
THE IMPACT OF THE IFRS 9 ON THE LOAN LOSS PROVISION OF BRAZILIAN BANKS

O IMPACTO DO IFRS 9 NA PROVISÃO PARA PERDAS DE CRÉDITO DOS BANCOS BRASILEIROS

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RESUMO

No Brasil, o IFRS 9 introduzirá um novo critério que não se sabe se os resultados das provisões para perdas de crédito serão maiores, menores ou iguais aos obtidos pelos padrões locais e também há poucos estudos empíricos sobre este tema no Brasil. Esta pesquisa apresenta possíveis impactos regulatórios, antes que eles ocorram no Brasil, e destaca pontos relevantes em relação à adoção do novo padrão internacional à estrutura contábil utilizada para cálculo do capital prudencial. Assim, o objetivo principal deste artigo é investigar o impacto do IFRS 9 na provisão para perdas de crédito dos bancos brasileiros nos primeiros anos de aplicação da nova norma. Para tanto, realizou-se uma estimativa de diferenças em diferenças para uma amostra de 34 bancos brasileiros no período de 2014 a 2019. Os resultados revelaram que houve aumento no nível médio de provisão para perdas de créditos de liquidação duvidosa nas demonstrações que seguem o padrão contábil internacional no período, porém, os resultados demonstraram que esse aumento não pôde ser explicado pela mudança normativa do IAS 39 para o IFRS 9. Nesse contexto, o presente estudo contribui para o debate sobre a adoção do IFRS 9 com evidências empíricas do comportamento dos bancos brasileiros dada a recente mudança regulatória. Apresenta-se três importantes insights práticos. Primeiro, com a redução das diferenças entre os níveis de provisão para perdas de créditos dos dois métodos, a implementação de uma metodologia única parece ser uma meta viável. Em segundo lugar, a significativa diferença de tamanho entre os bancos brasileiros merece atenção do órgão regulador. Terceiro, a introdução da norma IFRS 9 trará novos desafios à regulação prudencial devido a alterações no sistema de monitoração regulamentar existente.

Palavras-chave: Provisão para perdas de crédito; Bancos; IFRS 9.

ABSTRACT

In Brazil, the IFRS 9 will introduce a new criterion and we do not know whether it will result in equal, greater, or lesser levels of loan loss provision than those applied by local standards, and there are few studies with empirical data on this issue in Brazil. This research discloses possible regulatory impacts before they occur in Brazil and highlights relevant points regarding the adoption of the new international standard to the accounting framework that is used for calculating the prudential capital. So, the main objective of this paper is to investigate the IFRS 9 impact on loan loss provision of Brazilian banks in the first years of the new standard application. We perform a difference-in-differences estimation for a sample of 34 Brazilian banks in the period from 2014 to 2019. The results revealed that there was an increase in the average level of loan loss provision in the statements that follow the international accounting standard in the period, however, the results demonstrated that this increase could not be explained by the normative change from IAS 39 to IFRS 9. In this context, the present study contributes to the debate on the adoption of the IFRS 9 with empirical evidence of the behavior of Brazilian banks given the recent regulatory change. We present three important practical insights. First, with the reduction of the differences between the loan loss provision levels of the two methods, the implementation of a single methodology seems to be a feasible goal. Second, the significant size difference between Brazilian banks deserves attention from the regulatory body. Third, the introduction of the IFRS 9 standard will bring new challenges for prudential regulation due to changes in the existing regulatory monitoring system.

Keywords: Loan loss provision; Banks; IFRS 9.

1 INTRODUÇÃO

The large universal banks were the main private-sector catalysts for the credit boom that led to the Great Recession in 2008, becoming the epicenter of the systemic crisis (Wilmarth, 2009). Among the causes of this global crisis, Kothari and Lester (2010) point to lax regulation, a growing housing bubble, the rise of derivative instruments, questionable banking practices, managerial incentives, and the US accounting standards in force at that time. In addition, Wilmarth (2009) argues that the regulatory policies of the two decades before the crisis were detrimental to the security and solidity of banks, as well as to the stability of financial markets and the economy in general.

In response to those events, the International Accounting Standards Board (IASB) replaced the International Accounting Standard (IAS) 39 - Financial Instruments: Recognition and Measurement with the International Financial Reporting Standard (IFRS) 9 - Financial Instruments, whose final version was published in July 2014. Among the main changes, one of the most relevant is the loan loss provisioning (LLP) rule, which changed from the incurred credit losses (ICL) to the expected credit losses (ECL) approach. As justified by IASB, the delay in recognizing credit losses on loans and other financial instruments was identified as a weakness in existing accounting standards during the financial crisis (IASB, 2014b). This was because the ICL model of the IAS 39 required evidence of a “trigger” event to recognize the deterioration of the debtors’ creditworthiness and so banks postponed the recognition of credit losses, they acted only when default actually occurred (IASB, 2014b).

