an optional accounting practice governed by the standards IAS 39, SFAS 133 and IFRS 9. The studies that have analyzed the determining factors for the choice of different accounting practices by a company are align with the research on accounting choices (Holthausen & Leftwich, 1983; Watts & Zimmeman, 1986).

The line of research that has investigated corporate debt is largely based on agency theory (Jensen & Meckling, 1976). In the case of covenants, they are treated as costs of external monitoring for the holders of obligations over an owner-manager, whereby they ensure monitoring in a less costly manner.

There are no studies that have tested whether restrictive clauses affect the choice of hedge accounting practice. This study seeks to identify whether the proximity of covenant breach is one of the determinants that guide such decision-making.

In Brazil, the discussion of the impact of debt on companies is of great relevance. According to data from the Center for Studies of IBMEC (CEMEC), the volume of debt of nonfinancial corporations in the period 2013-2017 was approximately 50% of GDP.

The debt hypothesis suggests that managers make accounting choices to enhance their results due to the proximity of violations of accounting clauses (Watts & Zimmerman, 1986; Smith & Warner, 1979; Holthausen & Leftwich, 1983). In a recent case in Brazil, Sticca and Nakao (2019) have investigated the accounting choice to adopt hedge accounting in relation to the level of financial exposure to exchange rate risk in a financial crisis. The authors have thus found evidence of companies recognizing their foreign exchange losses in comprehensive income and, consequently, increasing their reported gains in the relevant period.

In contrast, Stent et al. (2017) find no evidence for this debt hypothesis, while Beatty (2012) shows that creditors are more likely to include covenant clauses for companies that are less likely to maintain hedging practices during the salient financing period.

In this regard, we investigate whether hedge accounting has been adopted by companies to avoid breaching covenants.

H3: Companies that designate a greater volume of instruments for hedge accounting are closer to the fulfillment of covenants.

3 METHODOLOGICAL PROCEDURES

3.1. SAMPLE

The first companies to adopt hedge accounting did so in 2008. The initial sample in this study included all nonfinancial publicly held companies from 2008 to 2017, listed in B3. Financial companies were excluded from the sample due to specific criteria required by accounting standards. Moreover, these companies have risk practices that differ significantly from those in nonfinancial companies. A total of 331 companies were identified for the 10-year period.

Today, CPC 14 – Financial: Recognition, Measurement and Disclosure in 2008, which established the main concepts related to the recognition and measurement of financial assets and liabilities, allows hedge accounting. However, in its first two years, 2008 and 2009, it was adopted by a very small number of companies, 13 and 22, respectively. As of 2010, this number jumped to 39 companies. In view of this incipient adoption, the above two years were removed from the sample. Due to the implementation of CPC 48 in 2018, to avoid causing bias in the analyses resulting from changes in practices, 2017 was defined as the deadline.

Among the total sample of 331 companies, only those that had, in at least one of the years from 2010 to 2017, adopted derivatives or nonderivatives, as mentioned in their explanatory notes, were selected. Notably, the nonderivatives considered in the calculations were derived exclusively from information provided by the companies about their use as hedging instruments. Nonderivative instruments were predominantly used in cash flow hedge accounting. These criteria were used to produce a sample in which each company had the possibility of choosing the practice of hedge accounting. Thus, the analyzed sample increased to a total of 187 companies, covering the years 2010 to 2017.

It is noteworthy that the use of derivatives and nonderivatives has been considered a hedging strategy. Most companies report that they use derivative instruments for the sole purpose of hedging. It was not the object of this study to identify whether companies actually use these instruments for protection.

3.2. HEDGE ACCOUNTING PROXIES

The present study uses three proxies for hedge accounting.

1) HA_Ratio – Calculated by dividing the total value of derivative and nonderivative financial instruments designated for hedge accounting by the total amount of derivative and nonderivative instruments used by the company on the balance sheet date, generating a hedge accounting ratio that ranges from 0 to 1.

2) Cluster_HA – Constructed by clustering companies by HA_Ratio level in the period from 2010 to 2017.

