

DETERMINANTS OF HEDGE ACCOUNTING ADOPTION BY BRAZILIAN BANKS

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ABSTRACT

This study aimed to identify the determining factors for adopting hedge accounting by Brazilian banks that publish financial statements in IFRS. In order to carry out the tests, the IFRS financial statements of 41 banks were examined from 2015 to 2020. The results of the empirical tests revealed that the adoption of hedge accounting is positively related to the fact that banks have a controlling capital of private nature, be publicly traded (listed on B3), and have investments abroad in the form of facilities or subsidiaries; and the level of participation of customer loans and bonds and securities portfolios in the entities' equity structure. The tests also showed that the size of the banks, the fact that they are listed in B3's governance levels, and the level of profitability of the entities do not help to explain the adoption of hedge accounting by Brazilian banks. The results make it possible to identify patterns in the financial institutions that most adopt hedge accounting and enable economic agents to understand the accounting choices practiced by these entities, considering their relevance for the financial industry - especially regarding the need for risk and capital management in companies in this segment. Additionally, the findings fill a gap in the literature regarding the financial segment, identifying factors that act as incentives for adopting hedge accounting – an accounting practice compatible with risk management by Brazilian banks.

Keywords: IFRS 9. Hedge Accounting. Accounting Hedge. Banks.

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1 INTRODUCTION

This study aimed to identify the determining factors that lead Brazilian banks to use hedge accounting – an accounting practice used to ensure that the financial statements more appropriately reflect the entity's accrual basis and risk management policy when conducting operations with financial instruments for hedging purposes. Besides reducing income volatility, the main benefit is that adopting hedge accounting helps reduce agency conflict (Silva, 2014). An example of agency conflict mitigation occurs in cases where managers are remunerated in stock options and tend to make riskier decisions since this dynamic tends to generate greater volatility in the value of stocks, thus increasing the market value of options (Muurling & Lehnert, 2004), part of the compensation of managers.

Notwithstanding the benefits associated with hedge accounting, applicable accounting standards – the International Accounting Standard [IAS] 39, until 2017, and the International Financial Reporting Standard [IFRS] 9, as of 2018 – treat this practice as a prerogative of the entity and not mandatory handling. Moreover, they impose a series of requirements, mainly associated with proving the effectiveness of the protection and documentation relationship so that hedge accounting can be adopted, which results in the assumption of associated costs (Bernhardt et al., 2016; Singh, 2019). Combining these elements justifies knowing which factors explain the entity's decision to adopt the hedge accounting practice. Thus, it is inserted in the context of the literature that discusses the relationship between costs versus benefits of disclosure, as highlighted in Botosan (1997), Verrecchia (2001), Dantas et al. (2005), Leuz and Wysichi (2016), and Nahar et al. (2016).

Adequate financial statement disclosure is essential to achieve its main objective: to inform. Quality information is intended to generate comprehensibility, reliability, comparability, and interpretation, in addition to serving as a robust basis for quantitative and qualitative analysis and decision-making by managers, investors, and other users (Galdi & Guerra, 2009). The breadth of the scope of this purpose requires an effective understanding of the economic nature of the operations and an adequate interpretation of the requirements outlined in the applicable accounting standards. This is particularly relevant in the case of transactions subject to exceptional handling, such as hedge accounting, given the various requirements to be met if the entity wants to adopt this practice, which makes its implementation complex (Amaral, 2020; Galdi & Guerra, 2009; Matos et al., 2013; Paulino, 2010; Pereira et al., 2017; Toigo et al., 2015).

One of the criteria that can be highlighted is the hedge effectiveness test, which requires planning, evaluation, and identification of transaction risks, choice of appropriate financial instruments to mitigate these risks, and continuous monitoring of operations to conclude on their effectiveness, with impacts on the documentation of these operations, which makes the process more costly. According to Paulino (2010), the increased use of derivatives for hedging or speculation increased the possibility of disclosure errors in entities' financial reports, causing inaccurate, incorrect, and/or incomplete interpretations. This compromises the analysis and/or decision-making, the equity of investors, and other market players, and depending on the case, cause legal demands to the entity.

Because it is a discretionary adoption, hedge accounting is not performed by all institutions that use economic hedging. Despite bringing benefits such as reducing the volatility of the companies' incomes (Silva, 2014), hedge accounting is still considered a complex matter, which requires planning, monitoring, and formal documentation, among other requirements, in addition to incurring higher costs to entities (Amaral, 2020).

If discussions about what would lead entities, in general, to adopt hedge accounting assumed this type of relevance, given this duality between the direct benefits (in particular, the reduction of income volatility) and indirect benefits (greater transparency of the effects of the hedging strategy) and the costs and complexities arising, in the specific case of financial entities this is even more relevant, given the nature of their transactions and associated financial risks.

Despite this context, much of Brazil's hedge accounting literature does not focus on the financial market (Matos et al., 2013; Pereira et al., 2017; Silva, 2014; Toigo et al., 2015). On the other hand, studies focusing on the adoption of hedge accounting by financial institutions (Amaral, 2020; Paulino, 2010; Tavares & Cia, 2014) focus more on the description of reasons that could lead to the adoption of this practice and do not advance in the examination of the determinants that would explain its adoption.