Previously the IFRS 9 adoption, the European Parliament and the Council of the European Union implemented an optional transitional regime for banks, intending to mitigate a rapid and intense increase in loan losses provisions and consequently a sharp decrease in the capital of these banks, based on predictions made by the European Central Bank and the European Economic and Social Committee (Parlamento Europeu & Conselho da União Europeia, 2017). This regime authorized that in five years starting in 2018 institutions that incur a reduction in Tier 1 capital due to the increase in LLP may again include part of that amount in the capital.

In Brazil, the IFRS 9 will introduce a new criterion and we do not know whether it will result in equal, greater, or lesser levels of LLP than those applied by local standards. Currently, the Brazilian banks follow the Resolution of the National Monetary Council (NMC) n° 2,682/99, seeing that the Brazilian regulation determines a mixed provisioning model, with the approach of both incurred and expected losses since its edition more than twenty years ago.

Since 2010, the larger Brazilian banks have been required to disclose financial statements in accordance with international standards (IFRS) and with local regulation, the Accounting Plan of the National Financial System Institutions, called Cosif standard (CMN, 2009).

This Brazilian institutional environment feature makes it possible to carry out a comparative study of the effects of the IFRS 9 adoption on the provision for credit losses before an effective application of this new IASB standard. Although the coexistence of two different accounting models to estimate the provision for credit losses can generate doubts among users, we have a unique situation that allows us to perform an empirical analysis about the impacts of a new accounting standard on the estimates of LLP in a real experiment.

Thus, the main objective of this paper is to investigate the IFRS 9 impact on LLP of Brazilian banks in the first years of the new standard application, by the analysis of the difference between the LLP calculated according to the international accounting standards (IAS 39 and IFRS 9) and the Brazilian standard (Resolution n° 2,682/99) on the balance sheets of Brazilian banks in the years 2014 to 2019.

As a result, this study identified an increase in the LLP level registered after the adoption of IFRS 9 compared to the levels recorded by the criteria of the Brazilian local standard at the same time. However, such an increase could not be attributed to the regulatory change, and one reason is the divergent behavior of banks with foreign private control, which reduced the LLP level in the same period.

In this paper, we present three important practical insights. First, with the reduction of the differences between the LLP levels of the two methods, the implementation of a single methodology seems to be a feasible goal.

Second, the significant size difference between Brazilian banks deserves attention from the regulatory body. We know that smaller banks may not have sufficient resources to implement sophisticated estimation models. Then, it is quite understandable that the implementation of a hybrid solution with lower regulatory costs for small banks is needed, i.e., a single regulatory solution for the entire NFS may not be the best decision.

Third, the introduction of the IFRS 9 standard will bring new challenges for prudential regulation due to changes in the existing regulatory monitoring system. Currently, a local standard requires a high degree of transparency in disclosing the risk levels of the banks' credit portfolios. Using internal models, where the credit portfolio is divided into three stages as defined in IFRS 9, would make it difficult to adopt a uniform regulatory monitoring system.

2 BRAZILIAN INSTITUTIONAL SETTING

In Brazil, the Central Bank published three public consultations between August 2017 and September 2018 announcing proposals to incorporate the IFRS 9 criteria into the Cosif standard (BCB, 2018). However, to date, there has been no publication of standards incorporating IFRS 9 into Cosif. Thus, about LLP criteria, Resolution n° 2,682/99 remains in force.

The Brazilian standard determines that banks should classify their loans in order of credit risk, based on consistent and verifiable criteria supported by internal and external information, considering aspects related to the debtor and its guarantors and concerning the operation, past events, and vision of the future (CMN, 1999).

In addition to these elements, which are banks' responsibility to analyze and judge, the NMC (1999) also stipulated an objective rule to evaluate the risk of the loans. The Brazilian rule determines a

range of credit risk according to the number of days delayed in the loan, as well as the respective minimum provision that must be constituted for each risk level, according to Table 1:

Table 1 - Credit risk levels of Resolution nº 2,682/99

Delay	Minimum risk level	Minimum LLP
-	AA	-
-	A	0,5%
Between 15 and 30 days	B	1%
Between 31 and 60 days	C	3%
Between 61 and 90 days	D	10%
Between 91 and 120 days	E	30%
Between 121 and 150 days	F	50%
Between 151 and 180 days	G	70%
More than 180 days	H	100%

Source: Prepared by authors based on Resolution nº 2,682/99 (CMN, 1999).

It is important to note that both the risk level and the percentage of provision shown in Table 1 correspond to the minimum values that banks must observe, and their administrators are responsible for providing LLP in sufficient amounts to face probable losses in the realization of credits (emphasis added) (CMN, 1999).

Thus, Resolution nº 2,682/99 has some subjective and objective commands and it determines the analysis of credit risk both retrospectively and prospectively in the so-called mixed provisioning system.

