Determinants of Bank Spread in Brazil and the Impact of these Variables on the Brazilian Credit Market Between 2000 and 2020

Determinantes do Spread Bancário no Brasil e o impacto dessas Variáveis no Mercado de Crédito Brasileiro entre 2000 e 2020

Determinantes del Spread Bancario en Brasil y el Impacto de estas Variables en el Mercado de Crédito Brasileño entre 2000 y 2020

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RESUMO

O presente trabalho tem por finalidade identificar os principais determinantes das taxas de spreads *bancários observadas nas operações de crédito no Brasil, entre os anos de 2000 a 2020. Para isso, estuda-se as variáveis que compõem o* spread *bancário e mostra-se como estas influenciam o custo de crédito para o Brasil. Na realização deste estudo, utiliza-se a metodologia de pesquisa bibliográfica e pesquisa descritiva e econométrica, comparando as taxas de* spread *e o mercado de crédito brasileiro com outras economias, e confrontando os estudos abordados com os achados deste trabalho. Constata-se que, no período analisado, o Brasil possui o maior* spread *bancário médio do mundo e que seu mercado de crédito é pouco desenvolvido. Verifica-se também que o risco de crédito, o risco de liquidez, o retorno médio sobre o ativo e a concentração de mercado são os principais fatores microeconômicos que determinam o* spread *no Brasil, enquanto o crescimento real do produto interno bruto e a taxa básica de juros são as variáveis macroeconômicas mais relevantes para a determinação das taxas de juros dos empréstimos. Por último, ao lançar luz sobre a pressão concorrencial exercida pelos bancos públicos, este trabalho espera contribuir para a inserção de tal variável na discussão econômica sobre o* spread *bancário brasileiro.*

Palavras-chave: Spread bancário. Mercado de Crédito. Concorrência Bancária.

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ABSTRACT

The present study identifies the main determinants of bank spread rates observed in Brazil's credit operations between 2000 and 2020. The variables composing the bank spread are examined, and their influence on the cost of credit for Brazil is demonstrated to achieve this objective. The methodology used for this research includes bibliographic and descriptive as well as econometric analysis, comparing the spread rates and the Brazilian credit market with those of other economies and confronting the findings of previous studies with the results of this work. It is observed that, during the analyzed period, Brazil has the highest average bank spread in the world and that its credit market is relatively underdeveloped. Furthermore, the microeconomic factors determining Brazil's spread are credit risk, liquidity risk, average return on assets, and market concentration. On the other hand, the macroeconomic variables most relevant for determining loan interest rates are the real GDP growth and the benchmark interest rate. Lastly, by shedding light on the competitive pressure exerted by public banks, this research aims to contribute to the economic discussion on the Brazilian bank spread.

Keywords: Bank Spread. Credit Market. Banking Competition.

RESUMEN

El objetivo de este trabajo es identificar los principales determinantes de las tasas de spread *bancario observadas en las operaciones de crédito en Brasil entre 2000 y 2020. Para ello, estudia las variables que componen el* spread *bancario y muestra cómo influyen en el coste del crédito en Brasil. Este estudio utiliza investigación bibliográfica e investigación descriptiva y econométrica, comparando las tasas de* spread *y el mercado de crédito brasileño con otras economías, y comparando los estudios abordados con las conclusiones de este trabajo. Se constata que, en el período analizado, Brasil tiene el* spread *bancario medio más alto del mundo y que su mercado de crédito está poco desarrollado. También se constata que el riesgo de crédito, el riesgo de liquidez, la rentabilidad media de los activos y la concentración del mercado son los principales factores microeconómicos que determinan el* spread *en Brasil, mientras que el crecimiento real del producto interior bruto y el tipo de interés básico son las variables macroeconómicas más relevantes para determinar los tipos de interés de los préstamos. Por último, al arrojar luz sobre la presión competitiva ejercida por los bancos públicos, este trabajo espera contribuir a la inclusión de esta variable en la discusión económica sobre el* spread *bancario brasileño.*

Palabras clave: Spread *bancario. Mercado de crédito. Competencia bancaria.*

1 INTRODUCTION

The banking credit market is paramount for an economy, especially for those countries with underdeveloped capital markets and a low savings level, as is the case with Brazil. Through the intermediation and action of banks, surplus agents – those with savings who offer credit – interact with deficit agents – those without savings who demand credit – and establish a flow of resources that enable the implementation of economic projects in each nation (LEVINE, 2004).

It can be asserted that a developed banking credit market is crucial for a country's functioning, while a poorly developed credit market can hinder economic development. Since the bank spread directly impacts the cost of credit operations, this variable is undoubtedly critical for the functioning and volume of credit market operations. Higher interest rates tend to reduce the borrowing of funds as they become, and lower interest rates make loans more accessible, increasing demand for them. In turn, the increase or decrease in credit operations directly affects the realization, or lack thereof, of disbursements in the economy.

In Brazil, it is widely recognized that the country has not yet reached the desired level of credit market development. The volume of loans relative to the gross domestic product (GDP) is low, and the country possesses one of the highest spreads in the world, resulting in elevated credit costs. As demonstrated in this study, Brazil exhibits significantly higher spreads than other emerging economies and high-income countries, especially concerning operations with free resources. How can this phenomenon be explained?

Given the importance of studying bank spreads, there have been significant essays on this subject in economic literature, offering various contributions. Internationally, notable works include the pioneering study by Ho and Saunders (1981) and the comprehensive work of Jorgensen and Apostolou (2013) for the World Bank. At the domestic level, several discussion papers from the Central Bank of Brazil and the Institute of Applied Economic Research, as well as research commissioned and presented by the Brazilian Federation of Banks (Febraban), add to the discussion.

Within the debate surrounding the bank spread, certain variables consistently emerge as contributors to the rise in credit interest rates. These include increased operational costs and more significant financial institutions' exposure to liquidity risk. Specifically for the Brazilian case, the debate on the high spread level revolves around credit risk – argued to be higher in Brazil than the international average – and market concentration, which theoretically grants banks more market power. This study will further analyze these arguments to elucidate and explain the components of the Brazilian bank spread.

Given the context mentioned earlier, studying a country's bank spread is highly relevant. Understanding the characteristics that permeate this variable and,

consequently, the credit market becomes necessary for policymakers and economic agents in general. In the specific case of Brazil, such understanding is even more critical in light of the prevailing high-interest rates in its banking system. Once again, the question arises: Why are bank spreads in Brazil higher than in other countries? Therefore, to provide an answer, the present analysis aims to identify the main determinants of the Brazilian bank spread between 2000 and 2020 through bibliographic research and descriptive and econometric analysis. It will study the variables that compose the spread and demonstrate how they influence Brazil's credit cost.

The study seeks to comprehend the Brazilian credit market to identify the composition of credit operation spreads in Brazil. It will also analyze the nature of these operations and compare the Brazilian credit market with similar economies to highlight the disparities in interest rates and identify possible factors causing such differences.