The results of the empirical tests conducted through regression estimation, using data from the 41 banks that publish their financial statements in IFRS, considering the period from 2015 to 2020, revealed that the adoption of hedge accounting by these entities positively relates to: (i) the fact that banks have control capital of a private nature, are publicly traded (listed in B3), and have investments abroad, in the form of facilities (agencies) or subsidiaries; and (ii) the level of participation of loan portfolios to customers and securities in the equity structure of the entities. On the other hand, it was found that the size of the banks, the fact that they are listed in the governance levels of B3, and the level of profitability of the entities do not help to explain the adoption of hedge accounting by Brazilian banks.

The empirical findings have implications for regulators, investors, and other users of financial statements interested in the functioning of the financial market. They fill the literature gap on the subject and help understand the factors that function as characteristics or incentives for adopting hedge accounting, compatible with risk management by Brazilian banks. Also, because the management of financial risks by banking entities is essential to ensure their solvency and stability, adopting hedge accounting is fundamental for properly understanding the statements' users on the effects of contracted transactions as instruments to protect the capital and performance of the institution.

The remainder of the article includes the theoretical framework, where the characteristics, requirements, and types of hedge accounting are discussed (section 2); the definition of the methodological procedures used to conduct the tests, including the specification of the model (section 3); the analysis of the empirical results (section 4); and the presentation of the conclusions, contributions, and limitations of the study (section 5).

2 THEORETICAL BACKGROUND

2.1 Hedge Accounting

Given the nature of their financial intermediation activities, banks are exposed to various financial risks – including market risk, which is the risk of financial losses arising from variations in market conditions, such as interest rate, currency exchange, and stock and commodity prices (Badawi, 2017; Dinh & Seitz, 2020). For this reason, it is common for such entities to use operations with financial instruments to mitigate risks – a risk protection practice called hedge (Amaral, 2020). In practical terms, this configures the so-called economic hedge, the configuration of hedging transactions, regardless of the accounting practice adopted.

In these transactions, the most widely used financial instruments for hedging relationships are derivatives due to their versatility, variety of options, and good modeling capacity, which makes it possible to mirror the operation subject of a hedge reasonably (Capelletto et al., 2007). These financial instruments protect against exposed risk, whether interest rate, exchange rate, or price risk, mainly aiming to ensure the realization of future cash flow, whether for asset or liability positions. The central objective of a hedge is to mitigate positive or negative variations in the income and, consequently, in the operations conducted by the entities, by neutralizing the risks of these operations (Amaral, 2000). In this perspective, the result of a hedging operation should tend to zero in an ideal market, free of distortions, and even in a non-ideal market, the result of the hedged operation should not have a relevant impact. Otherwise, the instrument used should not be handled as a hedge (Dinh & Seitz, 2020).

Following accounting standards, adjustments to the carrying amount of hedged items and hedging instruments (transactions contracted to hedge changes in hedged items) do not always reflect the same measurement criteria. Besides, gains or losses are usually accounted for in the income of the period they occur. In several cases, there is a mismatch of the years in which the impacts of the instrument and the hedged subject occur.

The consequence is that due to the measurement of the fair value of hedging instruments, the expressive risks arising, and the possibility of mismatching the maturities of the subject operations and hedging instruments, these can generate volatility in accounting incomes (Amaral, 2000). Such volatility would not occur if the gains or losses of both transactions were recognized in the same year, as the balance of this sum should be null since the hedge aims to neutralize the risk effects of the hedged transaction.

In this sense, the utility of hedge accounting arises since IFRS 9 determines that the impacts of gains and losses on hedging instruments and hedged items must be recognized in the income for the same year. Hedge accounting is, therefore, a specific accounting way of recording hedge, which recognizes the income obtained from the hedging instrument simultaneously with recognition of the income obtained by the hedge subject, whether positive or negative, simultaneously (Capelletto et al., 2007).

In short, hedge accounting aims to represent in the financial statements the effect of the entity's risk management activities (Bernhardt et al., 2016) when it uses financial instruments to manage exposures to assets and liabilities whose risks may affect income or other comprehensive income. Furthermore, it contributes to reducing the volatility of the company's income.

2.2 Types of Hedge Accounting

IFRS 9 provides for different forms of hedge accounting, depending on the type of relationship documented: the fair value hedge, the cash flow hedge, and the hedge of net investments in foreign operations.

Fair value hedging is defined as hedging exposure to changes in the fair value of a recognized asset or liability or an unrecognized firm commitment or component of any of these items, to which specific risk can be attributed and which may in any way affect income (IFRS 9). It is a mechanism capable of allowing the risk variable of the hedged item to be measured at a fair value so that its effects are offset in income along with the variation in the fair value of the hedging instrument (Amaral, 2020). In practical terms, the effects of changes in the fair value of the items subject to hedging are recorded in income for the period. The same occurs with the fair value adjustment of hedging instruments, usually derivatives, which are also recorded directly in income for the period.

Cash flow hedging, in turn, is defined as the protection of exposure to variability in cash flows, which may address the specific risk associated with the totality of a recognized asset or liability or a component thereof or the highly probable forecast transaction and which may affect income (IFRS 9). The hedging model allows unrealized gains and losses on the hedging instrument to be recognized as other comprehensive income in the entity's equity (Amaral, 2020). The objective is to protect future cash flows from risks arising from future operations, assets, or liabilities, factual or projected (Capelletto et al., 2007). Therefore, it would be possible to reconcile income and expenses and gains and losses from hedging operations, which includes the mechanism for reclassifying amounts previously recognized as other comprehensive income.

