Journal of Finance & Economics Research

Journal of Finance & Economics Research

The Relationship of Government Effectiveness and Level of Economic Development with Bank Spread in Different Countries

Affiliation:
Douglas Jos´e Mendonca
Instituto Federal de Minas Gerais / Campus Formiga, Brazil.
E-mail: mendonca douglas@yahoo.com.br

Manuscript Information
Submission Date: September 09, 2023
Reviews Completed: December 13, 2023
Acceptance Date: January 01, 2024
Publication Date: January 09, 2024

Citation in APA Style:
Mendonca, D. J. (2024). The Relationship of Government Effectiveness and Level of Economic Development with Bank Spread in Different Countries, *Journal of Finance & Economics Research, 9*(1), 27-48.

DOI: https://doi.org/10.20547/jfer2409103

.

Journal of Finance & Economics Research
Vol. 9(1): 27-48, 2024
DOI: 10.20547/jfer2409103

The Relationship of Government Effectiveness and Level of Economic Development with Bank Spread in Different Countries

Douglas José Mendonça *

Abstract: *The aim of this study was to investigate the relationship between the level of economic development, government effectiveness, and variations in financial intermediation spreads in 157 countries during the period from 2015 to 2021. The sample comprised countries from six different regions: Africa (43 countries), Asia (43 countries), Europe (42 countries), North America (15 countries), Oceania (3 countries), and South America (11 countries). These countries were categorized based on their levels of economic development, as defined by the International Monetary Fund (IMF). Banking spreads were determined as the difference between lending rates and deposit rates. Government effectiveness was assessed using a World Bank index reflecting the population's perception of public service quality. We employed a hierarchical linear regression econometric modeling approach with three levels to analyze the proposed relationships. The results indicated that 46% of the variations in banking spreads can be accounted for by the economic development levels of the countries. Additionally, banking spreads exhibited significant annual variations, with an estimated annual decrease of -0.060 during the examined period. It is worth noting that the government effectiveness index (GEI) displayed a statistically significant relationship with banking spreads. Countries with higher GEI values tended to exhibit lower levels of banking spreads. These findings underscore the concurrent influence of both economic development and government effectiveness on the banking intermediation process within the analyzed countries. This study contributes to an enhanced understanding of the determinants of banking spreads, highlighting the significance of economic development and government effectiveness as key influencers in this process.*

Keywords: Spread; government effectiveness; financial intermediation.

Introduction

The financial intermediation activity carried out by banks is essential for the functioning of economies as it enables the movement of resources between economic agents (Tarus & Manyala, 2018). In this process, banks receive funds from the public and utilize them to grant loans, charging a higher interest rate to the borrower than the rate paid to the depositor, resulting in what is known as the spread (Diamond, 1984).

Banking spread is a widely accepted measure to gauge the costs of financial intermediation services provided by banks Variations in the spread have the potential to impact

*Instituto Federal de Minas Gerais / Campus Formiga, Brazil. E-mail: mendonca_douglas@yahoo.com.br

Received September 09, 2023; Received in revised form December 13, 2023; Accepted January 01, 2024; Available online January 09, 2024

the cost of money, influencing employment levels, price stability, and economic growth (Obeng & Sakyi, 2017).

Countries with lower economic development tend to be more affected by spread variations, as capital markets in these countries are underdeveloped, and companies and individuals primarily rely on bank loans for external financing (Birchwood, Brei, & Noel, 2017). To classify the level of economic development of countries, the International Monetary Fund (IMF) uses economic, social, civil liberties, political rights, and financial system maturity indicators. Based on these criteria, countries are classified into three levels: advanced, emerging, and developing (Agapova & McNulty, 2016).

An important aspect that may be related to the spreads practiced by banks is the maturity of the financial system, which encompasses the solidity of the institutional environment, financial stability, the quality of banking services, and the ease of access for the population and businesses to the financial system (Dwumfour, 2019). Despite the apparent influence of the level of economic development on the spread, there is a lack of studies that investigate this relationship as a determinant explaining variations in banking spreads.