In line with existing discussions on the subject, specific factors related to financial institutions, such as their size and exposure to risk, undoubtedly impact the determination of interest rates. Additionally, the level of competition in the credit market and the economic performance during the analyzed period must be considered in explaining the bank spread. On the other hand, unexpected results may arise, or factors that previously played a significant role in the spread composition may seem less relevant in the studied period. As shown towards the end of the study, some factors commonly cited as explanations for the Brazilian bank spread may hold less importance in its dynamics. Conversely, a brief but critical experience of competitive pressure among the leading banks operating in Brazil emerges as a relevant element.

To accomplish the proposed objectives, in addition to this introduction, this study is divided into seven additional sections. Section 2 provides a literature review to demonstrate the state of the art – both nationally and internationally – regarding the topic at hand. Section 3 presents an exploratory analysis of the Brazilian credit market and bank spread, comparing them with selected economies and regions. Section 4 describes the methodology used in the econometric study and the databases used. Section 5 develops an econometric model to estimate the determinants of the bank spread and presents the results. Section 6 discusses the study's results, comparing them with the literature reviewed and linking them to events in the Brazilian economy during the analyzed period. Finally, Section 7 presents the concluding remarks for this study.

2 MODELS OF BANK SPREAD DETERMINATION

Before delving into the development of the proposed subject, it is important to shed light on the concept of bank spread. With that assumed, when a credit intermediary participates in the credit market, it raises funds from savers – paying a certain remuneration – and lends these amounts to borrowers, charging a rate different

from the one paid in raising funds. This gap between fund raising and credit allocation is called the bank spread.

Cintra (2005, p.16) contributes to the study by defining bank spread as "the difference between what banks pay to investors and what is charged from their clients who demand funds." In line with this, Portugal (2018, p.20) states that the spread is "the difference between the interest that banks charge on loans and what they pay to depositors to raise money."

Based on the mentioned definitions, many individuals may be led to mistakenly perceive the bank spread as the profit of financial institutions acting as credit intermediaries. Such thinking does not reflect reality, as there are other variables incorporated into the calculation of the differential between lending rates, with the profit of institutions being only a part – although this part may be considered high in the case of Brazil, as will be observed throughout this study.

Given this, what variables would determine the bank spread in credit operations? The literature has a wide variation of determining factors for the spread. However, the most recurrent ones in works such as Ho and Saunders (1981), Demirgüç-Kunt and Huizinga (1998), Jorgensen and Apostolou (2013), Faro (2014), among others, that delve into the topic are: default – the main cause of the high Brazilian bank spread in the banks' view– taxes, administrative costs, inflation, GDP, credit market regulation and efficiency, and banks' profits – seen by some independent authors as the main culprit of the bank spread. For example, Cintra (2005) questions the banking sector's hypothesis that personnel expenses would determine the large margins of banks observed in the Brazilian bank spread, as fee charges offset a significant portion of this cost. Thus, banks' profits would be the main component of the high interest margins. In line with this, Belaisch (2003) asserts that Brazilian banks operate in an oligopolistic market structure, granting them specific pricing determination power and, consequently, adopting higher profit rates, thereby increasing the bank spread. Considering the above information, theoretical and empirical models seeking to explain the determination of bank spreads are emphasized and presented below.

2.1 THEORETICAL MODELS OF BANK SPREAD DETERMINATION

Regarding the theoretical models, two theories initially emerged with greater relevance to explain the behavior of spreads: a) the idea of adopting risk hedging by banks; and b) the utility maximization model through the analysis of microeconomic fundamentals of the financial sector and banking firms (HO; SAUNDERS, 1981).

When banks employ risk hedging, referred to as "hedge" by the authors, to determine interest rate margins, they assume a risk-averse behavior. Ho and Saunders (1981) state that the basic assumption of the hedge assumption model for determining spread margins is that the main risk faced by financial institutions lies in the volatility

of interest rates in an economy. As there is a time gap between the remuneration paid by banks on deposits and the returns obtained from credit operations, with the former often fluctuating temporarily while the latter is fixed in contracts, institutions seek to minimize risks through hedging.

Under this risk hedging model, a positive relationship exists between interest rate volatility and the spread practiced by banks. For example, an expectation of a restrictive monetary policy that raises the basic interest rate in an economy – with most deposit remunerations following this rate – would undoubtedly lead to an increase in bank spreads in that economy.

On the other hand, models that consider utility, through the analysis of microeconomic characteristics of banks, to determine spreads are more connected to aspects of profit maximization by lending institutions. Unlike the risk hedging model, where the primary characteristic was to reduce risks in financial intermediation, the utility maximization model assumes that the primary objective is the banks' profit (HO; SAUNDERS, 1981).

In the utility maximization model for determining the spread, it is plausible to affirm that banks are more risk-tolerant because assuming higher risks leads to higher returns, i.e., higher profits. Thus, according to this model, a positive relationship can be established between bank profitability and spread rates.

According to Pyle (1971, *apud* Ho and Saunders, 1981), in the utility maximization model, the bank spread would be determined by the differential between deposit and loan interest rates, assuming them to be independent. Financial intermediation, or credit operations, would occur when there is a positive risk premium for loans and a negative risk premium for deposits. In other words, credit operations occur when the returns from loans exceed the costs of raising funds. However, it is not sufficient to have this positive gap between loan and deposit returns; it is also necessary for this difference to be greater than the bank's operational costs. In other words, to maximize their gains, the bank engages in credit operations whenever loan revenues exceed the costs of raising funds plus operational expenses.

Note that there is a certain similarity between the two presented theoretical models, although the purposes for which spread rates are formed differ significantly. Considering this, Ho and Saunders (1981) proposed a new model for determining the financial intermediation rate, which sought to assimilate the premises of both previously presented models and formed the basis for discussing of this topic in recent decades. To put it differently, the authors sought to incorporate the assumptions of risk hedging as security for banks and the analysis of the microeconomic fundamentals of banking firms, which aim to maximize profit.

In the new model defined by Ho and Saunders (1981), banks are seen as resource dealers – they buy resources from savers (deposits) and sell them to borrowers

(loans). The difference between the selling and buying prices represents the financial intermediation margin, i.e., the bank spread. However, this difference does not represent the percentage of bank profit, as banks have operational costs – which differ between banks – and, most importantly, face uncertainties within the intermediation cycle because deposit and loan operations are not simultaneous.

In summary, deposits are more liquid than loans, and therefore banks must charge a risk premium for intermediation. Considering those mentioned above, the authors identified a set of factors that determine the formation of the bank spread: the degree of risk aversion of bank management; the market structure in which the bank operates; the average size of bank transactions; and the variation in interest rates.

Among the factors mentioned, only the market structure in which the bank operates is not directly related to uncertainties in financial intermediation. Even in a perfectly competitive market, spread margins tend to be positive because banks have operational costs, seek profits, and face uncertainties that require charging a risk premium. Thus, Ho and Saunders (1981) introduced the concept of pure spread, which considers only the variables subject to uncertainties in calculating the spread. Therefore, the Ho-Saunders model can be summarized in the following equation:

$$S = \frac{\alpha}{\beta} + \delta(a) + \delta(t) + \delta(\Delta i) \quad (1)$$

Where: S is the spread; α/β represents the bank's mark-up, which includes both operational costs and bank profits and is closely linked to the market structure in which the institution operates; δ represents what the authors call the pure bank spread; a is the degree of risk aversion on the part of the bank; t is the average transaction size; and Δi captures the volatility of the interest rate that remunerates deposits.