Finally, the purpose of hedging net investment abroad is to mitigate the risk of exposure to foreign currency arising from investments abroad, whether in related companies, according to IAS 21, or in international transactions subject to the risk of exchange variation (Galdi & Guerra, 2009). Accounting is similar to cash flow hedge accounting, where the effective portion of the gain or loss on the hedging instrument is recognized in other comprehensive income. Equity is recognized in income in the period in which the income of the hedged operation is recognized. The non-

effective portion of this gain or loss is recognized immediately in income for the current year. It is important to note that investments abroad that can be classified as hedged items for hedge accounting purposes are those with a functional currency different from the functional currency of the investor. This is the condition for the effects of the exchange variation of the investment to be recorded as other comprehensive income, equivalent to the handling that applies to the fair value of the hedging instrument.

Regardless of the type of hedge accounting, the profits or losses must be periodically evaluated to confirm the effectiveness of the hedging relationship of the items subject to hedge through hedging instruments. To assess the effectiveness and measure the ineffectiveness of the hedge, IFRS 9 provides that the test is conducted at the beginning of the hedge structuring (prospective test) and repeated periodically to demonstrate that the hedging relationship remains effective.

2.3 Empirical Evidence on Hedge Accounting in Brazil

Despite the relevance that the adoption of hedge accounting can assume for risk management, capital protection, and the reduction of volatility in profits or losses, in addition to the transparency of financial information and the adequate communication of protection strategies adopted by entities, the literature on the subject in Brazil can still be considered focused on non-financial entities (Angelo, 2010; Matos et al., 2013; Silva, 2014; Toigo et al., 2015; Pereira et al. (2017); Turra et al., 2017; Rosas et al., 2018). A less representative portion focuses on financial institutions (Paulino, 2010; Aguiar, 2014; Tavares & Cia, 2014; Amaral, 2020).

One of the first studies to address the topic in Brazil, by Angelo (2010), examined whether the disclosure of derivative financial instruments for hedge accounting purposes in the 2009 financial statements of 44 Brazilian non-financial companies listed on the BM&FBovespa would comply with the requirements listed by IFRS 7. The survey concluded that 71.25% of the requirements are met in the case of fair value hedging but that this percentage is below half – 45.0% and 43.25% for net investment hedging operations abroad and cash flow hedging, respectively. The results demonstrate the low adherence, at the time, to disclosure standards, which can be associated in a certain way with the beginning of IFRS standards in the Brazilian market.

Matos et al. (2013) examined 40 companies listed on The New York Stock Exchange (NYSE), 25 Brazilian and 15 Japanese companies, in order to analyze whether there were differences in the use of derivative financial instruments and hedge accounting in companies from different countries, but with stocks traded in the same market since previous studies showed that more economically developed countries tended to use hedge and hedge accounting in greater volume. As a conclusion of the study, the researchers found that, except for one Brazilian company, 39 conducted transactions with derivative financial instruments. All of them used the economic hedge to protect their operations. Also, they found that 42% of Brazilian companies used hedge accounting, compared to 87% of Japanese companies. According to the authors, one of the explanations for this difference would be that Japanese companies are based in a more developed economy, corroborating the conclusion of previous studies.

Silva (2014) discussed hedge accounting in Brazil and its correlation with volatility in accounting incomes and the cost of equity of publicly-held companies on the Brazilian stock exchange, B3, concluding on strong evidence that adopting hedge accounting resulted in a decrease in the income volatility of companies listed in Brazil since all return proxies analyzed indicated an average reduction in volatility. Besides, it concluded that hedge accounting reduces these companies' equity costs. This conclusion is justified by reducing the volatility of the companies' profits or losses, which arouses greater confidence from investors relative to the objectives with which the financial instruments were traded, especially derivatives, for hedging purposes.

Identifying the specific financial and corporate governance characteristics determinant for adopting hedge accounting by Brazilian companies listed on B3's Novo Mercado was the purpose of the research by Toigo et al. (2015). The authors concluded that entities with equity concentration, foreign investors, and a greater volume of assets are the companies that most significantly adopt hedge accounting, as they ensure the improvement of their governance practices and use it for the management of financial and market risks, offering more security, and transparency to the shareholder with the voluntary adoption of hedge accounting.

Pereira et al. (2017) analyzed the association between the use of hedge accounting, the fact that the company is listed on B3's Novo Mercado, and the economic and financial characteristics of the company, using information from non-cyclical consumer companies and indicators such as short-term and long-term indebtedness, performance, and the company size. The researchers concluded that companies with long-term indebtedness and greater size are the ones that most use the applicability of hedge accounting, and most disclose the use of hedge accounting in their statements, corroborating Galdi and Guerra (2009). Moreover, they also concluded that hedge accounting grew in the analyzed period from 2008 to 2014, from five to 15 companies in a sample of 34 entities, resulting in a growth of 200% in six years.

To verify the behavior of Brazilian non-financial companies listed on B3 relative to the level of disclosure of hedge accounting, Turra et al. (2017) evaluated the 2014 financial statements of 70 companies to determine the level of disclosure. They found that the overall average disclosure rate was 70.45%, and only three companies analyzed reached a 100% disclosure rate in the aspects analyzed. The authors assume that perhaps the entities have only failed to express in explanatory notes more information related to the validity of the operations, which would increase the disclosure rate since the three main criteria not met are related to this aspect of the transactions.