In this step, the prospective aspect of Resolution nº 2,682/99 prevails when the contractual loan terms are being met without delay. It demonstrates that the Brazilian standard already provided the economic logic of the expected credit losses. However, despite this similarity, some relevant differences stand out between the Brazilian standard and IFRS 9:

- a) the scope of the IFRS 9 is greater. While Resolution nº 2,682/99 covers only credit operations and leasing, the IFRS 9 covers all financial instruments (CMN, 1999; IASB, 2018);
- b) the Brazilian standard determines the minimum percentage of LLP that must be applied to each risk level and, therefore, when there is a delay and the operation falls within the minimum risk levels stipulated, that is, from the moment retrospective approach prevails, the loan guarantees are not considered, since the LLP corresponds to the product of the minimum percentage determined by the standard versus the value of the operation on that date, in contrast to IFRS 9, which considers the value of guarantees for calculating the loss given default (Antunes, 2021); and
- c) for the AA risk level, Resolution nº 2,682/99 does not establish a minimum percentage of LLP (CMN, 1999). In turn, the IFRS 9 determines the recognition of an ECL provision for 12 months even for Stage 1 assets (IASB, 2018).

Additionally, since 2010 the largest and most systemically relevant Brazilian banks have been required to disclose their financial statements observing all applicable IASB pronouncements, including the IFRS 9, which took effect in 2018 (CMN, 2009).

In this context, on one hand, there is a group of institutions that must prepare and disclose financial statements in the IASB standard, that is, they observe all the pronouncements issued by the IASB that apply to its activities, even if the Central Bank of Brazil (CBB) has not adhered to them. On the other hand, all institutions of the National Financial System observe international standards when there is an approximation of the Brazilian accounting criteria with the concepts of pronouncements issued by the IASB, in the process of international convergence of accounting standards that occurs at the CBB.

3 LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Borio and Lowe (2001) explain that the recognition of a provision for loans impacts banks' current profits and leads to a write-down in their net asset value since it reduces the value of these loans, and, thus, the provisioning would cause more realistic earnings and asset values. However, the effect of LLP on banks' profits affects the regulatory capital, which should cover exclusively unexpected losses.

The IAS 39 requires that a financial asset is impaired only if there is a loss event that impacts its estimated future cash flows, and, on the other hand, losses expected as a result of future events are not recognized under any circumstances (IASB, 2003). Thus, there is no “generic” provision, which is related to uncertain future events, more subjective and applicable to all operations, but only a “specific” provision, related to observable events (Gebhardt, 2008; Majnoni & Cavallo, 2001).

Against this background, Restoy and Zamil (2017) consider that IAS 39 impairment model does not adequately reflect a loan's actual value, exposes the profit and loss account to undue volatility and excessive pro-cyclicality, and impacts regulatory capital inappropriately because if the LLP cover only incurred losses, capital is exposed to expected and unexpected losses. However, “regulatory capital should be a bank's last line of defense, by absorbing only unexpected losses” (Restoy & Zamil, 2017, p. 17).

It is noteworthy that several studies have addressed the relationship between the behavior of banks concerning LLP and crises. Ozili and Outa (2017) state that, after the 2008 global financial crisis, LLP became the third most debated accounting number in bank financial reports, after profitability and derivatives, and they stress that provisions are often pro-cyclical, which can worsen an economic recession. This was evidenced at the peak of the 2008 crisis when many American and European banks increased their LLP estimates and consumed their profits to the point of depleting their capital, which led them to government intervention and bailouts (Ozili & Outa, 2017).

Beatty and Liao (2011) concluded that banks with longer delays in provisioning for credit losses reduce the loans in times of crisis more than banks with smaller delays because it is harder for them to allocate more capital during the crisis. The authors also argue that banks with fewer delays accumulate more equity capital during expansionary periods and then use it as a buffer for losses in the crisis, which allows them to do not reduce the volume of the loans significantly in crises (Beatty & Liao, 2011).

LLP's cyclicality corresponds to the relationship between this and economic factors and ultimately it reflects the bank's risk perception. An example brought by Borio and Zhu (2012) is the link between monetary policy and the risk perception by economic agents, what the authors call the “risk-taking channel” of monetary policy. The authors explain that lower interest rates reduce banks' risk aversion, with an impact on credit supply and consequently on business (Borio & Zhu, 2012).

In Brazil, Tabak, Laiz, and Cajueiro (2013) show that rising interest rate reduces loans and identified that banks change their credit strategy according to the direction of monetary policy, with different responses according to the type of bank analyzed.

In the same stream, Montes and Peixoto (2014) investigated the pro-cyclicality of banks under the influence of the risk-taking channel of monetary policy and identified evidence that Brazilian banks react to changes in the basic interest rate through changes in the values of the LLP and the credit spreads. Following Borio and Zhu (2012), the authors found that the analyzed banks take more risks by reducing their provisions and credit spreads when interest rates fall, which increases the supply of credit. In addition, when the economy shows signs of warming up, banks tend to increase the number of loans, which reinforces the pro-cyclical character of banks (Montes & Peixoto, 2014).

Also in Brazil, De Moraes, Montes, and Antunes (2016) analyzed the link between monetary policy and capital regulation through the risk-taking channel and identified a positive relationship between the basic interest rate and the LLP, in line with previous studies. They also showed an inverse relationship between the level of economic activity and the LLP, that is when there is economic growth, default expectations decrease, the LLP decreases, and banks are more exposed. It was further reinforced

by the analysis of a dummy variable used to capture shocks from external crises in the Brazilian economy, which showed that banks increased provisions during periods of crisis.