3) Hedge accounting dummy – A value of 1 is assigned to companies that have adopted hedge accounting and 0 to those that have not (Potin,

Bortolon, & Neto, 2016; Santos et al., 2017; Panaretou et al., 2013; Huguen, 2010, Sticca and Nakao, 2019).

In the literature, there are no analyses using the first two metrics (HA_Ratio and Cluster_HA). They present a differential in relation to a use dummy because there is variance among companies that adopt hedge accounting, whereby the dummy only evaluates whether a company employs the practice of hedge accounting. Thus, it equates companies that use hedge accounting for all their financial instruments to companies that do so only for a low volume of operations. Matos, Rezende, Paulo, Marques and Ferreira (2013) show that although most companies use hedge accounting, none of them designate all their existing hedges. Similarly, Pierce (2020) has found in his sample that not all derivative instruments are designated for hedge accounting, even for companies that adopt the practice.

The use of a proxy that divides the designated notional volume of hedge accounting by the notional value of total derivatives and nonderivatives, as well as the preparation of groups, may have greater adherence to a company's chosen accounting policy.

3.3. PROPOSED MODELS

Model 1: Hedge accounting and firm value maximization

This model verifies whether hedge accounting is significant for the increase in firm value, as proposed by the determinants of hedging (Smith & Stulz, 1985). The equation in Model 1 is proposed below:

$$QT_{ij} = \varphi + \beta_1 Metric_HA_{ij} + \sum_{k=1}^w Controls_{kij} + e_{ij} \quad (1)$$

The impact of the hedging strategy on company value is assessed in the present study using Tobin's Q metric (QT). The choice of this proxy is justified by its wide use in empirical studies that evaluate this relationship (Santos et al., 2017; Aretz & Bartram, 2010; Allayannis, G., Irhig, J., & Weston, J. 2001; Allayannis & Ofek, 2001 Bartram, Brown, & Conrad, 2011). The adopted hedge accounting proxies are Cluster_HA, HA_Ratio and Dummy_HA, as defined in item "3.2. Hedge accounting proxies".

To promote the necessary considerations for a better model fit, the following control variables are included: log of total assets (LAT), which reflects the size of the company; lagged Tobin's Q (QTL), which reflects market expectations; return on assets (ROA), which represents profitability; proportion of derivatives (DEA), calculated by the notional of derivatives divided by total assets, which reflects the level of exposure that the company tries to protect; liquidity (LIQ), which reflects the financial constraints; beta (BETA), which reflects the company's volatility; investment opportunity (INV), which reflects the company's expectations; financial leverage (ALA), which controls for the indebtedness decision and the effect on firm value industry dummy (IND) and time dummy (ANO) to reflect the potential effect of years, such as financial cycle (Aretz & Bartram, 2010, Silva, 2014, Santos et al., 2017, Allayannis & Ofek; 2001; Bartram et al.; 2011).

Model 2: Hedge accounting and income smoothing

The equation in Model 2 is proposed below:

$$\mathbf{Smooth}_{ij} = \varphi + \beta_1 \mathbf{METRIC_HA}_{ij} + \sum_{k=1}^w \mathbf{Controls}_{kij} + e_{ij} \quad (2)$$

The smoothing variable (Smooth) represents when managers exercise accounting discretion for income smoothing, consistent with previous studies (Tessema & Deumes, 2018; Tucker & Zarowin, 2006). This measure is based on the modified Jones model, in which discretionary accruals are calculated based on the residuals of the equation.

The calculation of this equation—as in Tucker and Zarowin (2006) and in Tessema and Deumes (2018)—is performed for each fiscal year and sector using ordinary least squares regression. This variable shows that the more negative the correlation is, the greater the smoothing of the results.

$$\mathbf{Smoothness} = \mathbf{Corr} \frac{\Delta \mathbf{AC}}{\Delta (\mathbf{NI} - \mathbf{AC})} \quad (3)$$

where:

AC = discretionary accumulation

NI = Net Income

The adopted hedge accounting proxies are Cluster_HA, HA_Ratio and Dummy_HA, as defined in item “3.2. Hedge accounting proxies”. The control terms in the model are the same as those used in Model 1, with the exception of liquidity and lagged Tobin Q.