Rosas et al. (2018) discussed the determinants for using hedge accounting by Brazilian companies listed in the Novo Mercado segment of BM&FBovespa. The study's final sample was composed of 91 companies that conducted transactions in foreign currency, whose 2016 financial statements presented the use of derivative financial instruments and that mentioned the use of hedge accounting. Using parameters such as indebtedness, level of revenue, and gross profit, in addition to the condition of being audited by the big four, they sought to determine whether these factors could be criteria to explain the adoption of hedge accounting in the companies analyzed. Based on the statistical analyses conducted, they concluded that of the variables tested, only the level of revenue directly associates with the adoption of hedge accounting.

In studies aimed at financial entities, Paulino (2010) aimed to demonstrate the reliability of the financial statements when using hedge accounting, concluding that, although it is technically the best way to account for market variations of a hedging operation, using this practice requires the institution to comply with a series of requirements that makes its adoption complex. These requirements are causing financial institutions not to be motivated to adopt this accounting practice, according to the examination of the financial statements of the 10 main Brazilian banks.

Aguiar (2014) discussed the quality and degree of disclosure of hedge accounting in the 10 largest Brazilian and European banks, using total assets as a sample parameter. Nineteen requirements defined by IFRS 7, IFRS 9, and others defined by the author were evaluated, such as: the description of the financial instruments designated as hedging instruments and their fair values at the date of the financial statement; the effect that hedge accounting had on the statement and the comprehensive income and changes in equity; the nature of the risk being hedged (informing the associated subject asset); among others. The author concluded that using hedge accounting is 70% of Brazilian institutions and 80% of European ones, corroborating its importance for managing risks and profits or losses. It also concluded that fair value hedging is the most used modality, present in 93% of cases, followed by cash flow hedge and net investment abroad, with 73% and 67%, respectively. The results suggest a discrepancy between the disclosures made between the institutions, sometimes presenting excessive, non-concise, and low

value-added information for the objective analysis of risks and the established management, inserting, in many cases, transcripts of the standards in the explanatory notes. In addition, they demonstrate a low level of detail in hedging instruments and subjects, not providing an adequate understanding of the risks to which the hedge is sought.

Also focusing on financial institutions, Tavares and Cia (2014) evaluated the level of adequacy of the 15 largest banks to publish information on hedge accounting, considering the incentives for the transparency of risk management practices by parts of these entities. They concluded that its adoption is less than 50% of the cases examined.

Finally, Amaral (2020) sought to explore, through interviews with financial institutions, external consulting firms, and independent auditing, the reasons for influencing Brazilian banks not to classify their derivative hedging instruments as hedge accounting. It was found that the difficulty of smaller banks to understand the requirements of accounting standards related to hedge accounting and effectiveness testing procedures, as well as the perception of cost and benefit of accounting practice in the entity's decisions, are the main factors that justify the non-adoption of hedge accounting.

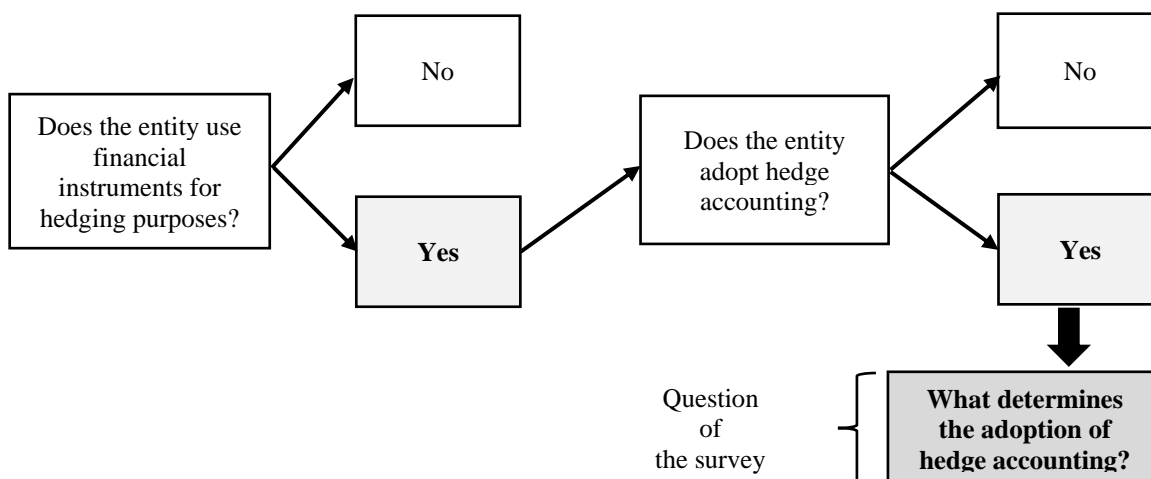
The review of these studies reveals, therefore, that the literature on hedge accounting in Brazil is still incipient, with gaps to be explored, especially those that explore from an empirical perspective the adoption of hedge accounting by banking entities. In this sense, this study provides a specific gap in the literature, seeking to identify the determinants for adopting hedge accounting by Brazilian banks. The importance of this research for the literature is perceived, mainly, among other factors, because it is a complex matter even for entities that use economic hedging but do not adopt hedge accounting.

3 METHODOLOGICAL PROCEDURES

To achieve the purpose of identifying the determinants that lead financial institutions to adopt hedge accounting and what are its main characteristics, the flow highlighted in Figure 1 was observed.