About the relationship between the LLP and financial and economic stability, the Basel Committee (2017) highlights that there is a tension between the backward-looking and the forward-looking approach. This tension is based on the need to avoid the discretion that allows banks to manage results and capital and the need to register provisions at the appropriate time, so as not to accumulate the recognition of losses when the situation is already deteriorating to the point of consuming capital. In conclusion, the Committee says that “corner solutions in one or the other direction do not seem optimal and that an adequate mix of the two concepts may be superior” (BCBS, 2017, p. 2).

However, IFRS 9 is criticized for its subjective character. For example, the standard states that entities should consider “reasonable and supportable information, that is available without undue cost or effort, that is indicative of significant increases in credit risk since initial recognition” (IASB, 2018, p. 21). The high degree of judgment in assessing the increase in credit risk is noticeable and, in Basis for Conclusions, the IASB confirms that it has not prescribed a specific methodology or formula for assessing changes in credit risk because the appropriate approach varies for different levels of credit, the sophistication of entities, financial instruments, and data availability (IASB, 2014a). Likewise, the default concept has not been established and must be determined by the entity itself, based on its credit risk policy.

On the other hand, according to Restoy and Zamil (2017), one of the advances in the pronouncement is the require a more granular assessment of credit risk, as IFRS 9 determines the classification of financial assets in three distinct risk groups: “performing” (Stage 1), “underperforming” (Stage 2) and “non-performing” (Stage 3), instead of the “unimpaired” and “impaired” categories of IAS 39 (Restoy & Zamil, 2017).

Focusing on other issues, Buesa, Población García, and Tarancón (2020) compared the LLP behavior and the ability to forecast future losses under the different accounting criteria. The authors concluded that the LLP constituted under the criteria of IFRS 9 is much less pro-cyclical than under the IAS 39 regime, in which losses were recognized only when they occurred or long afterward, whereas in IFRS 9 one year before the default and although recognition may occur too early, there was an advance to the previous standard. In addition, the authors concluded based on estimates that the level of provisioning will be higher under IFRS 9 than under IAS 39 (Buesa et al., 2020).

In the first year of IFRS 9 adoption, the European Banking Authority (2018) analyzed the data for the 2nd quarter of 2018 from 54 banks from 20 member countries. The report highlighted that the application of IFRS 9 resulted in a 9% increase in the LLP of the banks analyzed, less than the 13% increase estimated by the own European Banking Authority in an impact assessment published in July 2017 (European Banking Authority, 2018).

In research about the relationship between IFRS 9 and credit contraction for micro and small businesses, Ertan (2019) identified an average increase between 12.50% and 13.36% in the LLP in the transition from IAS 39 (12/31/17) for IFRS 9 (1/1/18) in a sample of 108 European banks.

Using data from 142 banks under the expected credit loss model, Albrahimi (2020) identified an increase in the LLP from 2.97% to 3.56% and a decrease in the association between the LLP and the determinants of the incurred loss model in the post-IFRS 9 periods (changes in non-performing loans and the level of non-performing loans).

In Brazil, Dantas et al. (2017) predicted the impact of the adoption of IFRS 9 on Brazilian banks and show that, if the Brazilian model of Resolution nº 2,682/99 is not changed, the level of provisioning will be higher in the IFRS statements.

Considering previous studies, this research expects that there will be an increase in the level of LLP recorded in the international standard as a result of the IFRS 9 adoption and thus we will test the following hypothesis:

“The increase in the LLP levels registered in the financial statements based on the international accounting standard issued by the IASB is explained by the regulatory change from IAS 39 to IFRS 9.”

We expect that the hypothesis is confirmed and that it captures the regulatory impact since the change from the ICL model of IAS 39 to the ECL model of IFRS 9 makes the LLP sensitive to future events and the macroeconomic environment, factors whose impacts are much less relevant, or even non-existent, in a retrospective evaluation method.

4 EMPIRICAL ANALYSIS

The sample comprises 34 banks, and the period of analysis includes the years from 2014 to 2019. This period includes two financial statements under IFRS 9 (2018 and 2019) and four under IAS 39 (2014 to 2017).

Table 2 – Sample composition

Panel A – Sample composition				
	<u>N</u>	<u>%</u>		
Brazilian Financial Institutions	137			
(-) Segment S4 ^(a)	<u>-87</u>			
= Population	50	100%		
(-) Not required to prepare IFRS Financial Statements	(3)	6%		
(-) Not disclose IFRS Financial Statements	(11)	22%		
(-) No data available	<u>(2)</u>	<u>4%</u>		
= Sample	34	68%		
Panel B – Sample proportion				
	<u>Population</u>	<u>%</u>	<u>Sample</u>	<u>%</u>
S1 – size equal to or greater than 10% of GDP	6	12%	5	15%
S2 – size less than 10% and equal to or greater than 1% of GDP	6	12%	5	15%
S3 – size less than 1% and equal to or greater than 0.1% of GDP	<u>38</u>	<u>76%</u>	<u>24</u>	<u>71%</u>
Total	50	100%	34	100%

Source: prepared by authors.