In an extension of the Ho-Saunders model, Allen (1988) introduces the idea of cross-elasticity of loan demand to the model. In this extension, pure spreads can be reduced by considering the portfolio effect, where banks control loan demand by adjusting their prices. By exerting certain control over loan demand, the banking institution takes on a more active role in managing its portfolio, which reduces uncertainties and thus decreases the risk premium for credit operations, leading to a decline in the pure spread.

Regarding the specific case of Brazil, Faro (2014) synthesized the modern theoretical framework by defining seven factors that influence the Brazilian bank spread, namely: the bank's funding rate; indirect taxes and contributions; administrative and judicial expenses of the institution; default rates; taxes on profits; bank profits; and the degree of concentration in the banking industry. According to the author, all these factors positively correlate with the spread charge.

The model built for Brazil is based on the variables defined in the Ho-Saunders model. However, important characteristics differentiate them. First, variables related to

taxation (direct and indirect) and legal factors are added. Also, by considering default rates, the bank incorporates not only portfolio risk – related to the remuneration rate on deposits and the time lag between deposit and loan operations – but also credit risk – the chance of the bank not receiving repayments on the loans – requiring a higher risk coverage, thus leading to a higher bank spread.

As observed in the study of theoretical models on the determination of the bank spread, Ho and Saunders built a robust model widely accepted at their time. In this model, the authors considered banks as reselling agents of financial products, risk-averse, and thus charging a premium for the uncertainties arising from the discrepancy between random deposit flows and recurrent loan flows in financial intermediation.

2.2 EMPIRICAL MODELS OF BANKING SPREAD DETERMINATION

Empirical studies on the determination of banking spread are much broader and more heterogeneous than theoretical models. Several studies on this topic seek to explain the formation of banking spread through econometric equations and analysis of micro and macroeconomic data, following the theoretical foundations laid out by Ho and Saunders (1981). Additionally, several studies use data from specific countries as case studies to determine financial intermediation rates. Below some of these empirical studies are presented and discussed, starting with Ho and Saunders' work.

As a result, the authors found empirical evidence that banking spread is positively determined by changes in the economy's interest rate, as discussed in the theoretical model. They also concluded that the term of loans has a positive relationship with banking spread and that larger banks have relatively lower spreads than smaller banks due to the market structure faced by banking institutions. Larger banks in the sample were operating in a more competitive environment, which required greater efficiency, enabling them to charge lower interest rates on loans (HO; SAUNDERS, 1981).

Another essential empirical model for the determination of banking spread can be seen in the study by Demirgüç-Kunt and Huizinga (1998), where the authors use panel data from 80 countries for the period from 1988 to 1995 to determine banking spreads and the profitability of various credit-providing institutions. The study analyzes various macroeconomic and microeconomic variables but differs from previous studies by adding tax and financial regulation factors. According to these findings, banking spread is formed by: a) Bank-related factors and macroeconomic indicators: net worth (positive relationship); indirect costs (positive relationship); foreign control (positive relationship for poor countries and negative relationship for rich countries); inflation (positive relationship); real interest rate (positive relationship). b) Tax-related variables: direct taxation (income tax and others) (positive relationship); indirect taxation (reserve requirements) (negative relationship). c) Deposit insurance (negative relationship): a dummy variable that takes the value one if the country has

an explicit deposit insurance scheme and zero otherwise. d) Market structure: bank size (positive relationship); market concentration index (positive relationship); credit market/GDP (negative relationship); capital market/GDP (positive relationship). e) Legal and institutional indicators: contract enforcement (negative relationship); functioning of the judicial system (negative relationship); corruption (positive relationship).

Empirical studies use banks' income statements and balance sheets to determine banking spread rates. However, in a pioneering work, Brock and Franken (2003) address the determination of banking spread using monthly data on bank loans in Chile, reported by financial institutions to the Central Bank of Chile from 1994 to 2001. They also use these institutions' income statements and balance sheet data to compare the spread values determined by both methods.

Combining the two data analysis methodologies, Brock and Franken (2003) construct an empirical model in which the determination of banking spread is divided into five categories: i) Bank characteristics: including the implicit interest payment (positive relationship); capital adequacy (negative relationship); asset quality (ambiguous results, depending on the spread determination methodology, which can assume negative or positive values); bank management efficiency (negative relationship). ii) Risk premium: controlling for risks associated with financial intermediation, whether credit risk (positive relationship) or liquidity risk (positive relationship). iii) Market structure (positive relationship): capturing the influence of market power in determining the spread. iv) Spread policies: relating banking spread to business cycles (positive relationship); monetary policy (positive relationship with the basic interest rate); and external policy related to capital flows (negative relationship with capital controls). v) Specific factors: dummy variables capturing the effect of sporadic events during the analysis period (negative relationship for external shocks and positive relationship for regulatory changes).

Moreover, Gambacorta (2004) conducted an empirical study with Italian banks, considering macroeconomic factors such as GDP and inflation and specific microeconomic factors of each banking institution, such as operational costs, credit risk, and interest rate volatility. This model concluded that an increase in GDP and inflation positively relates to banking spread. Likewise, increased risks, interest rate volatility, and operational costs also lead to higher spread rates charged on credit operations.

For Brazil, Afanasieff *et al*. (2002) contribute to the topic by formulating an empirical model to explain the definition of banking spreads in the country, using panel regression with monthly data from February 1997 to November 2000, based on the empirical work of Ho and Saunders (1981), with a two-stage specification. After presenting stylized facts for Brazil and based on previous empirical studies, Afanasieff *et al*. (2002) infer that the following factors determine Brazilian banking spread during the analyzed period: a) Microeconomic variables: bank size (positive

relationship); the proportion of demand deposits to total operational assets (positive relationship); the proportion of interest-bearing funds to total operational assets (negative relationship); operational costs (positive relationship); banking system liquidity (positive relationship); service revenue to total revenue (positive relationship); foreign capital control (negative relationship). b) Macroeconomic variables: basic interest rate (Selic) (positive relationship); GDP growth (positive relationship); financial taxation (positive relationship); inflation (negative relationship).

In line with Afanasieff *et al*. (2002) study, World Bank (2006) also states that macroeconomic variables are the main determinants of banking spread from 1994 to 2005 for Brazil and the other countries analyzed in the study. On the other hand, Jorgensen and Apostolou (2013), in a study involving 197 countries or economic areas - Latin America, BRIC, European Union, among others - between 1995 and 2009, find a different result for the Brazilian case, with microeconomic factors being more relevant for determining banking spread than macroeconomic factors. For the study, the authors used the same methodology as Saunders and Schumacher (2000), which disaggregates the determinants of banking spread into three components. The first component covers institutional and regulatory variables; the second concerns market structure, and; the third relates to the risk premium generated by macroeconomic factors.