Figure 1

Hedge accounting adoption flow and definition of the research question



As shown in Figure 1, to adopt hedge accounting, it is necessary that the entity already has transactions for hedging purposes – which characterizes economic hedge – in general through the use of derivatives, to be accounted for by this method. After that, the entity chooses, or not, to adopt hedge accounting, where it considers the pros and cons of this choice.

3.1 Sample Data Source and Profile

Based on consultation with the website of each financial institution and the Central Financial Statements of the National Financial System [CDSFN], available on the website of the Central Bank of Brazil [BCB], data were collected for all banks operating in Brazil published their financial statements in IFRS, as listed in Table 1 with 41 banks.

Table 1

List of banks that make up the research sample

ABC	BNP Paribas	Daycoval	Mercantil	Safra
Alfa	Bradesco	Deutsche Bank	Mercedes Benz	Santander
Banco do Brasil	BRB	Fator	Merrill Lynch	Sicredi
Bancoob	BRDE	GMAC	Morgan Stanley	Societe Generale
Banese	BTG Pactual	HSBC	Original	Volkswagen
Banestes	Caixa Econ Federal	Indusval	Ourinvest	
Banrisul	China Const Bank	Inter	PAN	
BMG	Citibank	Itaú	Paraná Banco	
BNDES	Credit Suisse	JP Morgan	PINE	

The restriction to IFRS statements is justified because these accounting standards define the handling applicable to hedge accounting more clearly and comprehensively than in the accounting standard of institutions regulated by the Central Bank of Brazil [Cosif] – an accounting model applicable to all entities of the National Financial System. This option was possible because since the edition of Resolution No. 3,786, of 2009, of the National Monetary Council [CMN], double accounting disclosure was instituted, in Cosif and IFRS standards, for larger or publicly traded financial entities. This profile of entities that disclose statements in the international standard highlights the relevance of the sample considered in the study.

Concerning the analysis period, 2015 to 2020 were considered, resulting in a potential limit of 246 financial statements. Of these, 235 were identified, corresponding to the study's final sample. The study did not consider eleven financial statements from nine different institutions because they were not found in the sources surveyed.

3.2 Model Definition

To identify the determinants for adopting hedge accounting by Brazilian banks, the logit regression model (3.1) was developed, considering as independent variables the potential explanatory factors of the decision of the sample banks to use hedge accounting.

$$HA_{it} = \beta_0 + \beta_1 SIZ_{it} + \beta_2 GC_{it} + \beta_3 BA_{it} + \beta_4 ABR_{it} + \beta_5 LIST_{it} + \beta_6 PRIV_{it} + \beta_7 PROFIT_{it} + \beta_8 LOAN_{it} + \beta_9 SECUR_{it} + \varepsilon_{it} \quad (3.1)$$

Wherein:

HA_{it}: indicates the adoption of hedge accounting in the statements of bank i, in period t, assuming 1 when it adopts this accounting practice and 0 when it does not;

SIZ_{it}: indicates the size of bank i, in period t, represented by the natural logarithm of the total assets;

GC_{it}: dummy variable, assuming 1 when bank i, in period t, is listed at some level of corporate governance of B3 and 0 for the other cases;

ABR_{it}: dummy variable, assuming 1 when bank i, in period t, has investments abroad (branch or subsidiary) and 0 for other cases;

LIST_{it}: dummy variable, assuming 1 when bank i, in period t, has stocks listed in B3 and 0 for the other cases;

PRIV_{it}: dummy variable, assuming 1 when bank *i*, in period *t*, is a private bank and 0 for the other cases;
PROFIT_{it}: represents the profitability of bank *i*, in period *t*, corresponding to the return on equity (ROE);
LOAN_{it}: translates the representativeness of the loan portfolio into the equity structure of bank *i*, in period *t*, measured by the relationship between the balance of loan and financing operations to customers and the total assets;
SECUR_{it}: represents the participation of the securities portfolio in the equity structure of bank *i*, in period *t*, measured by the relationship between the balance of securities and the total assets.

Regarding the expected signals relative to the independent variables, it is initially expected that larger entities (**SIZ**) are more likely to adopt hedge accounting due to the greater ability to bear the costs of implementing and maintaining this type of hedge accounting, in addition to being more interested in the best accounting disclosure to reduce the cost of capital (Pereira et al., 2017; Silva, 2014; Toigo et al., 2015;). Thus, a positive relationship between the variables **SIZ** and **HA** is expected.

For the same reason of seeking more transparency and better accounting disclosure, it is expected that entities listed at the corporate governance levels of B3 (**GC**) are more likely to adopt hedge accounting since they are subject to stricter regulatory standards, in addition to the fact that this practice can increase the reliability of published information, decreasing the cost of capital inflow, both from stock market investors and various creditors.

Banks with related entities abroad (**ABR**), in the form of facilities or subsidiaries, are expected to have a greater tendency to adopt hedge accounting. The hypothesis is strengthened by the fact that one of the hedge accounting modalities is precisely the hedge of net investment in operations abroad, with the main objective of protecting capital against the risk of exchange variation of operations and participations abroad (Galdi & Guerra, 2009). To this end, banks are expected to want to mitigate the risk exposure of these operations by adopting hedge accounting.

For the entities listed in the B3 (**LIST**), they are expected to register a greater tendency to adopt hedge accounting, basically due to the fact of greater monitoring of market agents, which react negatively relative to the volatility in the entities' profits or losses, with reflections on the stock price. The premise is that listed banks are more incentivized to protect the entity's income from excessive volatility through hedge accounting.