Previous studies on the determinants of banking spreads categorized the factors into three categories: bank-related variables, macroeconomic variables, and government variables (Poghosyan, 2013; Tarus & Manyala, 2018). Among these categories, Tarus and Manyala (2018) were the only ones to investigate government effectiveness as a government variable but limited their analysis to developing countries. However, Dwumfour (2019) argues that governmental ineffectiveness is not restricted to developing countries and is directly related to the stability and confidence in proposed public policies.

The existing literature on the determinants of banking spread covers a variety of factors, such as credit risk, banking sector structure, operational costs, inflation, and government effectiveness (Ho & Saunders, 1981; McShane & Sharpe, 1985; Demirgüç-Kunt & Huizinga, 1999). However, there is a noticeable research gap in the use of the hierarchical linear regression model to investigate the impact of economic development level as a determinant of banking spread. This gap hinders the understanding of the underlying mechanisms of banking spread in different economic contexts.

Given this context, this research aims to investigate the relationship between the level of economic development, government effectiveness, and variations in financial intermediation spreads. This study aims to fill the existing gap in the literature by considering these factors as determinants of banking spreads, exploring samples of countries at different levels of economic development using a hierarchical linear regression model.

In this sense, this study intends to contribute to the literature by providing insights into the relationship between the level of economic development, government effectiveness, and variations in banking spreads. Additionally, the use of hierarchical linear regression models allows for the analysis of heterogeneities among country groups and identifies the proportion of spread variation correlated with the level of economic development. The results obtained can provide valuable guidance for monetary policy makers and contribute to the development of strategies aimed at reducing the social costs imposed by banks in the form of spreads, promoting efficient financial intermediation, and contributing to economic development.

Theoretical Framework

Financial Intermediation Spread

The theory of financial intermediation, stemming from the pioneering studies of Gurley and Shaw (1955), emphasizes the fundamental role of financial intermediaries in the economy. These studies highlight that intermediaries perform the function of withdrawing primary securities from the market and replacing them with secondary securities of their own issuance, thereby promoting the efficient circulation of resources.

Financial intermediation is based on the existence of market failures resulting from asymmetric and imperfect information. Financial institutions, by addressing these failures, play a crucial role in reducing transaction costs and the allocative efficiency of resources in an economy. They have privileged information, allowing them to efficiently monitor borrowers and minimize agency costs between savers and investors (Shayanewako & Tsegaye, 2018). In a perfect financial market, however, intermediation would not be necessary, as economic agents could directly engage in financial transactions (Allen & Santomero, 2001).

Financial intermediaries play a crucial role in the movement of resources between surplus and deficit agents, contributing to the natural cycle of the economy. By mobilizing resources and providing financing, they stimulate the flow of capital, promoting economic growth and financial stability (Philippon, 2015). Through public fund collection and lending, financial intermediaries, mainly banks, play a fundamental role in mobilizing savings and efficiently allocating resources in the economy.

However, financial intermediation activities do not occur without costs and risks. Financial intermediaries face various challenges, such as credit risk management, operational costs of financial institutions, and the need to achieve an adequate profit margin. The spread, representing the difference between funding and lending rates, reflects the costs and risks associated with financial intermediation (Diamond, 1984). A high spread can signal inefficiency in the banking sector, negatively affecting savings, investment, and credit availability in the economy (Poghosyan, 2013; Shayanewako & Tsegaye, 2018).

The banking spread consists of various elements, such as reserve requirements and taxes, which are legal determinations affecting banking activity. Additionally, the costs of risks related to the uncertainty of intermediation activity and the risk of default contribute to the composition of the spread (Thierie & De Moor, 2019). Operational costs of financial institutions, including personnel, technology, and infrastructure expenses, are also relevant to the formation of the spread.

The theory of financial intermediation highlights the primary importance of financial intermediaries in the efficient allocation of resources, overcoming market deficiencies caused by information asymmetry and imperfection. These intermediaries mobilize savings, grant credit, and drive economic growth. However, the formation of the banking spread requires a careful analysis of its elements to ensure the efficiency and stability of the financial system. As noted by Shayanewako and Tsegaye (2018), high spreads can improve bank profitability, strengthen their capitalization, and solidify their financial position; however, they can also pose a series of challenges for the financial sector, such as

lack of competition, credit risk, banking instability, and high operational costs.