Model 3: Hedge accounting and the debt covenant hypothesis

Model 3 analyzes whether companies that are closer to violating covenant clauses are more likely to adopt hedge accounting. The adopted variables have been selected based on models of determinants of hedge accounting (Galdi & Guerra, 2009; Silva, 2014). The equation in Model 3 is proposed below:

$$\mathbf{Metric_HA}_{it} = \varphi + \beta_1 \mathbf{Slack_Cov}_{it-1} + \sum_{k=1}^w \mathbf{Controls}_{kij} + e_{ij} \quad (4)$$

In this model, the hedge accounting variables become dependent. For this calculation, as the covenant metric is bound annually, only the HA_Ratio and Dummy_HA metrics are used.

The variable of interest is proximity to covenants (Slack_Cov), also called covenant breach slack. This metric is obtained by dividing the amount calculated based on the covenants index by the limit imposed by the clause, resulting in a ratio. This variable is widely used in the literature on debt covenants (Beatty and Weber, 2003; Dichev & Skinner, 2002; Kim, Lisic, & Pevzner, 2010).

For this hypothesis, we have identified companies that used derivatives and hedge accounting and that had covenant indices containing, in their calculation metric, financial expense, financial income or financial result. These items were chosen because they display a direct response to the application of hedge accounting. Thus, the use of this methodology can have a positive impact on the calculation of the index and allow a company to meet the value stipulated by a covenant clause.

To calculate the proximity of covenant breach, the following criteria are used:

- 1) If the company has elaborated the value of covenants, this value is considered.
- 2) If the company has not elaborated the value of covenants, the calculation is performed with values obtained via Economatica.

To calculate the proximity of covenants, the calculated value is divided by the target value. Thus, the closer the value to 1, the closer it is to achieving the covenant goal. If the value is less than 1, the company has already violated the covenants.

The control terms in Model 3 are the same as those in Model 1, with the exception of lagged Tobin Q.

4 ANALYSIS AND DISCUSSION OF RESULTS

4. ANALYSIS OF RESULTS

The sample in this study, composed of 187 companies that used derivative instruments in at least one of the years between 2010 and 2017, is distributed into 10 sectors according to Securities and Exchange Commission (CVM) classification.

Table 1 presents a summary of the descriptive statistics. According to the Size variable, the sample has variability and is composed of large, medium and small companies.

Table 1.
Descriptive Statistics

Variable	Note	Mean	Standard deviation	Minimum	Maximum
Q Tobin	1.296	1.415	0.824	0.555	0.544
HA_Ratio	1.261	0.2010	0.3692	0.000	1.000
Size (Ln)	1.395	8.335	1.567	4.439	12.495
Investment Opportunity	1.371	0.220	0.782	- 0.832	6.765
ROA	1.496	0.090	0.096	- 0.292	0.352
Leverage	1.392	0.335	0.170	0.000	0.809
Beta	1.251	0.771	0.496	0.021	2.199
Liquidity	1.406	1.757	1.235	0.194	8.266
Notional Derivatives (DEA)	1.314	0.075	0.098	0.000	0.466

Source: Prepared by the authors.

Regarding the use of derivatives and hedge accounting, companies also exhibit great variability, with an average of 7.5% of derivatives and nonderivative instruments used for hedging, with a standard deviation of 9.8%. For accounting, which can be observed by the variable HA_Ratio, it is clear that companies designate on average 20% of derivative instruments, with a standard deviation of 36.9%.

Table 2 shows the number of companies that use derivatives or nonderivatives and hedge accounting. Notably, as presented in item "3.1 Sample", the years 2008 and 2009 were removed from the sample because they

presented a lower level of adoption than the other years. There was considerable growth in the use of hedge accounting, reaching its highest level in 2016, 48.4%. The average from 2010 to 2017 was 39.4%.