Private banks (**PRIV**) are also expected to adopt hedge accounting more frequently. The main argument for this relationship is that private entities, as they are not supported by state power, are more subject to the scrutiny of customers and investors, increasing incentives to report a more stable economic and financial situation. The use of hedge accounting would contribute to achieving this purpose by reducing the volatility of reported incomes.

For the variable representative of profitability (**PROFIT**), there is no specific expectation about its behavior. This is because, as Dantas, Galdi, Capelletto, and Medeiros (2013) concluded, some banks use discretion in the measurement and accounting disclosure of derivative financial instruments for income smoothing. Moreover, according to Silva (2014), hedge accounting can be pointed out as a practice that decreases the volatility of the entity's income. Thus, the income presented in the financial statements may result from some of these practices, which would affect the real view of the profitability of the banks studied and, consequently, make it difficult to expect the behavior of the variable.

Regarding the participation of loan (**LOAN**) and security (**SECUR**) portfolios in the banks' equity structure, it is natural that they expose banks to different types of risks, particularly the market risk represented by the behavior of interest rates, exchange rate, and price variation. Banks generally use derivative financial instruments to mitigate these risks (Amaral, 2020), using fair value hedge to mitigate these risks. Thus, it is natural to expect that the greater the relevance of loan and security portfolios, the greater the exposure to risks, increasing the probability of hedge accounting.

Finally, it is important to emphasize that the selection of variables representing the potential explanatory factors of the decision of the sample banks to use hedge accounting recognizes that

the main reason for adopting hedge accounting is the very nature of the operations and the resulting risks. Among these variables, investments in subsidiaries or facilities abroad (*EXT*) stand out, which would justify the need to protect exposure to exchange variation; and the relevance of the participation of loan portfolios (*LOAN*) and securities (*SECUR*), which as they have greater exposure to risk factors, such as the interest rate, would justify the need for economic and accounting hedging. On the other hand, as the contracting of economic hedge is not necessarily reflected in the adoption of hedge accounting, given its discretionary nature, it is important to evaluate whether the option to adopt this accounting practice can also be explained by the characteristics of the organization such as having stocks traded on the stock exchange (*LIST*); controlling capital being private (*PRIV*); the size of the entity (*SIZ*); and the corporate governance structure (*CG*).

4 ANALYSIS OF THE RESULTS

The empirical tests, based on the data collected from the 41 banks, included the analysis of descriptive statistics and the regression model estimation.

4.1 Descriptive Statistics

The first stage of the empirical tests consisted of calculating and analyzing the descriptive statistics of the model variables (3.1), segregating the information related to continuous and binary variables into two blocks – statements without (*HA=0*) and with (*HA=1*) adoption of hedge accounting. The results of the 235 bank/year observations are in Table 2.

Table 2
Descriptive statistics of model variables (3.1)

	<i>HA = 0</i> (127 observations)				<i>HA = 1</i> (108 observations)			
	<i>SIZ</i>	<i>PROFI</i> <i>T</i>	<i>LOAN</i>	<i>SECUR</i>	<i>SIZ</i>	<i>PROFI</i> <i>T</i>	<i>LOAN</i>	<i>SECUR</i>
Continuous variables								
Mean	16.8348	0.0765	0.3764	0.2135	17.4036	0.0780	0.4708	0.2020
Median	16.6673	0.0943	0.3451	0.1931	16.9645	0.1123	0.4460	0.1979
Standard deviation	1.7013	0.1365	0.2733	0.1422	1.8431	0.1280	0.1977	0.1240
Maximum	21.2502	0.4995	0.9574	0.7368	21.1962	0.3350	0.9667	0.6247
Minimum	13.1204	-0.7246	0.0000	0.0000	14.0596	-0.4969	0.0000	0.0030
Binary variables								
0	90.55%	51.18%	74.02%	28.35%	52.78%	17.59%	34.26%	21.30%
1	9.45%	48.82%	25.98%	71.65%	47.22%	82.41%	65.74%	78.70%

Where: *HA* indicates the adoption of *hedge accounting*; *SIZ* indicates the size of the bank represented by the natural logarithm of total assets; *CG* dummy variable indicates whether the bank is listed at some level of corporate governance at B3; *ABR* dummy variable indicates whether the bank has investments in entities or facilities abroad; *LIST* dummy variable indicates whether the bank has stocks listed at B3; *PRIV* dummy variable indicates whether it is a private bank; *PROFIT* variable representing the bank's profitability corresponding to ROE; *LOAN* variable that demonstrates the representativeness of the loan portfolio on the bank's assets; *SECUR* variable that demonstrates the representativeness of the securities portfolio on the bank's assets.

Using as references the measures of central tendency (mean and median) of the continuous variables, the data in Table 2 reveal that the bank/year observations related to the financial statements in which hedge accounting is adopted are, on average, related to larger banks (*SIZ*),

record higher levels of profitability (**PROFIT**) and greater relative participation of the loan portfolio in the equity structure (**LOAN**) than the observations related to statements that do not report this accounting prerogative – results compatible with expectations. For the relevance of the participation of the securities portfolio (**SECUR**), the central tendency statistics are not conclusive, with a higher mean in the group of statements of entities that do not adopt hedge accounting and the most relevant median in the group of information related to the statements that apply hedge accounting.