Note: Data extracted from the IF.data repository on the CBB website, on 6/4/2020. (a) Segment S4 includes Brazilian Banks with a size less than 0.1% of GDP.

The sample represents 68% of the population and includes 29 commercial banks, 3 investment banks, and 2 development banks. In addition, the sample is made up of 44% of foreign banks, 41% of national private banks, and 15% of public banks.

The data were collected directly from the audited financial statements prepared according to IASB and Cosif standards available on the bank’s websites. The banks chosen were those that were obliged to disclosure the consolidated financial statements under Cosif standard (under article 249 of Law n° 6,404/76) and in the IFRS standard until the year 2019.

Given that the scope of Resolution n° 2,682/99 encompasses only credit operations, while IFRS 9 includes all financial instruments, such as derivatives, bonds, securities, guarantees, etc., we focused exclusively on the loan to customers portfolio, aiming to maintain the comparability of values. Thus, data were collected to compare the level of banks' LLP under the different accounting models according to the following variables of interest, adapted from Dantas et al. (2017):

$$a) \text{PROV}_{IASB\ it} = \text{LLP}_{it} / \text{CLP}_{it}$$

$$b) \text{PROV}_{COSIF\ it} = \text{PCLD}_{it} / \text{COP}_{it}$$

Where:

- PROV_{IASB}: this variable represents the LLP level (%) in the IFRS financial statements;
- LLP: this variable represents the value of loan loss provisions in the IFRS financial statements;
- CLP: the value of customer credit loan portfolio in the IFRS financial statements;
- PROV_{COSIF}: this variable represents the LLP level (%) in the Cosif financial statements;
- PCLD: this variable represents the value of loan loss provisions in the Cosif financial statements;
- COP: the value of credit operations for customers' portfolios in the Cosif financial statements.

We collected information regarding the prudential classification stipulated by the CBB (S1, S2, or S3) and the type of control (public, foreign private, or national private) of banks, and these data are also available on the Central Bank website, as well as the macroeconomic variables gross domestic product (GDP) and the Brazilian basic interest rate (Selic) for the period analyzed available in the Central Bank's Time Series Management System (series 1208 and 4189).

To test the hypothesis, we applied the difference-in-differences method (diff-in-diffs). The difference between the average provision's levels for credit losses in the group under the IASB standard before and after the adoption of IFRS 9 (treatment group) and the difference in the level of the provision under the Cosif standard (control group) in the same periods was calculated.

The groups received different statuses represented by $i = 0$ or 1 , where 0 represents the individuals who did not receive treatment and 1 for those who did. The IASB standard group is 1 (as there was a change in "treatment" from IAS 39 to IFRS 9), and the Cosif Standard (Resolution n° 2,682/99) is 0 . We observed two periods: $t = 0$ or 1 , where 0 represents the period before the change in the treatment group (2014 to 2017) and 1 the period after the regulatory change (2018 and 2019).

The proposed statistical model seeks to estimate the change in the provision level that is a result only of the regulatory change, according to the basic equation of the diff-in-diffs model, adapted from Hansen (2019):

$$PROV_{it} = \beta_0 + \beta_1 Standard_i + \beta_2 Time_t + \theta D_{it} + \varepsilon_{it} \quad (1)$$

Where:

- $PROV_{it}$ represents the level of LLP by bank in time t ;
- β_0 is the constant term;
- β_1 represents the treatment group-specific effect;
- $Standard_i$ is the variable that indicates the accounting standard, $Standard_i = 1$ for IASB e $Standard_i = 0$ for Cosif;
- β_2 is the time trend common to control and treatment groups;
- $Time_t = 0$ for the period before IFRS 9 (2014 a 2017) and $= 1$ for the period after IFRS 9 (2018 e 2019);
- θ the difference in difference estimator, it is the true effect of treatment;
- D_{it} denotes a treatment dummy, with $D_{it} = 1$ if the LLP is based on IFRS 9 criteria ($D_{it} = Standard_i * Time_t$);
- ε_{it} is an error term.

One assumption of the diff-in-diffs model is that the treatment and control groups are subject to the same trends that influence their results and so these trends are included in the model (Hansen, 2019; Lechner, Rodriguez-Planas, & Kranz, 2016). Although the two groups (IASB and Cosif) are under the influence of the same macroeconomic variables, as they comprehend the same banks, the LLP values used in the equation result from the application of three different provisioning models: incurred losses, expected losses, and the mixed model, whose sensitivity to macroeconomic factors may vary.