To control for outliers, the winsorization technique of the control variables was applied, which exhibited large dispersion at the 1% and 99% levels.

Table 2.

Use of derivatives and/or nonderivatives and hedge accounting

Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Use of derivatives and/or derivatives	102	100	118	131	131	130	122	127	128	143
Hedge accounting	13	22	38	41	44	48	47	59	62	68
%	12.7	22.0	32.2	31.3	33.5	36.9	38.5	46.5	48.4	47.6

Source: Prepared by the authors.

4.1. EXPLORATORY DATA ANALYSIS

The data referring to HA_Ratio were used to construct the cluster variable, whereby companies were divided by level of designation of derivative and nonderivative instruments for hedge accounting in relation to the adopted notional of derivatives and nonderivatives. After the individual calculation per year, the averages of HA_Ratio were calculated, considering only the years in which the company adopted hedge accounting.

Through the analysis of the dendrogram, it was possible to identify two groups with characteristics that were homogeneous among themselves and heterogeneous in relation to the other groups.

To complement the information regarding the divisions of the clusters, Table 3 presents the descriptive analysis of the variable HA_Ratio for each of the clusters and the overall mean. Cluster 1 has the highest number of observations and the lowest average, whereas Cluster 2 has an average of 0.8784 HA_Ratio and a standard deviation of 0.1485.

Table 3.

Descriptive analysis of clusters

Cluster	No.	Mean	Standard deviation	Minimum	Maximum
1	112	0.0476	0.1304	0.0000	0.5327
2	66	0.8784	0.1485	0.5622	1.0000
Total	178	0.3556	0.4251	0.0000	1.0000

Source: Prepared by the authors.

4.2. ANALYSIS OF THE RESULTS OF THE ESTIMATES OF HEDGE ACCOUNTING AND FIRM VALUE

This section presents and analyzes the results obtained through the estimation of the parameters of the proposed models in panel data, according to Model 1, as detailed in item "3.3. Proposed models".

Table 4.

Results of panel data on hedge accounting and firm value

$$QT_{ij} = \varphi + \beta_1 \text{Metric_HA}_{ij} + \sum_{k=1}^w \text{Controls}_{kij} + e_{ij} \quad (1)$$

Variables	Cluster_HA	HA_Ratio	Dummy_HA
METRIC_HA	0.082***	0.019	0.008
Controls	Yes	Yes	Yes
Constant	Yes	Yes	Yes
Adjusted R ²	0.675	0.661	0.680
No.	1.056	1.056	1.111

Legend: *** p<0.01, ** p<0.05, * p<0.1

Source: Prepared by the authors.

Table 4 shows that the dummy variable of the hedge accounting cluster is positive and significant at the 1% level with Tobin's Q variable. Thus, a relationship is identified between the level of hedge accounting designation and firm value. Companies in Cluster 2 thus have, on average, a Tobin's Q higher by 0.082.

The variables HA_Ratio and Dummy_HA did not show statistical significance. This result is similar to that obtained by Santos et al. (2017). Statistical significance was obtained only for the cluster metric, whereby this result implies that the relationship between hedge accounting and an increase in firm value occurs when a risk management policy is adopted that includes hedge accounting on an ongoing basis, since the cluster metric is intended to represent companies that, on average, use hedge accounting to a greater or lesser extent.

4.3. ANALYSIS OF THE RELATIONSHIP BETWEEN HEDGE ACCOUNTING AND INCOME SMOOTHING

To calculate the income smoothing metric, it is necessary to apply the Modified Jones Model (MJM). After applying the MJM, the model residual is obtained, i.e., the discretionary accruals.

The income smoothing metric is presented as the relationship between the change in discretionary accruals and the variation in the difference between net income and discretionary accruals, using three-year observations, according to Tessema and Deumes (2018) and Tucker et al. Zarowin (2006). In the literature, this variable is found via the correlation of 3 and 4 years. The present study analyzed the results by considering both calculations.