Up to this point, the empirical models presented for the determination of Brazilian banking spread have mostly followed the methodology for ex-ante spread determination, which is determined prior to the loan operation, involving the decision period for credit granting, where pricing is determined based on expectations of demand, default, among other variables. However, Dantas *et al*. (2011) enrich the study on banking spreads by identifying the determinants of Brazilian banking spread through the ex-post spread methodology, i.e., the spread calculated directly after the credit operations, reflecting the actual margins obtained by banks. For this study, the authors used panel data from January 2000 to October 2009 for 201 Brazilian banking institutions engaged in credit operations. They arrived at the following variables for the determination of banking spread: Credit risk (positive relationship); bank size (negative relationship); market concentration (positive relationship); GDP variation (positive relationship).

In addition to the factors mentioned above, the model incorporated the previous period's banking spread (positive relationship), which was highly significant. This indicates that the history of spread rates directly affects the current spread rate. In fact, due to the high significance level of the lagged variable, the authors consider this variable the main determinant of ex-post spread in Brazil.

To further explore this topic, the study of Were and Wambua (2014) served as the basis for this work. Using panel data from 31 out of 44 commercial banks in Kenya, the authors investigate the determinants of banking spread in the country

from 2002 to 2011. For this purpose, the empirical model is kept relatively simple, employing a vector of bank-specific variables along with a vector of macroeconomic variables. After running the model, the authors reached that regarding bank-specific variables, it was concluded that bank size, credit risk, operational costs, average return on assets, net interest income to total revenue ratio, and market concentration have a positive relationship with banking spread. On the other hand, they found a negative relationship between banking spread and liquidity risk.

As for the vector of macroeconomic variables, the study found that banking spread in Kenya is positively related to the economy's basic interest rate - although the authors consider the relationship weak - and negatively related to real GDP growth. The impact of inflation on spread determination was also assessed, but this variable was not statistically significant.

This section addressed empirical models for the determination of banking spread, presenting various well-regarded studies at the national and international levels. Both general models - using data from multiple countries - and specific models - using data from a particular country - were considered for the determination of banking spread, with a focus on studies for Brazil. Different methodologies were also discussed, leading to different conclusions on the subject, which enriches the discussion of the topic.

In the following sections, the intention is to contribute to this discussion by presenting and estimating an empirical model, based on the study of Were and Wambua (2014), to analyze the determinants of banking spread in Brazil for the period from 2000 to 2020, to compare the results with previous studies and gain a better understanding of the determination of lending rates in the Brazilian credit market.

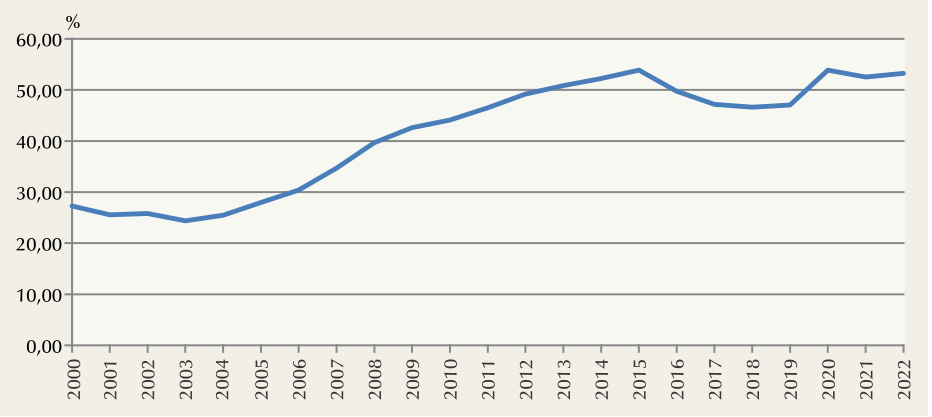
3 EXPLORATORY ANALYSES OF THE BRAZILIAN CREDIT MARKET AND BANK SPREAD

Until now, studies and theories have been presented, concluding that the Brazilian bank spread is excessively high. Therefore, the present section aims to introduce the dynamics of the Brazilian credit market and showcase the bank spread rates between 2000 and 2020, comparing them with various global economies and analyzing their behaviors to demonstrate that the Brazilian spread is above the international average.

Upon examining the Brazilian credit market dynamics for the observed period, it is evident that significant evolution has occurred in this market, despite the credit-to-GDP ratio still being below expectations for a developed credit market. According to Portugal (2018), the Brazilian credit market is at an intermediate level, with a credit portfolio - measured as a proportion of GDP - larger than some significant emerging countries but considerably below the participation observed in developed nations.

As can be observed in graph 1, at the end of the year 2000, Brazil's credit portfolio represented 27.26% of the GDP, experiencing a substantial increase until 2015, after which it underwent a slight decline until 2017, closing at 53.23% in 2022. Although there has been a significant increase in the credit portfolio relative to the GDP, Brazil still lags the levels achieved by European Union countries, as well as those considered middle-income, and members of the Organization for Economic Cooperation and Development (OECD). On the other hand, the figures for Brazil's credit portfolio as a percentage of the GDP are consistent with the Latin America and Caribbean region and quite close to countries in the South Asia, Middle East, and North Africa regions.

GRAPH 1 - BRAZILIAN CREDIT PORTFOLIO AS A PROPORTION OF GDP - 2000-2021



SOURCE: Central Bank of Brazil (2021b, d)

First, it is possible to highlight that between 2000 and 2008, the growth of the Brazilian credit portfolio - as a proportion of GDP - was driven by a higher expansion of operations with free resources, which increased from 12.84% of GDP in 2000 to 26.79% in 2008, while operations with directed resources had lower growth, going from 11.66% of GDP in 2000 to 12.89% in 2008. Additionally, it can be noticed that from 2009 to 2015, there was a change in the dynamics of the Brazilian credit market.

While operations with free resources remained at a practically constant level, going from 27.09% of GDP in 2009 to 27.37% of GDP in 2015 - greatly influenced by the external scenario - operations with directed resources experienced significant growth, going from 15.53% of GDP in 2009 to 26.49% of GDP in 2015, also leading to the growth of total operations. Another significant point to highlight is that in the year 2020, due to the effects of the Covid-19 pandemic, there was a 3.88% decrease in Brazilian GDP, along with a 15.64% expansion in the balance of the Brazilian credit portfolio, which ultimately raised the credit/GDP ratio of Brazil.

The US Subprime crisis led private banks - the main agents in credit operations with free resources - to change their lending behavior. According to Oliveira and Wolf (2016), private institutions acted pro-cyclically during the 2008 crisis, prioritizing liquidity by reducing the volume of resources loaned and adopting shorter payment periods. Furthermore, there was a greater reduction in lending to legal entities driven by losses from companies with currency derivatives.

On the one hand, the pro-cyclical behavior of private financial institutions during the 2008 crisis can be observed, while on the other hand, public banks - the leading agents in credit operations with directed resources - played a crucial role in credit expansion during the analyzed period. These institutions assumed an anti-cyclical role during the crisis, reinforcing the strategic role they can assume as a channel for credit policy transmission.