Given this complexity, it is essential to understand the determinants of banking spreads, considering that risks vary among countries. Banking markets are heavily influenced by the economies in which they operate, as well as by spread levels that differ among various economies (Dwumfour, 2019). Therefore, studies that investigate the determinants of the spread play a crucial role in providing an understanding of resource allocation and contributing to the development of appropriate financial policies, fostering economic stability and sustainable growth.

Previous Studies

Previous studies have revealed that the banking spread varies due to transaction risks, transaction size/volume, banking sector structure, and changes in interest rates (Ho & Saunders, 1981). McShane and Sharpe (1985) found similar results for Australian commercial banks, identifying the relationship between the banking spread and banking sector structure, credit risk, and interest rate fluctuations.

Studies covering different countries have found that spreads are related to operational costs, the country's inflation, sector competitiveness, and the concentration index of the banking sector. In a study with Colombian banks, Barajas, Steiner, and Salazar (1999) also identified that banking sector structure, credit risk, and operational costs caused variations in the spread.

Other research has shown that the spread is influenced by inflation, concentration, banking sector size, and sector regulation of the country. Specific studies in countries such as Venezuela (Vera, Zambrano-sequín, & Faust, 2007), Uganda (Beck & Hesse, 2009), Pakistan (Afzal & Mirza, 2012), Estonia (Männasoo, 2013), and Kenya (Were & Wambua, 2014) found other determinants of the spread, such as credit risk, bank efficiency, monetary policy, and administrative expenses. Additionally, factors such as banking integration and banking sector concentration influencing spreads were identified.

Studies in different regions, such as South Asia, the Persian Gulf, and Central America and the Caribbean, have also found determinants of the spread, including revenue diversification, economic growth, and exchange rate volatility. Obeng and Sakyi (2017) found that exchange rate volatility, fiscal deficit, economic growth, and public sector loans from commercial banks affect spreads in the short term, while inflation, interest rate volatility, and monetary policy influence the spread in the long term. Al Shubiri and Jamil (2017) demonstrated that the spread in Omani banks is influenced by the return on assets index, liquidity risk, credit risk, concentration, and the country's unemployment rate. Tarus and Manyala (2018) identified that inflation, operational costs, concentration, and government effectiveness are determinant factors of the spread in sub-Saharan African countries. Dwumfour (2019) found that bank size, concentration, operational efficiency, economic growth, and inflation are factors that influence the banking spread in a worldwide sample of countries. Azumah, Owusu-Ansah, Amewu, and Ohemeng (2023) demonstrated that bank size, profitability, gross domestic product, and inflation rate significantly influence the banking spread in Ghana.

Despite the contributions of previous studies, it is pertinent to highlight the gap in

the literature regarding the absence of research that has adopted the hierarchical linear regression model and investigated the impact of the level of economic development as a determinant of the banking spread. This gap compromises the understanding of the mechanisms underlying the banking spread and the nuances associated with different economic contexts. Therefore, it is crucial for research to incorporate the use of hierarchical linear regression models and examine the role of economic development level as a determinant of the banking spread. These approaches have the potential to enhance the understanding of the relationships between a country's economic characteristics and banking spreads, providing a more comprehensive and accurate perspective on this phenomenon.

Development of Hypotheses

When analyzing previous studies, it is observed that countries can be grouped into different levels of economic development, and this factor can influence banking spreads. Studies such as those by Demirgüç-Kunt and Huizinga (1999); Poghosyan (2013); Birchwood et al. (2017) have shown that average spreads are higher in developing countries compared to advanced countries. This can be attributed to characteristics such as less developed financial systems, regulatory issues, and a higher volume of problematic loans in less advanced economies. The classification of countries into levels of economic development is carried out by the IMF based on economic, social, political, and financial system maturity indicators. An important aspect is the maturity of the financial system, which varies among different levels of development. This maturity of the financial system varies among different levels of economic development, and for this reason, the following hypothesis is proposed:

H1: The level of economic development of countries explains variations in banking spreads.