In the case of binary explanatory variables, the proportion of bank/year observations related to entities that are part of the corporate governance segments of the stock exchange (**GC**), have foreign shares in the form of facilities or subsidiaries (**ABR**), are publicly traded listed on B3 (**LIST**) and the controlling capital is of private origin (**PRIV**) is more relevant in the group related to the financial statements in which hedge accounting is reported. Again, these results are consistent with the expectations highlighted in section 3.

As an example of the variable representative of investments abroad (**ABR**), statistics show that this condition is present in more than 80% of bank/year observations that indicate the adoption of hedge accounting. In contrast, in the set of observations related to statements without adopting hedge accounting, they represent less than half. This suggests that investments in subsidiaries or facilities abroad increase the likelihood that the entity will adopt hedge accounting, although descriptive statistics alone are insufficient to conclude this.

4.2 Regression Analysis

Regression analysis was performed through maximum likelihood estimation of the logit model (3.1). The binary choice logistic modeling reveals the predicted probabilities for the occurrence of the adoption of hedge accounting for each observation. As highlighted in Moreira et al. (2022), the logistic regression did not estimate the values of the dependent variable, but the probability of occurrence of one of the two values assumed by the dependent variable. The results of the estimate with the 235 bank/year observations are consolidated in Table 3.

Initially, the likelihood ratio test (LR Statistics) must verify the adjustment of the model to validate the existence of variables with statistical significance. At the same time, McFadden's pseudo-R² reveals that the model explains 39.04% of Brazilian banks' adoption of hedge accounting.

The estimation results reveal that the variables **ABR**, **LIST**, **PRIV**, **LOAN**, and **SECUR** have a positive and statistically relevant relationship with the dependent variable **HA**. These results demonstrate that entities with investments abroad, through facilities or subsidiaries (**ABR**), publicly traded (**LIST**), with private control capital (**PRIV**), with greater relevance of the loan portfolio to customers (**LOAN**), and with greater relative participation of the securities portfolio (**SECUR**), are those with a greater propensity to adopt hedge accounting as a form of accounting for financial instruments for hedging purposes.

Table 3
Estimation of regression model to identify the determinants of hedge accounting by Brazilian banks – 2015 to 2020

Model:					
$HA_{it} = \beta_0 + \beta_1 SIZ_{it} + \beta_2 GC_{it} + \beta_3 B4_{it} + \beta_4 ABR_{it} + \beta_5 LIST_{it} + \beta_6 PRIV_{it} + \beta_7 PROFIT_{it} + \beta_8 LOAN_{it} + \beta_9 SECUR_{it} + \varepsilon_{it}$					
	Coefficient	Odds ratio	Standard Error	z stat	p-value
Const	-5.7225***	0.0033	1.6362	-3.4975	0.0005
SIZ	0.0745	1.0774	0.0811	0.9187	0.3583

CG	-0.2917	0.7470	0.4253	-0.6857	0.4929
ABR	1.7863***	5.9673	0.2963	6.0282	0.0000
LIST	2.0911***	8.0941	0.4439	4.7110	0.0000
PRIV	1.0602***	2.8869	0.3457	3.0672	0.0022
PROFIT	0.1412	1.1516	0.8385	0.1684	0.8663
LOAN	2.7390***	15.4715	0.5413	5.0603	0.0000
SECUR	1.7395*	5.6944	0.9535	1.8243	0.0681
No. of bank/year observations:	235		R ² McFadden		0.3904
HA = 0	127		LR Statistics		126.5741
HA = 1	108		p-value (LR)		0.0000

Where: **HA** indicates the adoption of *hedge accounting*; **SIZ** indicates the size of the bank represented by the natural logarithm of total assets; **CG** dummy variable indicates whether the bank is listed at some level of corporate governance at B3; **ABR** dummy variable indicates whether the bank has investments in entities or facilities abroad; **LIST** dummy variable indicates whether the bank has stocks listed at B3; **PRIV** dummy variable indicates whether it is a private bank; **PROFIT** variable representing the bank's profitability corresponding to ROE; **LOAN** variable that demonstrates the representativeness of the loan portfolio on the bank's assets; **SECUR** variable that demonstrates the representativeness of the securities portfolio on the bank's assets.

Significance level: * ** 1%, ** 5%, * 10%.

The findings relative to the variable **ABR** are compatible with the very nature of the hedge of net investment abroad, which exposes the investing entity to the risk of exchange variation (Galdi & Guerra, 2009). The odds ratio shows that holding investments abroad increases by almost six times the chance of the entity adopting hedge accounting. The justification for this decision is that the non-adoption of hedge accounting by entities with investments abroad, in the form of facilities or subsidiaries, with a functional currency other than Real, would expose the investor to the risk of volatility in the income. This would occur even when it performs the economic hedge, considering that the effects of the exchange variation of the investment would be recorded as other comprehensive income, and the adjustment to the fair value of the hedging instrument accounted for as an income of the period. This is a strong incentive for adopting hedge accounting, as found in this study. This evidence is also consistent with Toigo et al. (2015) that the bank's relationship with the foreign market may imply greater experience and professionalism of banks, in addition to the trend of convergence with accounting practices conducted internationally, including hedge accounting.