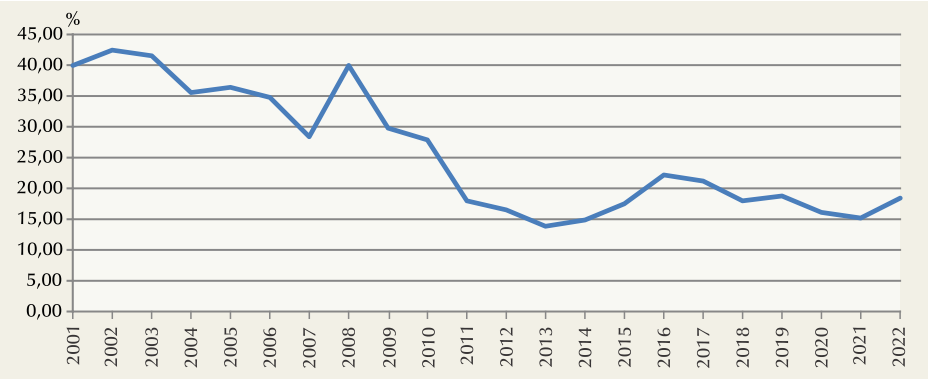
From 2011 onwards, three other points became important in explaining the growth of the credit portfolio of public banks, especially in operations with directed resources. Each of these points is closely related to the performance of the three main public credit providers: Banco do Brasil (BB), Caixa Econômica Federal (CEF), and Banco Nacional do Desenvolvimento Econômico e Social (BNDES).

With the rise in international commodity prices, according to BB's financial statements, the credit portfolio for agribusiness showed a real growth rate of 39.41% between 2011 and 2015. Likewise, the booming construction sector led to a significant increase in CEF's credit portfolio. The bank's management data indicates that infrastructure financing showed a real growth rate of 115.12% between 2010 and 2015, while real estate financing experienced a real growth rate of 92.53% during the same period. According to Central Bank of Brazil data, BNDES credit operations had a real growth rate of 51.58% between 2009 and 2015.

However, after 2015, there was a reversal in the growth trajectory of the total Brazilian credit portfolio in relation to GDP, resulting in a decrease in this proportion, which had not happened since 2003. The main reason explaining this situation seems to be related to political changes and the exhaustion of the federal government's fiscal capacity in Brazil during that period, interfering mainly in credit operations with directed resources.

Despite a significant decrease in the Brazilian bank spread between 2000 and 2019, as shown in graph 2, this variable remains excessively high in the international comparison, especially when considering only operations with free resources. At the beginning of the 21st century, the Brazilian bank spread - considering total operations - was approximately 39%, while in the year 2022, this number decreased to 18.42%. Significant changes in the behavior of the studied variable during the intermediate years are strongly linked to the events that determined the dynamics of the Brazilian credit market, as presented in the previous subsection.

GRAPH 2 - BRAZILIAN BANKING SPREAD - TOTAL OPERATIONS - 2001-2022



SOURCE: Central Bank of Brazil (2021e)

Between 2000 and 2007, a period characterized by an expansion of the Brazilian credit portfolio relative to GDP, led by private institutions, it is noticeable that the spread rates decreased, which could be attributed, among other factors, to the increase in productivity in the Brazilian credit market and the reduction in delinquency rates of private institutions within the National Financial System (SFN), which is, in turn, linked to the modernization of the credit market through the creation of consigned credit and the implementation of fiduciary alienation.

In 2008, there was a break in the declining trend, driven by the financial crisis in the United States, but from 2009 onwards, the spread rate experienced a more substantial decline until 2013. It is intuitively observable that this significant drop was caused by the countercyclical actions of public banks, achieved by increasing the share of credit operations with directed resources in the total Brazilian credit portfolio. For instance, between 2011 and 2015 – years with the lowest spread rates for the analyzed period – the period when directed credit operations had a more significant share in the total credit portfolio. Moreover, actions by the Banco do Brasil and Caixa Econômica Federal to lower interest rates charged in free credit operations also contributed to the spread reduction, creating competitive pressure in the Brazilian banking market, thereby limiting the capacity for private banks to set higher spreads.

Schmitz (2020) contributes to this study by demonstrating that the credit stimulus programs launched in 2012 by Banco do Brasil ("BOMPRATODOS") and Caixa Econômica Federal ("Caixa Melhor Crédito") led to an expansion of credit operations for legal entities of these institutions, particularly for small and medium-sized enterprises, with lower spreads and more extended repayment periods. Additionally, public banks' decreased interest rates prompted foreign capital banks to follow suit, demonstrating that the policies adopted were sufficient to stimulate competition in the Brazilian banking sector. Meanwhile, domestic private banks began to direct more credit to stronger companies and regions with higher economic growth, implying lower credit risk exposure and, consequently, adopting lower spreads.

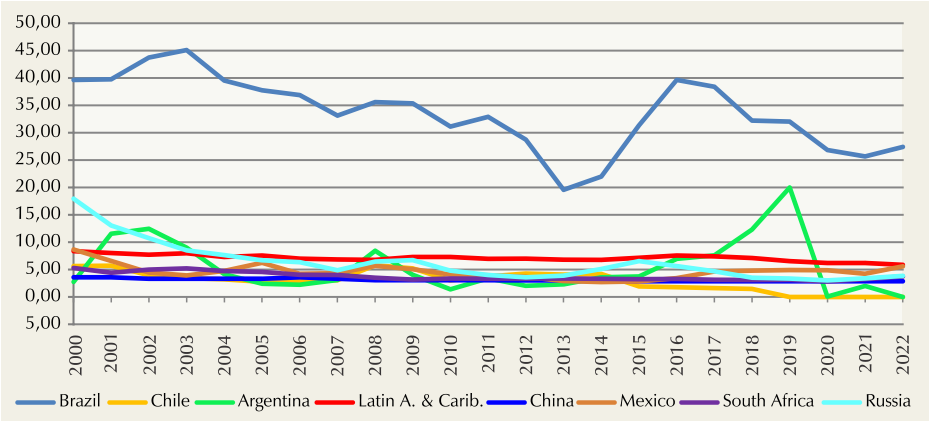
From 2016 to 2021, the banking spread rate shows a downward trend, reflecting Brazil's low performance and declining economic expectations. However, due to the Covid-19 pandemic's repercussions and the maintenance of a relatively high basic interest rate, spreads will rise again in 2022.

Based on the information presented, even though there was a reduction of more than twenty percentage points in the Brazilian banking spread during the analyzed period, it is necessary to highlight the decline in interest rates practiced by banks, especially in the private sector. The banking spread in operations with free resources decreased significantly, but less than in total operations between 2000 and 2013. From that year on, a sharp reversal occurred, with 2016 rates reaching the same level as in 2000. It can be inferred that the observed decrease in the banking spread in total credit operations in Brazil was partly due to the significant increase in directed credit operations' share, with an exception from 2012 to 2014, when Banco do Brasil and Caixa Econômica Federal imposed an unprecedented competitive pressure in the country's banking market.

Graph 3 presents a comparison of Brazil with the main economies of Latin America and the Caribbean. The Brazilian spread is significantly higher than the other countries, with an average of approximately five times higher than Argentina and other countries in Latin America and the Caribbean and over nine times higher than Chile.

As observed, until 2013, the Brazilian spread was on a convergent trend with other countries analyzed; however, the rates started to rise and distance themselves again after 2014. Another aspect to analyze is that the trajectory of spread rates in other countries is smoother than in Brazil, with only Argentina - due to the major economic problems it has been facing - experiencing an increase in this variable during the period, although it closed 2022 with a negative value.