For this reason, we carried out complementary tests with models other than the basic one, which included macroeconomic variables and specific characteristics of the banks. We chose the variables based on previous studies and the characteristics of the banks available in the CBB website:

- a) GDP: the relationship between the LLP and economic cycles has been pointed out in several studies, with evidence that the provision has a pro-cyclical character, aggravated under IAS 39 (Borio & Zhu, 2012; Curcio, De Simone, & Gallo, 2016; de Moraes et al., 2016; Montes & Peixoto, 2014; Ozili & Outa, 2017; Restoy & Zamil, 2017).
- b) Selic (Brazilian basic interest rate): considering findings of previous studies that identified the relationship between monetary policy and the exposure of the financial system to credit risk, the basic interest rate Selic was added, which is the main monetary policy tool in Brazil (Borio & Zhu, 2012; de Moraes et al., 2016; Montes & Peixoto, 2014; Tabak et al., 2013).
- c) $PROV_{it-1}$ (LLP first lag): previous studies have highlighted the self-regressive nature of the LLP. Laeven and Majnoni (2003) used the lagged values of the dependent variable to capture the speed of loan loss provisions adjustments to an equilibrium level and obtained statistically significant results, concluding that banks are slow to adjust the ideal level of provisioning. Fonseca and González (2008) also used LLP lags to capture adjustment costs that restrict the complete adjustment to an equilibrium level and found positive coefficients, recommending a dynamic specification to model the provisioning of banks. Still, Bouvatier and Lepetit (2008) found evidence that banks adjust the provision for credit losses gradually, with a positive and significant relationship of 1% between the dependent variable and its lag.
- d) Dummy shows the prudential segment (segment): seeks to capture the effect of the size and systemic relevance of institutions (segments S1, S2, or S3) on the level of LLP.
- e) Dummy shows the type of control (control): seeks to identify whether there is a relationship between the type of control of banks - public (PU), foreign private (FP), or national private (NP) - and the level of provision for losses credit.

5 RESULTS AND DISCUSSION

The difference-in-differences method seeks to identify the increase or decrease in the LLP level that occurred only as a result of the normative change, excluding the time difference and the intrinsic difference of each group (treatment versus control), through linear regression.

Table 3 shows those differences, considering the averages of the LLP levels in the two accounting standards. The last column of Table 3 shows the temporal comparison between the pre and post-adoption period of IFRS 9 for the control group, that is, the values obtained under Cosif standard, and the result was a decrease of 0.0033 percentage point (p.p.) in the average level of LLP, which is equivalent to a reduction higher than 7%. In this same period, the LLP based on the IASB standard showed an increase of 0.0021 p.p. in the mean, representing an increase of almost 5% in the period.

Table 3 – Differences in the LLP levels

	Pre-IFRS 9 (2014 to 2017)	Post-IFRS 9 (2018 to 2019)	Temporal difference
Cosif Standard	4,52	4,19	-0,33
IASB Standard	4,29	4,50	0,21
Standards difference	-0,23	0,31	0,54

Source: prepared by authors.

On the other hand, when comparing the standards, the average LLP level in the IASB was 0.0023 p.p. lower than in the Cosif standard before the change. In contrast, the average level of LLP was 0.0031 p.p. higher in the IASB standard after the change of the incurred losses to the expected losses model. In conclusion, the final difference in the average after the adoption of IFRS 9 was an increase of 0.0054 p.p. in the LLP level in the financial statements under the IASB standard.

The positive difference of 0.54% in the average level of LLP between the international and Cosif standards is aligned with previous studies that concluded that the adoption of IFRS 9 would increase the level of LLP in banks (Albrahimi, 2020; Buesa et al., 2020; Dantas et al., 2017; Ertan, 2019; European Banking Authority, 2018).

It is important to highlight that the nonparametric statistical tests show that there is a statistically significant difference between the levels of provision in the IASB and Cosif standards in the pre-IFRS 9 period (Wilcoxon test = -4.9168, p-value <0,01). In this pre-IFRS 9 period, the median LLP is higher in the local standard (Cosif = 4.66%) than in the international standard (IASB = 4.25%). However, in the post-IFRS 9 period, there is no statistically significant difference, and the medians were 3.69% and 3.68% for Cosif and IASB, respectively.

In this context, one of the purposes of the IASB when issuing the new accounting standard, about the issue of “too little, too late” in the recognition of credit losses, seems to have been met by the banks that compose the sample of this study. However, as other factors may have influenced this increase, it is necessary to verify whether there is a relationship between this behavior and the normative change.

Table 4 presents the multivariate analysis, where the dependent variable is the level of LLP and explanatory variables in Model 1 are the accounting standard observed, the period reported, and the two factors together, which represent the final difference between the standards after the regulatory change.

As expected, the values of the Model 1 coefficients correspond exactly to the values presented in Table 3, allowing the verification of the average differences captured by the model, including the difference of the differences. The results did not show statistical significance in the test with the application of the basic model, that is, we did not identify any statistical relationship between the average level of LLP and the independent variables that represent the period, the accounting standard, and the two factors together.

The model was also not significant (F test is 0.8925), that is, the independent variables do not explain the behavior of the variation in the LLP in the sample banks. Thus, the hypothesis proposed by this work was rejected in this first test.

Following the analysis, we ran complementary tests, with the insertion of the variables described in the methodology.

In model 5, given that the dummy for the year 2019 presented a perfect collinearity problem, we excluded it from the regression, as well as the GDP, which presented less collinearity, but an inflation factor of variance above the acceptable (14.26).