The level of economic development affects banking spread levels due to a series of interconnected factors. In less advanced economies, the financial system tends to be less mature, with lower levels of capitalization, regulatory problems, and a higher volume of problematic loans. This creates a riskier environment for financial intermediation, leading banks to require higher spreads as compensation (Agapova & McNulty, 2016). Additionally, financial instability is more common in developing economies, which also contributes to higher spreads. In contrast, in advanced economies, financial systems are more advanced, well-structured, and present lower risk, allowing for lower spreads (Tarus & Manyala, 2018; Dwumfour, 2019; Azumah et al., 2023). Thus, the level of economic development plays a crucial role in determining banking spread levels, reflecting the characteristics and stability of each country's financial systems. While advanced countries have mature and well-structured financial systems, emerging and developing countries face structural and institutional inefficiencies, resulting in higher spreads.

This hypothesis will be tested using a dataset grouped according to the development levels proposed by the IMF. Furthermore, it is essential to consider the different determinants of the spread in each level of economic development, encompassing banking,

macroeconomic, and governmental variables, as indicated in previous studies.

The analysis of previous studies also reveals the importance of understanding the determinants of the banking spread at different levels of economic development. These studies categorized the determinants of the spread into three groups: banking variables, macroeconomic variables, and governmental variables (Poghosyan, 2013; Tarus & Manyala, 2018). The determinant factors identified by previous studies for each level of economic development, with common variables such as credit risk, operational cost, and inflation noted across all levels. However, the governmental variable "government effectiveness index" was only tested in studies that investigated developing economies. Therefore, considering that this variable has not been tested in a sample composed of countries with different levels of economic development, the following hypothesis is proposed:

H2: The government effectiveness index is negatively related to the spread, even when the sample is composed of countries with different levels of economic development.

The relationship between the government effectiveness index and the banking spread is expected to be negative because of economic stability. An effective government tends to promote sound policies, adequate regulations, and financial stability measures, creating a conducive environment for the banking sector. This stability reduces the risks associated with the financial intermediation process, resulting in lower costs for banks and, consequently, lower spreads. On the other hand, an ineffective government or one lacking credibility in its public policies can deter investors and generate economic instability, increasing risks in the banking sector and contributing to higher spreads. Thus, government effectiveness plays a crucial role in financial stability and in determining banking spread levels, regardless of the level of economic development (Birchwood et al., 2017; Azumah et al., 2023).

Economic stability is directly related to risk in the financial intermediation process, and the greater the stability, the lower the spreads are expected to be (Afzal & Mirza, 2012). This means that government effectiveness can play a crucial role in financial stability and, consequently, in spread levels. Given the gaps and proposed hypotheses, it is essential to conduct new research that expands the understanding of the determinants of the banking spread and identifies other relevant variables.

Research Methodology

Study Type and Sample

This study is configured as quantitative research, grounded in a positivist approach, which employs statistical and mathematical analysis to give numerical character to the information obtained. The use of a quantitative approach in this research is justified by the adopted positivist perspective, which seeks objectivity and the measurement of phenomena through statistical and mathematical analyses. Such methodological choice aims to provide a solid numerical basis, allowing the translation of information into quantitative

data, contributing to a more precise understanding of the results obtained. In addition, the research adopts a descriptive nature, whose objective is to describe the characteristics of a population or specific phenomenon, establishing relationships between variables and facts.

Regarding the sample selection process, the importance of data availability throughout the entire analyzed period is highlighted since the sampling adopted in this study is non-probabilistic by accessibility, considering the availability and accessibility of data for the selection of countries included in the sample. In this sense, through The Global Economy database, information concerning the banking sector of various countries with data available between 2015 and 2021 was identified. Thus, countries that did not have data available for any of the examined years were excluded from the sample to ensure temporal consistency and ensure comprehensive analysis of the collected data. Therefore, the selection of countries was conducted considering data availability over the period. The data was grouped based on the level of economic development, as shown in Table 01.