GRAPH 3 - BANK SPREAD BRAZIL VS. SELECTED REGIONS - FREE OPERATIONS - 2000-2022



SOURCE: World Bank (2023)

Extending the analysis, graph 3 includes some BRICS countries - except India, for which data is unavailable- and Mexico, nations that share certain economic similarities with Brazil. Once again, the notable discrepancy of the Brazilian spread compared to other countries is evident. The difference would be even more pronounced if the data were extended to higher-income countries. In fact, from 2000 to 2022, on average, Brazil presented the highest bank spread in the world. However, since 2010, the highest spread rates recorded by the World Bank are from Madagascar, with Brazil in second place.

Considering the findings in this section, it becomes evident that the Brazilian credit market is indeed underdeveloped, and operations with directed credit are highly relevant to the Brazilian credit portfolio. This highlights the government's capacity to interfere in this market, as observed throughout the study period. However, even with a significant share of directed credit operations - which have lower interest rates - the Brazilian spread remains higher than the international average, even when compared to economies with similar characteristics in terms of credit market development. Thus, the significant difference in the Brazilian bank spread compared to other countries lies in the high value of the spread for free operations. As such, section 4 will address an empirical model for spread estimation and present the variables comprising the model, aiming to identify the determinants of the Brazilian bank spread.

4 METHODOLOGY AND DATA

Based on the review of theoretical and empirical works presented and examined previously, an empirical model is defined to estimate the determinants of banking spread in Brazil through econometric methods, along with their interrelations. To this purpose, a panel data estimation model is chosen to obtain consistent results. As previously discussed, the empirical model defined by Were and Wambua (2014), as presented in Equation 2, serves as the basis for this study.

$$\boldsymbol{r}_{it} = \alpha_i + \boldsymbol{X}_{it}\beta + \boldsymbol{Z}_t\gamma + \varepsilon_{it} \quad (2)$$

Where $\boldsymbol{r}_{it}$ represents the banking spread of bank i in period t; α_i captures the fixed effects of bank i; $\boldsymbol{X}_{it}$ is a vector of bank-specific variables in period t; Z_t represents a vector of time-specific variables in period t.

To estimate the values of the dependent variable, i.e., the banking spread (SPREAD), information from the balance sheets and financial statements of the National Financial System Accounting Plan (COSIF) of the Central Bank of Brazil is used for each of the banking institutions that make up the sample in this study. The SPREAD is calculated as the interest income from credit operations divided by the credit operations balance minus the funding expenses divided by the deposit balance as shown in Equation 3.

$$'PREAD = \frac{CREDIT\_OPERATIONS}{CREDIT\_OPERATIONS\_BALANCE} - \frac{FUNDING\_EXPENSES}{DEPOSIT\_BALANCE} \quad (3)$$

On the other hand, the independent variables were constructed as follows: The vector of bank-specific variables includes: a) bank size (ATIVO); b) credit risk (INAD) (the values for the quality of financial institutions' credit portfolios - in accordance with CMN Resolution 2.682/99 - are used as a proxy for default); c) operating costs (CUSTOP); d) liquidity risk (RLIQD); e) average return on assets (ROA); f) net interest income to total revenue ratio (RLJRT); g) market concentration (CR10). Meanwhile, the time-specific variables add in: h) real GDP growth (PIB); i) inflation (IPCA); j) basic interest rate of the economy (SELIC); k) compulsory reserves (DEPCOM) (a variable not present in Were and Wambua's original study).

Based on the empirical model presented by Were and Wambua (2014) and considering the dataset presented earlier, we arrived at the specification of the econometric model for this study, which is as follows:

$$SPREAD_{i,t} = \beta 0 + \beta 1\left[log\left(ATIVO_{i,t}\right)\right] + \beta 2\left(INAD_{i,t}\right) + \beta 3\left[log\left(CUSTOP_{i,t}\right)\right.$$

$$\beta 4\left(RLIQD_{i,t}\right) + \beta 5\left(ROA_{i,t}\right) + \beta 6\left(RLJRT_{i,t}\right) + \beta 7\left(CR10_{i,t}\right) + \beta 8\left(PIB_{i,t}\right) + \quad (4)$$

$$\beta 9\left(IPCA_{i,t}\right) + \beta 10\left(SELIC_{i,t}\right) + \beta 11\left(DEPCOM_{i,t}\right) + u_{i,t}$$

The use of the natural logarithm for the variables ATIVO and CUSTOP is related to the type of data that constitutes these variables. Both are constructed with level values that vary over time, unlike the other variables constructed based on index values.

The main database used in this study is IF. Data from the Central Bank of Brazil, which stores the financial statements of the institutions that make up the national financial system. With this database information, the ten largest credit-providing institutions in Brazil are selected for the study, considering the entire financial conglomerate to which these institutions belong, based on the size of their assets.

In this data selection processing, development banks, payment institutions, and non-banking institutions in the capital market that are part of the database are excluded from the sample. After these considerations, the following institutions are chosen to compose the sample for the empirical model: a) Itaú Unibanco S.A.; b) Banco do Brasil S.A.; c) Caixa Econômica Federal; d) Banco Bradesco S.A.; e) Banco Santander S.A.; f) Banco Safra S.A.; g) Grupo BTG Pactual; h) Banco Votorantim S.A.; i) Banco Citibank S.A.; j) Banco do Estado do Rio Grande do Sul S.A.

On average, the participation of the ten largest institutions in the Brazilian credit market – based on the criterion of asset size – between 2000 and 2020 was 75.58%. However, if the values of Unibanco and other institutions acquired by Itaú between 2000 and 2008 are considered, the percentage of participation increases

significantly. The same occurs when considering a single institution for Banco Banespa with Banco Santander, and Banco HSBC with Banco Bradesco. Considering the institutions that underwent mergers or were acquired by other financial conglomerates, the average percentage of participation, based on the asset size criterion, rises to 81.12% during the period. Therefore, it is plausible to affirm that the number of institutions chosen for the sample is sufficient to consistently explain the determinants of the Brazilian bank spread.

5 ESTIMATIONS AND ECONOMETRIC ANALYSIS

This section aims to specify a consistent econometric model for estimating the determinants of the Brazilian banking spread and introduce the results obtained from the conducted regressions. According to the model presented in equation 4, the determinants of the Brazilian banking spread are estimated for the study period. For this analysis, panel data estimation methods with annual information were utilized. The approach used includes the pooled data approach, fixed effects, and the random effects approach. According to Cameron and Trivedi (2005), the use of panel data is widely employed in studies with microeconomic data, and the main advantage of this method is that it allows for consistent results even in the presence of possible omitted variables that are not considered in the specified model.