For all models, the Kolmogorov-Smirnov normality test indicated that the distribution of residues does not tend to a normal distribution; however, we relaxed this assumption based on the Central Limit Theorem. The Breusch-Pagan test showed problems of heteroscedasticity and, therefore, White's correction was applied to the OLS estimates of models 2, 3, 4, and 5. The Durbin-Watson test indicated the absence of autocorrelation in the residues in all models.

Models 2, 3, 4, and 5 are statistically significant, with a small increase in the adjusted R^2 to each new model proposed, that is, an improvement in the explanatory capacity of the models, notably when compared to the basic model.

Regarding the analysis of the independent variables, it is noteworthy that, again, the variables that show the standard (IASB/Cosif), the period (pre and post-IFRS 9), and the two factors together did not show statistical significance, except for the model 4.

In model 4, the Time variable, represented by 0 in the years of IAS 39 and by 1 in the period of IFRS 9, proved to be statistically significant at the 5% level of significance, with a negative coefficient.

Table 4 - Results of diff-in-diffs models

Dependent variable:	Model 1		Model 2		Model 3		Model 4		Model 5	
PROV										
Explanatory variables:	Coefficient	t value	Coefficient	t value	Coefficient	t value	Coefficient	t value	Coefficient	t value
Intercept	0.045180	15.488	0.0057	0.0751	0.0165	0.2198	0.0122	4.9006***	0.0038	1.2394
Standard	-0.002272	-0.551	0.0012	0.4997	0.0011	0.4656	0.0011	0.4658	0.0013	0.7978
Time	-0.003286	-0.650	-0.0043	-1.2196	-0.0044	-1.2520	-0.0065	-3.2385**		
Standard*Time (θ)	0.005393	0.755	0.0003	0.1056	0.0005	0.1582	0.0005	0.1620		
PROV _{it-1}			0.9081	28.4664***	0.8766	24.0998***	0.8746	24.6141***	0.8779	23.8756***
Selic			0.0004	0.9031	0.0003	0.8495			0.0006	2.5999***
GDP			0.0000	-0.0380	-0.0000	-0.1098				
Dummy S1					0.0010	0.4465	0.0010	0.4610	0.0010	0.4381
Dummy S2					-0.0015	-0.5713	-0.0015	-0.5642	-0.0015	-0.5810
Dummy PU					0.0006	0.3144	0.0006	0.3084	0.0006	0.3199
Dummy FP					-0.0085	-3.8082***	-0.0085	-3.8719***	-0.0084	-3.7978***
Dummy 2016									0.0014	0.6090
Dummy 2017									0.0020	0.4388
Dummy 2018									-0.0030	0.1239
R-squared	0.001524		0.7961		0.8107		0.8101		0.8114	
Adjusted R-squared	-0.00589		0.7924		0.8050		0.8055		0.8057	
F-statistic (p-value)	0.2056 (0.8925)		216.6 (0.0000)		140.9 (0.0000)		176.5 (0.0000)		141.6 (0.0000)	

Source: prepared by authors.

Notes: (a) Significance levels: 0,01 = ***; 0,05 = **; 0,10 = *. (b) White's correction was applied to all the estimates. (c) Explanatory variables are: Standard: IASB or Cosif; Time: pre or post-IFRS 9; Standard*Time (θ): difference-in-differences estimator; PROV_{it-1}: LLP first lag; Selic: Brazil basic interest rate; GDP: Gross Domestic Product; Dummy S1: Dummy = 1 if the bank is classified at S1 prudential segment by CBB; Dummy S2: Dummy = 1 if the bank is classified at S2 prudential segment by CBB; Dummy PU: Dummy = 1 if is a bank with public control; Dummy FP: Dummy = 1 if is a bank with foreign private control; Dummies 2016, 2017, 2018 represent the respective years. (d) Variance inflation factor (VIF): Model 2 – Standard: 1,67; Time: 4,04; Standard *Time (θ): 2,67; PROV_{it-1}: 1,01; Selic: 2,37; GDP: 1,54. Model 3 – Standard: 1,67; Time: 4,09; Standard *Time (θ): 2,67; PROV_{it-1}: 1,13; Selic: 2,37; GDP: 1,54; Dummy S1: 1,14; Dummy S2: 1,18; Dummy PU: 1,24; Dummy FP: 1,28. Model 4 – Standard: 1,67; Time: 2,00; Standard *Time (θ): 2,67; PROV_{it-1}: 1,12; Dummy S1: 1,14; Dummy S2: 1,18; Dummy PU: 1,24; Dummy FP: 1,28. Model 5 – Standard: 1,00; PROV_{it-1}: 1,13; Selic: 1,72; Dummy S1: 1,14; Dummy S2: 1,18; Dummy PU: 1,24; Dummy FP: 1,28; Dummy 2016: 1,52; Dummy 2017: 1,30; Dummy 2018: 1,36.

In addition, the results presented in Table 4 demonstrate the influence of the autoregressive character of the LLP, since, when adding $PROV_{it-1}$ (LLP first lag) to the models, this proved to be statistically significant and positive in all situations.