Table 1
Study sample grouped by economic development level

Economy	Total Observations per Year	Total Study Observations
Advanced	38	266
Emerging	69	483
Developing	50	350
Total	157	1,099

As shown in Table 01, the sample comprises a total of 157 countries, distributed as follows: 38 countries with Advanced economies, 69 emerging countries, and 50 developing countries for each year analyzed. This approach allows for a comprehensive and representative analysis of different economic realities.

Furthermore, the sample includes countries from almost all continents, providing greater geographic diversity to the results. Among the continents represented are Africa, with 43 countries; Asia, with 43 countries; Europe, with 42 countries; North America, with 15 countries; Oceania, represented by 3 countries; and South America, with 11 countries. This continental coverage enhances the representativeness of the research, enabling a more comprehensive and contextualized view of how economic development level and government effectiveness are related to the spread of financial intermediation on a global scale. The sample, composed of 1,099 observations, provides a robust basis for analysis and conclusions based on a broad geographical and economic spectrum.

Research Variables

The dependent variable in this study is the financial intermediation spread, hereafter referred to simply as the spread. This variable is calculated as the difference between the lending rate and the deposit rate. The lending rate is the rate charged by banks for the credits granted in lending and financing operations, while the deposit rate is the rate offered by banks for deposits received from their clients (Agapova & McNulty, 2016).

On the other hand, the independent variables adopted in the research were selected considering the three categories of factors that can cause variations in spread levels. According to Poghosyan (2013); Tarus and Manyala (2018), the three categories of variables that can cause variations in the spread level are banking variables, macroeconomic variables, and government variables. Considering these three categories, the research variable representing the government variables category was selected, which is the government effectiveness index. This variable is used to test the second research hypothesis.

As for the control variables adopted, these are the ones that have been identified as determinants of the spread at all levels of economic development, according to the previous studies analyzed. These control variables aim to represent the other two categories of factors that can cause variation in the spread (macroeconomic variables and banking variables). For the group of macroeconomic factors, the inflation variable was selected, while for the group of factors representing the characteristics of the banking sector, the variables concentration, credit risk, and operational cost were chosen. Table 02 presents the variables used in this study, as well as the expected relationships of these variables with the spread.

Table 2
Expected relationship between independent variables and the spread

Name	Abbreviation	Relationship	Supporting Studies
Government Effectiveness Index	GEI	-	Afzal and Mirza (2012); Poghosyan (2013); Tarus and Manyala (2018)
Inflation	INF	+	Demirgüç-Kunt and Huizinga (1999); Demirgüç-Kunt, Laeven and Levine (2003); Beck and Hesse (2009); Obeng e Sakyi (2015); Dwumfour (2019)
Concentration	CON	+	Perera, Skully and Wickramanayake (2010); Hao, Nandy and Roberts (2012); Poghosyan (2013); Almeida and Divino (2015)
Credit Risk	CR	+	Ho and Saunders (1981); Barajas, Steiner and Salazar (1999); Vera, Zambrano-Sequín and Faust (2007); Were and Wambua (2014); Birchwood, Brei and Noel (2017)
Operational Cost	OC	+	Afzal and Mirza (2012); Männasoo (2013); Poghosyan (2013); Al Shubiri and Jamil (2017)

The Government Effectiveness Index (GEI) is measured by the World Bank and seeks to identify the population's perceptions of a country's public service quality. This index ranges from -2.5 to 2.5, with negative values indicating less effective government and positive values indicating more effective government.

The Inflation variable (INF) represents each economy's Consumer Price Index, calculated by the World Bank. It reflects the annual percentage change in the cost for the average consumer to purchase a basket of goods and services.

The Concentration variable (CON) is calculated using the Bankscope database. It is determined by the ratio of the total assets of the three largest banks in the dataset to the total assets of all banks in the dataset. This variable reflects the level of competition in the banking sector across the various countries in the sample.

Credit Risk (CR) measures the probability of default within a country's banking sys-

tem. This variable is computed by Bankscope using non-consolidated banking data aggregated at the country level.