In the case of the variables **LIST** and **PRIV**, the findings are consistent with the perspective that listed and private equity banks are more exposed to market scrutiny, which would act as an incentive for adopting hedge accounting. In the case of listed banks, mitigating the volatility of income through hedge accounting would avoid the negative effects of this volatility on investors' perception of risk, with consequences on the price of stocks. The model's estimation reveals that being a listed bank increases the chance of adopting hedge accounting by eight times. Regarding private banks, the incentives – compared to state-owned banks – are that because they do not have government support, they need to demonstrate the entity's stability to market agents, which could be compromised in a very volatile income environment. The perspective is that the greater perception of risk due to income volatility can result in increased funding costs and even a flight of resources, as highlighted by Valle (2002). Thus, using financial risk protection structures and adopting hedge accounting mitigates such risks and offers greater institutional and investment security. The odds ratio reveals that private banks are 2.8 times more likely to adopt hedge accounting.

Regarding the relevance of the loan portfolio (**LOAN**) in the equity structure, the empirical evidence shows a positive association between this participation and the adoption of hedge accounting. This is compatible with the perspective that greater investments in credit expose the financial institution to interest rate risk, being natural the greatest concern with the return of this portfolio relative to the opportunity cost of the resources invested in these operations. It is a classic case of fair value hedging (Amaral, 2020). An equivalent result is obtained in relation to the representativeness of the securities portfolio (**SECUR**), although with a lower level of statistical confidence. Two justifications for this relationship would be the need to protect treasury operations – more subject to the immediate effects of mark-to-market – and reduce the impact of derivative results on the entity's income, one of the benefits of using hedge accounting (Silva, 2014). In both cases, considering the measurement criterion of the explanatory variables, the odds ratios reveal that the increase of one percentage point in the relative participation of credit or credit operations in the equity structure of a bank increases by 1.15 and 1.06, the chance of the bank adopting hedge accounting.

Finally, one should note that no relevant relationships were found between the adoption of hedge accounting and the size of banks (**SIZ**), the fact that these entities are listed at one of B3's corporate governance levels (**GC**), and their level of profitability (**ROE**). In all these cases, the odds ratios are close to 1.0, revealing that variations in the dependent variable do not influence more (or less) than the chance of adopting the accounting hedge proportionally. Regarding the size of the entity and participation in the governance segments, the results contradict the forecasts of Silva (2014), Toigo et al. (2015), and Pereira et al. (2017). In practical terms, the evidence suggests that, instead of these characteristics, more specific incentives prevail, such as the fact that they are publicly traded and of private origin or even the nature of the business lines and the work abroad. In the case of the profitability measure, the empirical evidence reinforces the uncertainties suggested by Dantas et al. (2013) and Silva (2014) on the effects of the measurement of derivative financial instruments and hedge accounting itself on earnings management, which would make it difficult to identify return measures as determinants for adopting hedge accounting.

5 CONCLUSIONS

This study aimed to identify the determinants of Brazilian banks' adoption of hedge accounting. The purpose was to identify factors that may explain the entity's choice to adopt this optional accounting practice, which seeks to ensure that financial information more appropriately reflects the entity's accrual basis and risk management policy in cases where it conducts transactions with financial instruments for hedging purposes.

The results of the empirical tests, based on the IFRS statements of the 41 banks that disclosed in this standard between 2015 and 2020, revealed that the adoption of hedge accounting by Brazilian banks are positively related to the fact that the banks are private in nature, listed on B3, and have investments abroad; and the level of relevance of loan portfolios to customers and securities in the equity structure. On the other hand, for the variables related to the size of the banks, the fact that they are listed in the corporate governance segments of B3, and the level of profitability, no relevant associations were found with the adoption of hedge accounting by the studied banks. The results confirm the expectation that the original determinants for the adoption of hedge accounting are associated with the nature and risk of the assumed positions, such as possession of investment abroad and the relevance of loan and securities portfolios, but that characteristics of the entities, such as being listed on the stock exchange or private control help explain the discretionary choice of the entity to use this accounting practice. The findings provide a literature gap, identifying the factors that act as incentives for adopting hedge accounting – an accounting practice compatible with risk management by Brazilian banks. The identification and analysis of the determinants that drive the adoption of hedge accounting are relevant insofar as it is essential to know how Brazilian banks protect the income and their own capital and,

consequently, the resources of their investors and customers – especially given the strong oscillations of the macroeconomic indicators of the Brazilian market, which results in greater exposure of these entities to risks.

By way of limitations, the study's exploratory nature can be highlighted. It is not expected, as is common in empirical studies, that all the determinants that explain the phenomenon of hedge accounting adoption discussed here are identified, especially if the aspects of the financial sector are considered, where the causes can be numerous due to the various types of complex transactions and economic scenarios. In any case, given the scarcity and non-recurrence of academic studies related to hedge accounting, and its adoption by Brazilian banks, this research meets this literature gap, contributing to the advancement of knowledge on the subject. One should also note that the study was restricted to banks that disclose IFRS statements, limiting the research scope.

For future studies, it is suggested to research the adoption or influence of hedge accounting in a sample of banks in other financial centers to assess whether the behavior of Brazilian banks is compatible with those operating in other economic environments. It would also be advisable to expand the studies to the statements prepared based on the Cosif standards, even recognizing that these are much less comprehensive on the practice of hedge accounting than the IFRS standards – it may be an alternative to expand the number of entities reached in the research. Another suggestion would be to identify the hedged items and hedging instruments most commonly used in hedge accounting operations by Brazilian banks, enabling a better knowledge of how these entities operate and operationalize these transactions.

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