TABLE 1 - ECONOMETRIC REGRESSIONS ACCORDING TO EQUATION 4

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ECONOMETRIC REGRESSIONS	DEPENDENT VARIABLE:SPREAD		
	Pooled	Fixed Effects	Random Effects
log(ATIVO)	[3]-0.073	0.008	[3]-0.073
	(0.015)	(0.019)	(0.015)
INAD	-0.117	[1]0.122	-0.117
	(0.079)	(0.067)	(0.079)
log(CUSTOP)	[3]0.065	0.009	[3]0.065
	(0.014)	(0.015)	(0.014)
RLIQD	0.082	0.070	0.082
	(0.057)	(0.053)	(0.057)
ROA	[3]0.815	[2]0.722	[3]0.815
	(0.286)	(0.291)	(0.286)
RLJRT	[3]0.159	0.051	[3]0.159
	(0.039)	(0.033)	(0.039)
CR10	[3]-0.202	-0.249	-0.202
	(0.092)	(0.136)	(0.092)
PIB	[3]0.256	[3]0.577	[3]0.256
	(0.091)	(0.116)	(0.091)

TABLE 1 - ECONOMETRIC REGRESSIONS ACCORDING TO EQUATION 4

conclusão

ECONOMETRIC REGRESSIONS	DEPENDENT VARIABLE:SPREAD		
	Pooled	Fixed Effects	Random Effects
IPCA	-0.041	-0.096	-0.041
	(0.110)	(0.117)	(0.110)
lag(SELIC)	0.071	(3)0.415	0.071
	(0.135)	(0.125)	(0.135)
DEPCOM	0.054	-0.019	0.054
	(0.048)	(0.053)	(0.048)
Constant	(3)0.527		(3)0.527
	(0.108)		(0.108)
Observations	189	189	189
R2	0.519	0.458	0.519
Adjusted R2	0.490	0.398	0.490
F Statistic	(3)17.392 (df = 11; 177)	(3)13.004 (df = 11; 169)	(3)191.317

SOURCE: Central Bank of Brazil (2021a, b, d)

NOTE: Elaboration of the authors.

(1) p<0.1.

(2) p<0.05.

(3) p<0.01

An important observation is that for the SELIC variable, a lag of one period is used since the transmission dynamics of this variable to the market do not occur immediately. For example, Koyama and Nakane (2001) use a lag of five periods for the SELIC rate, even though their study is based on monthly data.

The F-test indicates that the models are globally significant at the 1% level for the three approaches. The Lagrange Multiplier test, Chow's F-test, and Hausman's test showed the existence of significant individual and time effects, so the fixed effects model should be chosen over the pooled data and random effects models. Once the empirical model is selected, it is necessary to check if it meets some classical assumptions for a regression analysis and whether the results are consistent and efficient. First, Pesaran's cross-sectional dependence test determined that the data does not show cross-sectional dependence among the analyzed financial institutions. Thus, the Dickey-Fuller test - which is consistent under the assumption of no cross-sectional dependence - was used to check the stationarity of the series, as non-stationarity can lead to spurious regressions, and all series are stationary.

Considering the heterogeneity of the variables used in the study, it is necessary to verify the presence of heteroscedasticity in the model, which is quite common in panel data. Thus, the Breusch-Pagan test found that the estimated model was indeed heteroscedastic, requiring corrections. Therefore, robust heteroscedasticity estimators, as Long and Erwin (2000) discussed, were used. The estimator values do

not change, but the variables INAD and CR10, which were initially significant at the 5% level, become significant only at the 10% level, and the variable RLIQD becomes non-significant (significant at the 10% level without correction).

Due to the number of observations used in this study, it is necessary to check whether the regression residuals follow a normal distribution. According to Gujarati and Porter (2011, p.507), "the role of the normality assumption is fundamental, especially in small samples [... and] without it, we cannot embrace any hypothesis test relative to the true values of these estimators." Therefore, the Shapiro-Wilk, Jarque-Bera, and Anderson-Darling tests, respectively, were performed to test the null hypothesis that the residuals follow a normal distribution. All tests indicate that the residuals are not normally distributed.

To address this issue, bootstrapping with one hundred repetitions was used, and the same coefficient values were obtained as estimated by the fixed effects model. Thus, the values presented in Table 1 are the results of this work after all necessary tests and corrections.

Therefore, it is found that a one percentage point increase in the default rate level is associated with a 0.122 percentage point increase in the bank spread. On the other hand, an increase of 1 percentage point in the return on assets is correlated with a 0.722 percentage point increase in the bank spread, being the variable of greatest magnitude. An increase of 1 percentage point in the concentration level of the top ten banks is associated with a 0.249 percentage point reduction in the spread. An increase of one percentage point in the GDP growth rate is associated with a 0.577 percentage point increase in the spread, and na increase of one percentage point in the basic interest rate is associated with a 0.415 percentage point increase in the spread.

This section addressed the econometric arrangement used in constructing a robust model that produces consistent and unbiased results, approaching as closely as possible to reality. In the next section, the study's results are discussed more in-depth, and a comparison of these results with the previous empirical works is made, as raised in section 2.

6 DISCUSSIONS OF RESULTS

In this section, we delve deeper into the analysis of the results obtained from the econometric study, following the order of presentation of the variables in the model, and bring to light the discussion of the relationships between the variables. We aim to understand these results and highlight the relevant characteristics that explain them.

Regarding banks' credit risk, the positive relationship established between delinquency (INAD) and the bank spread aligns with all the empirical studies presented in section 2 that address this variable. However, the coefficient of the variable is only significant within the 90% confidence interval after correcting for heteroscedasticity.

It is expected that there would be a positive relationship between the bank spread and delinquency, as higher credit risk prompts banks to include a risk premium in their loan interest rates. As discussed earlier, delinquency is the primary factor contributing to the high spreads observed in Brazil's banking system.

Concerning the level of bank profitability measured by the variable ROA, there is evidence to suggest that it has the most substantial marginal effect on the bank spread, as the coefficient associated with this variable has the highest magnitude in the model and is significant within the 95% confidence interval after correcting for heteroscedasticity. Once again, the size of profits is linked to banks' pricing power. Thus, the considerably high value found for the ROA variable supports the idea that Brazilian banking institutions have considerable market power. This result is also in line with the study by Were and Wambua (2014).

Regarding the relationship between the level of market concentration and the bank spread being negative, it is contrary to what was initially expected. However, an explanation lies in the role of public banks in the Brazilian credit market. As previously shown, while increasing their share in the Brazilian credit portfolio, Caixa and Banco do Brasil exercised some competitive pressure on the market, leading to lower interest rates and, consequently, a reduction in the bank spread. Although this relationship goes against all the studies – which consider the market concentration variable – reviewed in this work, Nascimento (2023) and Azevedo and Gartner (2020) demonstrate that market concentration in the Brazilian credit market does not necessarily reduce competitiveness. After correcting for heteroscedasticity, the market concentration variable is only significant within the 90% confidence interval.

Moving on to the results of the time-specific variables, the strong positive relationship – and statistical significance at the 1% level – between Gross Domestic Product (PIB) and the spread can be easily understood by briefly highlighting the dynamics of income in an economy. Assuming that economic agents expect sustained growth in the product and, consequently, income in the coming years, they tend to increase their spending, particularly on investment. To finance this increase in spending, agents turn to the credit market, leading to higher demand for loans. Considering the limited capacity of credit supply outside the banking market, in a less developed capital market, the increase in demand is followed by higher prices, i.e., higher interest rates. Additionally, except for the study by Were and Wambua (2014), which analyzes the case of Kenya, all the empirical studies reviewed in this work, using GDP as an explanatory variable, also show a positive relationship between GDP and the bank spread.