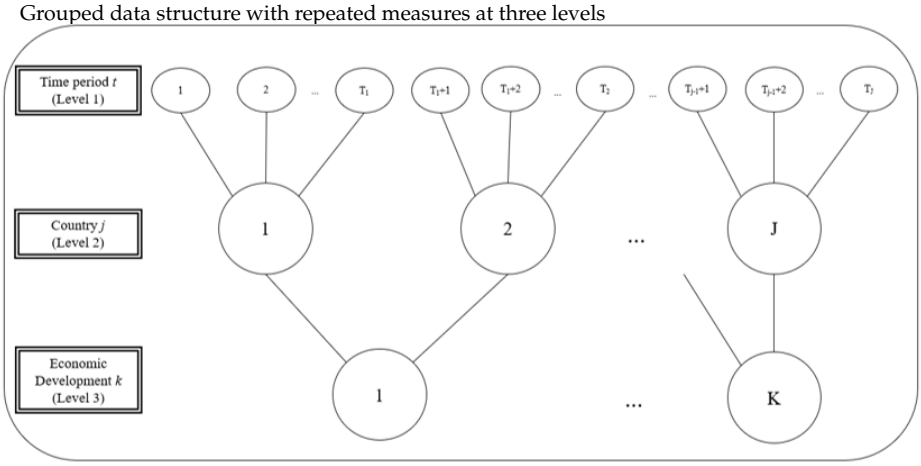
The Operational Cost variable (OC) is calculated from non-consolidated banking data in Bankscope. It is measured as the ratio of operational costs to the total value of assets held by the bank. This variable reflects the level of operational expenses incurred by the bank to conduct its financial intermediation activities.

Grouped Data Structure

Hierarchical Linear Models (HLM), also known as multilevel models, represent a progression from classical linear regression methods, offering advancements in statistical analysis. These models provide the capability to analyze data with a hierarchical structure, enabling the identification of models at each level and their respective contributions to explaining the dependent variable. This allows for the formulation and testing of more intricate hypotheses (Fávero & Belfiore, 2017). The distinctive feature of multilevel models compared to classical regression models is their ability to estimate variation between groups.

According to Raudenbush and Bryk (2002), hierarchical models acknowledge the existence of a multilevel structure, which means they consider the presence of groupings in the data. This grouping implies variation between distinct units that represent these groups but not among observations within the same group. Fávero and Belfiore (2017) explain that hierarchical regression models enable the analysis of dependent variables based on explanatory variables, considering variations among observations and among the groups to which these observations belong. This is applicable even to data with repeated measures over time.

Figure 1
Grouped data structure with repeated measures at three levels



In this study, Figure 1 illustrates the adopted data grouping structure. This structure encompasses repeated measures distributed across three distinct levels: the first level is

time, the second is represented by the country (equivalent to the individual level), and finally, the third level indicates the stage of economic development (reflecting the grouping level).

Based on the visual representation provided in Figure 1, it becomes evident that there are groupings among the units at the first level, corresponding to temporal variation, the units at the second level representing countries, and the units at the third level reflecting different levels of economic development. This configuration characterizes a data structure that incorporates repeated measurements. A closer analysis of Figure 1 reveals that the data structures demonstrate an absolute grouping, meaning that each individual is exclusively associated with one group, this group, in turn, connects to another group, and this pattern continues sequentially. With this visualization in mind, the algebraic formulations of the three-level hierarchical linear model are presented and analyzed below.

Three-Level Hierarchical Linear Model

Hierarchical linear models represent an advancement from classical regression methods, offering the advantage of considering the analysis of hierarchically structured data. These models recognize the existence of a multilevel structure, allowing for estimation of variation between groups. Therefore, they enable the analysis of more complex hypotheses and investigation of the behavior of explanatory variables at different levels, including data with repeated measurements over time (Fávero & Belfiore, 2017). These models provide a solid foundation for analyzing data with a grouped structure and repeated measures, contributing to a deeper understanding of studied phenomena (Raudenbush & Bryk, 2002).