Table 5.

Smooth panel data results: 4-year correlation and hedge accounting

$$\text{Smooth}_{ij} = \varphi + \beta_1 \text{METRIC_HA}_{ij} + \sum_{k=1}^w \text{Controls}_{kij} + e_{ij} \quad (4)$$

Variable	Cluster_HA	HA_Ratio	Dummy_HA
METRIC_HA	0.002	0.084***	0.067***
Controls	Yes	Yes	Yes
Industry Dummy	No	No	No
Dummy Year	No	No	No
Constant	Yes	Yes	Yes
Adjusted R ²	0.018	0.006	0.006
No.	1.040	1.042	1.095

Legend: *** p<0.01, ** p<0.05, * p<0.1.

Source: Prepared by the authors.

Table 6.

Smooth panel data results: 3-year correlation and hedge accounting

$$Smooth_{ij} = \varphi + \beta_1 METRIC_HA_{ij} + \sum_{k=1}^W Controls_{kij} + e_{ij} \quad (5)$$

Variable	Cluster_HA	HA_Ratio	Dummy_HA
METRIC_HA	-0.005	0.109***	0.062**
Controls	Yes	Yes	Yes
Industry Dummy	No	No	No
Dummy Year	No	No	No
Constant	Yes	Yes	Yes
Adjusted R ²	0.025	0.0004	0.0004
No.	1.034	1.037	1.088

Legend: *** p<0.01. ** p<0.05, * p<0.1

Source: Prepared by the authors.

The variable Cluster_HA does not show statistical significance with the practice of hedge accounting by group of companies. The hedge accounting dummy variable shows a positive and significant relationship with income smoothing at the 1% and 5% levels, with the dependent variable correlation at 4 and 3 years, respectively. The smoothing metric indicates that the more negative the value is, the greater the practice of income smoothing. Therefore, companies that have hedge accounting smooth their results less.

In turn, the analysis of the variable HA_Ratio shows a positive and significant relationship at the 1% level, with the dependent variable correlation at 4 and 3 years.

Based on the results presented above, companies that adopt a greater volume [of hedge accounting], based on the variable HA_Ratio or the dummy variable HA, have a lower practice of income smoothing. These findings corroborate the literature and indicate that via the practice of hedge accounting, which allows income smoothing in the time matching between derivatives and the hedged object, companies are less likely to practice income smoothing.

4.4. ANALYSIS OF THE RELATIONSHIP BETWEEN HEDGE ACCOUNTING AND COVENANTS

Managers make accounting choices to enhance their results due to the proximity of violations of accounting clauses (Watts & Zimmerman, 1986; Smith & Warner, 1979; Holthausen & Leftwich, 1983).

In this context, the present study has identified whether the focal companies that adopted hedge accounting were closer to violating covenants than companies that did not.

Table 7.

Results of hedge accounting and covenants

$$Metric_HA_{ij} = \varphi + \beta_1 Slack_Cov_{it-n} + \sum_{k=1}^W Controls_{it-n} + e_{ij} \quad (4)$$

Variable	HA_Ratio		Dummy_HA	
	Late	Not Lagged	Late	Not Lagged
Slack Cov t-1	0.004		-0.062	
Slack Cov t		-0.012***		-0.005
Controls	Yes	Yes	Yes	Yes

Industry dummy	No	No	No	No
Dummy Year	No	No	No	No
Constant	Yes	Yes	Yes	Yes
Adjusted R ² /Pseudo R ²	0.344	0.270	0.047	0.145
No.	152	170	187	184

Legend: *** p<0.01. ** p<0.05, * p<0.1

Source: Prepared by the authors.

In terms of Hypothesis 3, the interest variable proximity to covenants does not show statistical significance. This variable and the control variables were tested with a lag of one year to assess whether the contracting of the hedge accounting level is influenced by a company's previous equity situation.