Concerning the basic interest rate of the economy (SELIC), the sign found for the regression coefficient aligns with the initially expected relationship. As SELIC is the reference interest rate of an economy, it is expected that loan interest rates would

follow a similar behavior. Furthermore, since SELIC determines the remuneration for the vast majority of bank deposits, directly affecting banks' funding costs, an increase in funding costs would lead to higher interest rates charged to loan applicants. This increase in loan interest rates through the lending channel can lead to adverse selection and moral hazard problems, thus increasing the risk premium charged by banks, leading to higher spreads. The positive relationship between the spread and the SELIC rate is in line with Afanasieff *et al*. (2002) and all the empirical studies presented in this work, and it is highly significant within the 1% confidence interval.

Regarding the other variables in the study, it is noteworthy that the liquidity risk, which initially showed a positive correlation with the bank spread, lost significance after correcting for heteroscedasticity. Similarly, variables such as bank size and operational costs, which are usually considered important in determining the bank spread, were not relevant in this study, which also extends to variables such as net interest income as a share of total revenue, inflation, and compulsory deposits.

In this section, the results of the determinants of the Brazilian bank spread between 2000 and 2020 were presented, discussed, and compared with other similar works, focusing on the econometric examination. The findings demonstrate that specific factors of banking institutions are crucial in defining interest rate margins, and the external macroeconomic environment also plays a significant role.

The results related to delinquency, the return on assets, GDP, and the SELIC rate do not come as a surprise and are consistent with the preconceived expectations. Moreover, the concentration of the market results differs from the initially expected relationship, but these differences are explained by discussing the events that support them. Additionally, the variables size of institutions, operational costs, liquidity risk, net interest income, inflation, and compulsory deposits did not reach statistical significance, considering a 90% confidence interval.

CONCLUDING REMARKS

The studies on bank spread rates and, consequently, on the credit market of an economy are diverse, with their own characteristics that vary according to the regions studied, the period covered, and the methodology and data collection. Throughout this work, several theoretical and empirical studies on the composition of the spread were presented, which showed different results, taking into account the mentioned characteristics. In line with this, the findings obtained in our investigation also diverge from other studies in some factors and converge in others.

Regarding the Brazilian credit market, it was possible to verify that it is indeed far from full development, considering the criterion of the percentage of the credit portfolio in relation to GDP, especially when compared to developed economies,

but also in comparison to some emerging countries. Despite this, from 2000 to 2020, the Brazilian credit market grew, experiencing an increase of 26.59 percentage points of the credit portfolio in relation to GDP.

As shown, initially, such credit market growth was driven by the creation and development of new instruments – such as the emergence of payroll loans – which improved market regulation, providing greater legal security for institutions and directly contributing to the increase in credit operations, especially for private institutions. Between 2000 and 2008, credit operations of private institutions – with free resources – to GDP more than doubled, while operations of public banks – with directed resources – experienced a more modest growth of 1.23 percentage points.

The movements in the credit market also reflected on the bank spread, which showed a decrease of 11.55 percentage points until 2007, although it ended 2008 at a level almost equal to that of the beginning of the series. Undoubtedly, the Subprime financial crisis increased the risk premium charged by private institutions, leading to a significant increase in the spread observed from 2007 to 2008. In this regard, it is noted the ability of Brazilian financial institutions to increase interest rates charged for their credit operations quickly.

On the other hand, with the onset of the financial crisis, private institutions began to operate more cautiously, so their operations remained stable since then. However, the Brazilian banking credit market continued to expand due to the significant growth observed in credit concessions by public institutions, which acted counter-cyclically to the crisis. Such movements provided a change in the dynamics of the Brazilian credit market, which lasted between 2008 and 2015, in which public banks were responsible for the greatest growth in credit operations. After this period, principally due to political changes, directed resource operations decreased, and free resource operations started to grow again, reestablishing the previous credit dynamics.

Such changes were of utmost importance for the reduction of the bank spread. Naturally, credit operations with directed resources – operated mainly by public banks – have lower interest rates, which explains part of the observed decrease in the total spread. However, it was not only the operations with directed resources from public banks that grew after the crisis. A large part of the growth of the credit portfolio of these banks was driven by operations with free resources.

On the other hand, the main differential of these public institutions to compete with private banks was through lower prices, which meant smaller spreads. After 2015, however, the competitive pressure exerted by public banks weakened, and the spread started to grow again. Thus, despite a significant reduction in the Brazilian bank spread between 2000 and 2020, it remained – throughout the entire period – well above the international average, even when compared to similar economies to Brazil.

To identify the main determinants of the Brazilian bank spread and understand how they contributed to the changes in the credit market dynamics mentioned above, as well as to the maintenance of high interest rates, the present paper addressed the main variables identified in the economic literature on the subject, establishing an empirical model with the econometric exploration of the variables, and estimating the individual spread of each institution in the sample. The variables credit risk (INAD), the average return on assets (ROA), market concentration (CR10), the real variation of the gross domestic product (PIB), and the basic interest rate (SELIC) were identified as the main determinants of the Brazilian bank spread between 2000 and 2020.

It was found that credit risk, advocated by the banking industry as the main villain of high spreads, indeed has a positive and relevant impact on determining loan interest rates. On the other side of the discussion are those who argue that the main component of the bank spread is in the banks' profit, and in this study, this statement is also confirmed, as the variable average return on assets was statistically significant and showed the greatest magnitude among the regressors.

As verified, the real growth of Brazil's gross domestic product is linked to higher credit operation spreads, establishing a positive relationship between the variables. This variable had the second-highest value for the regression coefficient, which is a key component in determining the Brazilian bank spread from 2000 to 2020.

In this study, the option to use annual data was due to the search to analyze the bank spread's structural determinants, which are captured in the long term. It is possible that when using monthly or quarterly data, the variables that were not significant could have different results, especially in the case of the size of financial institutions and operating costs. Therefore, monthly or quarterly data is suggested for future studies aiming to capture the short-term effects of the spread's determinants.

Considering the above, this study hopes to contribute to the economic literature on the bank spread, as it uses an extended period, covering significant changes for the credit market and the Brazilian economy. Moreover, the study presents results that contradict the theory but are based on economic events throughout the study period and supported by econometric analysis of data. Furthermore, the study pointed out that the brief period in which competition intensified in the Brazilian credit market was sufficient to reduce the bank spread to historical lows, indicating the critical role that public banks can play in credit policy transmission.

Finally, it was observed that during the analyzed period, Brazilian banks could rapidly increase the bank spread in times of crisis and maintain interest rates at elevated levels, especially in periods of lower competitive pressure. So, could this be one of the reasons why the Brazilian spread is so much higher than the international average? In this regard, the challenge arises for future studies to construct a variable that measures competitive pressure in the Brazilian banking market and thus estimate

its explanatory role for the high spreads observed in the country with greater precision. Shedding light on the issue of competitive pressure, which is almost always absent in studies that estimate bank spreads in Brazil, this study hopes to have contributed to advancing the debate on the topic.

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