To test the hypotheses of this study, a three-level hierarchical linear model was employed, based on the grouping that considered a data structure with repeated measurements. The grouped data structure is one in which certain variables exhibit variation between distinct units representing groups but not among observations within the same group (Gelman & Hill, 2006). In this study, the level 1 units represent temporal variation, level 2 units are countries, and level 3 units are levels of economic development.

Raudenbush and Bryk (2002) explain that a three-level hierarchical model consists of three sub-models, each representing an analytical level within the grouped data structure. The first step in multilevel analysis is to fit the unconditional model, which is a simplified model assuming the absence of explanatory variables at any level and including only the random intercept. This model, known as the random intercept model, allows for the decomposition of variability in the dependent variable into components at each level of hierarchy (Fávero & Belfiore, 2017).

In the context of this study, with the temporal grouping of countries at different levels of economic development and repeated measures, estimating the unconditional model enables the verification of whether there is variability in the spread level between countries within the same level of economic development and between countries at different levels of economic development. As explained by Raudenbush and Bryk (2002), since no explanatory variables are included in the model, the unconditional model considers only the existence of an intercept and error terms $u00k, r0jk, andetjk$, with $\tau_{u00}, \tau_{r00}, \sigma_2$ respectively. The model used is presented in equations 01.

Unconditional Model

$$Spread_{tjk} = \gamma_{000} + \mu_{00k} + r_{0jk} + e_{tjk} \quad (1)$$

In the unconditional model presented in Equation 01, there is only one intercept ($\gamma 000$), representing the overall mean of the dependent variable, spread. The model includes three terms, $u00k, r0jk$, and $etjk$, indicating the presence of randomness in the intercepts.

According to West, Welch, and Galecki (2022), the unconditional model is estimated to assess whether the hierarchical linear model is preferable to the traditional linear regression model estimated using Ordinary Least Squares (OLS) method. To do this, it is necessary to examine the result of the Likelihood Ratio (LR) test.

Using the unconditional model, it was possible to test the first research hypothesis and investigate whether there is variation in the spread between countries with the same level of economic development and between countries with different levels of economic development, using the intraclass correlation. As explained by Fávero and Belfiore (2017), the intraclass correlation or intraclass correlation coefficient is a descriptive statistic used when quantitative measurements are made on units organized into groups.

After estimating the unconditional model and confirming that the hierarchical model approach is preferable to the traditional regression model, the linear trend model with random intercepts was estimated. In this model, the level 1 variable is included in the analysis to investigate the relationship between the temporal variable and the behavior of the countries' spread. The model used is presented in Equation 02.

Linear Trend Model with Random Intercepts

$$Spread_{tjk} = \gamma_{000} + \gamma_{100}.ano_{jk} + \mu_{00k} + r_{0jk} + e_{tjk} \quad (2)$$

In this context: $Spread_{tjk}$ represents the dependent variable spread at time t for country j at economic development level k; etjk is the random effect associated with the time period, signifying the deviation in $Spread_{tjk}$ from the period's average spread; r0jk is the random effect linked to the country, illustrating the divergence of spread for country jk compared to the average spread across countries; γ_{000} is the overall mean of annual spreads for countries; $\gamma_{100}.ano_{jk}$ signifies the estimated parameter for the annual variation in spread for country j at economic development level k; and μ_{00k} is the random effect related to the economic development level, signifying the deviation of spread for economic development level k from the overall spread mean.

Lastly, following the estimation of the linear trend model with random intercepts and the confirmation of the temporal variable's correlation with spread, the full linear trend model with random intercepts was estimated. As explained by Fávero and Belfiore (2017), this model incorporates additional explanatory variables into the analysis, along with the temporal variable. Through this model, presented in Equation 03, it was feasible to test the second research hypothesis.