The variable proximity to covenants has a negative and significant relationship at the 1% level with the variable HA_Ratio. Thus, the closer the violation of a covenant clause is, the greater the level of hedge accounting. This is the opposite of Hypothesis 3, where hedge accounting methodology is not being used for the nonviolation of covenants. This finding may be in line with that presented by Beatty (2010), i.e., creditors are more likely to include covenants; thus, companies could be performing the hedging practice in compliance with a requirement of their creditors. In terms of the control variables, accounting leverage and ROA were the only significant variables in the presence of the others, showing a positive relationship with the variable hedge accounting level, consistent with some findings in previous studies on the determinants of hedge accounting adoption (Galdi and Guerra, 2010)

Through a binary logistic regression, the practice of hedge accounting was evaluated through a practice dummy variable. In this test, only the use of hedge accounting was considered. Proximity to breach of covenants was not statistically significant. Based on these results, the only model in which the proximity of covenants was significant was level of hedge accounting and with the variable not lagged, but with a negative relationship. Thus, even in the case of a relationship between these variables, hedge accounting has an implied, opposite relationship with the proximity of covenants. Thus, for Hypothesis 3, proximity to covenants cannot be accepted as a determinant for a higher level of adoption of derivatives for hedge accounting or for their initial adoption.

5 CONCLUSIONS

Due to the recent increase in risk management practices among companies, it is important to identify the motivations and determinants of hedge accounting for Brazilian companies. To investigate the hypotheses in the present study, three proxies have been used for hedge accounting. The first is a hedge accounting dummy that reflects the adoption of the practice by a company, the second adopts the hedge accounting notional ratio and reflects the impact of the application of hedge accounting on the instruments, and the third is based on the clustering of this average ratio to reflect the recurring practices in companies divided into groups.

The first proxy was tested in terms of the three hypotheses of this study, and the second was tested only in relation to Hypotheses 1 and 2. We sought to

highlight the determinants and impact of the practice of hedge accounting in relation to firm value, income smoothing and the violation of covenants.

The first hypothesis in this study is based on the theoretical framework of the determinants of hedge and firm value maximization. Hedge accounting is an optional practice for companies that allows for a match between the hedging instrument and the object of protection and presents the economic essence of the transaction, identifying it more reliably. In this context, it was analyzed whether the relationship between firm value maximization and hedge accounting can be empirically observed in the Brazilian context.

Evidence found in testing Hypothesis 1 shows that the companies in the cluster with a higher level of hedge accounting designation in the focal period have a positive and significant relationship with an increase in company value. This study differs from previous ones because it uses proxies that consider the level of hedge accounting designation and cluster of average use of hedge accounting in a period without only considering the use of hedge accounting when this relationship did not already exist.

This result does not necessarily mean that the practice of hedge accounting increases firm value. It means that companies with evidence of the practice of hedge accounting, adhering to the appropriate standards of use, show a consistently higher appreciation of company value.

In terms of Hypothesis 2, the relationship between income smoothing and hedge accounting was analyzed. Hedge accounting allows for a reduction in the volatility of derivative financial instruments by matching a hedged item with the hedging instrument. This means that the variation in fair value does not affect the result for the focal period and that, thus, their accounting represents the effect of the risk management activities of companies that use financial instruments.

Based on the results, companies that adopt a lower volume or practice of hedge accounting have a greater practice of income smoothing. These findings corroborate the literature indicating that due to the practice of hedge accounting, which presents income smoothing through the temporal marriage of derivatives with a hedged object, companies have a lower propensity to practice income smoothing.

Concerning Hypothesis 3, this is the first study to analyze the accounting choice to adopt hedge accounting due to breach of covenants. Based on the results for this hypothesis, the only model in which the proximity of covenants showed significance was based on level of hedge accounting and with the variable not lagged but with a negative relationship. Thus, even in the case of an association between these variables, hedge accounting has an opposite relationship with the proximity of covenants.

Finally, as the present study has analyzed the level of adoption of hedge accounting and not its initial adoption, it is suggested that future studies analyze the proximity of covenant breach as a possible determinant for the adoption of hedge accounting.

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