The statistical significance of $PROV_{it-1}$ reveals that Brazilian banks adjusted the provision for credit losses gradually regardless of the rules in force, according to the findings of Laeven and Majnoni (2003), Fonseca, and González (2008), and Bouvatier and Lepetit (2008, 2012). The fact that $PROV_{it-1}$ proves to be statistically significant both in the diff-in-diffs models (2, 3 and 4) and in the year-to-year model (5) demonstrates, according to Fonseca and González (2008), that banks are slow to adjust to the ideal level of provisioning, and, although this was a criticism of the incurred losses model in IAS 39, the results showed that there was no change in the behavior of banks with the application of IFRS 9.

Also, in models 3, 4, and 5, where we inserted the dummies referring to prudential segmentation and the type of control, the variable Dummy FP, representative of banks with foreign private control, proved to be significant and with a negative coefficient, that is, the results showed that foreign banks practiced lower LLP levels than Brazilian public banks and national private banks in the analyzed sample.

Given that 44% of the banks in the sample have foreign private control, this result may be impacting on the statistical non-significance of the effect of the regulatory change on the banks investigated, that is, the LLP levels recorded by this specific group of banks negatively influenced the average of the main sample. However, explanation for the differentiated behavior of banks with foreign private control requires qualitative analyzes that go beyond the objective of the present study, with an investigation of possible differences in credit risk management policies, customer profiles, types of guarantees, as well as the influence of credit risk analysis guidelines by foreign headquarters.

Finally, specifically in model 5, when testing the model with year-to-year variables instead of the dummies variables representative of the pre and post-IFRS 9 periods of the diff-in-diffs model, the Selic variable became statistically significant, presenting a positive relationship with the dependent variable PROV, in line with findings of Borio and Zhu (2012), Tabak et al. (2013), Montes and Peixoto (2014) and Moraes et al. (2016), in the approach of the monetary policy risk-taking channel. In this context, the statistical test shows that the banks in the sample reacted to monetary policy through the LLP in the analyzed period.

On the other hand, the explanatory variables GDP, Dummy S1, Dummy S2, Dummy PU, and the dummies 2016, 2017, and 2018 did not show statistical significance in any of the tested models.

In conclusion, the absence of statistical significance for the Standard*Time (θ) variable in models 2, 3, and 4 confirmed the result found in model 1, the basic model of the diff-in-diffs method, rejecting the hypothesis proposed by this study that the normative change from IAS 39 to IFRS 9 could explain the increase in the LLP level registered in the international accounting standard issued by the IASB.

Based on these findings, we concluded that the average increase in the LLP level recorded in the financial statements that follow the IASB criteria cannot be explained by the normative change from IAS 39 to IFRS 9. Furthermore, the behavior of banks with foreign private control, with the lowest levels of LLP among the banks analyzed, may have contributed to the statistical non-significance of the normative change, given that they represent 44% of the sample.

6 CONCLUSIONS

This study identified an increase of 0.0054 p.p. at the loan loss provision level in the financial statements based on the IASB standard concerning the LLP level registered in the financial statements that follow Cosif standard criteria. However, the results of the basic regression of the diff-in-diffs model did not reveal statistical significance in any of the variables, i.e., we found no statistical relationship between the average level of LLP of the sample banks and independent variables representing the period (pre or post-IFRS 9), the accounting standard (IASB or Cosif), and the two factors together.

It should be noted that when we inserted dummies related to prudential segmentation and type of control, the Dummy FP variable, representative of banks with foreign private control, proved to be significant but with a negative coefficient, that is, the results showed that the foreign banks have practiced LLP levels smaller than public banks and national private banks.

Analyzing it all, although an increase in the LLP levels was identified in the international standard in the post-IFRS 9, when compared to the Cosif standard, the distinct behavior of foreign private banks led to a non-confirmation of the research hypothesis.

In this scenario, the diversity of behaviors identified between the different groups of banks stands out since there was an increase in the average LLP of the general sample, but foreign banks reduced the levels of provision in the period analyzed.

At this point, contrary to the concern of the European Union regulators with the abrupt increase of LLP, consuming the capital of European banks, which was mitigated by the adoption of the transitional regime quoted in the introduction, in Brazil the concern is about a possible fall in the provision levels.

Also, despite the classification in three stages of IFRS 9, it does not yet have the transparency from the granularity of the risk levels of the Cosif standard. In addition, the international standard presents a high degree of professional judgment in the evaluation of the credit risk increase, a factor that hampers both in the banks' applications and their regulators' monitoring. In this way, it is essential to reflect on full IFRS 9 adoption or adoption with prudential adjustments, since the expansion of discretion can bring losses to regulatory objectives.

It is important to emphasize that the results found here refer exclusively to the analyzed banks and they do not apply to other institutions, countries, or periods.

Considering the results found, we suggest the expansion of the period of analysis in future research, when it will be possible to include more exercises on IFRS 9. In addition, it is recommended that a multilevel model be used to better capture the effects of the implementation of the new accounting regulation under the different groups, in a more advanced statistical approach.

Data availability statement

The data that support the findings of this study are openly available in IF.data at <https://www3.bcb.gov.br/ifdata/>.

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