Complete Linear Trend Model with Random Intercepts

$$Spread_{tjk} = \gamma_{000} + \gamma_{100}.^{ano}_{jk} + \gamma_{010}.GEI_{jk} + \gamma_{020}.INF_{jk} + \gamma_{030}.CON_{jk} + \gamma_{040}.CR_{jk} + \gamma_{050}.OC_{jk} + \mu_{00k} + r_{0jk} + e_{tjk} \quad (3)$$

In this context: $Spread_{tjk}$ represents the dependent variable spread at time t for country j at economic development level k; etjk is the random effect associated with the time period, signifying the deviation in $Spread_{tjk}$ from the period's average spread; r0jk illustrates the random effect linked to the country, depicting the divergence of spread for country jk compared to the average spread across countries; γ_{100} denotes the overall mean of annual spreads for countries; $\gamma_{100}.^{ano}_{jk}$ signifies the estimated parameter for the annual variation in spread for country j at economic development level k; γ_{100} to γ_{100} represent the slope coefficients; GEIjk, INFjk, CONjk, CRjk, and OCjk are the investigative and control variables for country j at economic development level k; and μ_{00k} is the random effect associated with the economic development level, signifying the deviation of spread for economic development level k from the overall spread mean.

Results and Discussion

Descriptive Statistics of the Dependent Variable

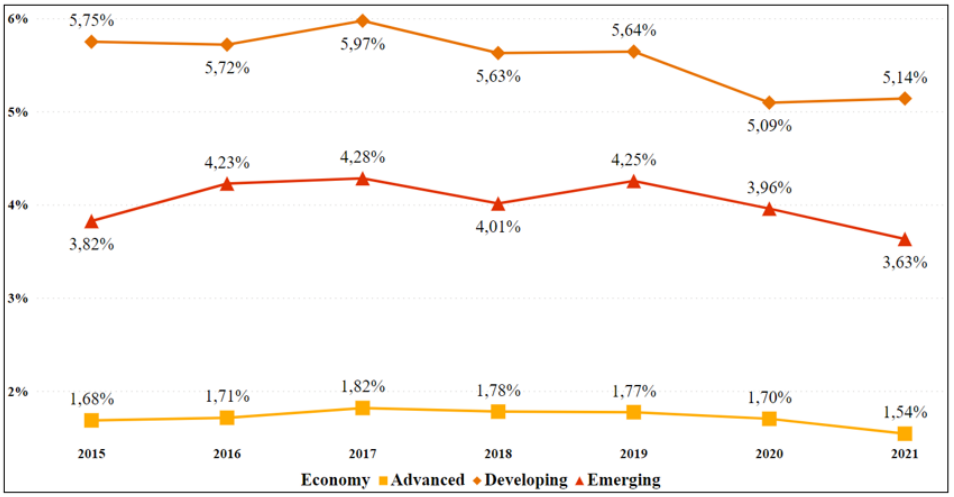
To gain a better understanding of the spread's behavior, a descriptive analysis was conducted over the analyzed period. The results of this analysis are presented in Table 03.

Table 3
Descriptive statistics of spread over the years

Year	Minimum	Mean	S.D	Maximum
2015	0.42%	4.14%	2.58%	15.44%
2016	0.37%	4.26%	2.61%	13.26%
2017	0.23%	4.42%	2.75%	14.31%
2018	0.26%	4.17%	2.45%	12.82%
2019	0.39%	4.25%	2.57%	13.55%
2020	0.49%	3.90%	2.27%	11.49%
2021	0.17%	3.78%	2.53%	12.83%

The descriptive statistics presented in Table 02 provide a comprehensive view of the spread's behavior over the analysis period. There is noticeable variation in the minimum and maximum values, highlighting the diversity of observed scenarios. The mean remains relatively stable, hovering around 4%, although there is some variability around this value. Additionally, the standard deviation, which indicates data dispersion around the mean, reveals that the spread exhibited notable volatility over the period, with an average standard deviation of approximately 2.5%. This volatility can be explained by considering the spread's distribution across various levels of economic development, as illustrated in Figure 02.

Figure 2
Average spread by economic development level over time



Based on Figure 02, notable variations in the spread over the analyzed period are observed, with distinct patterns among economies at different stages of development. In developing economies, the average spread fluctuated considerably, ranging from 5.09% to 5.97%, marking the highest range of average spreads. On the other hand, in emerging economies with an intermediate level of spread, fluctuations were less intense, ranging from 3.63% to 4.28%. Meanwhile, advanced economies stood out for having the lowest levels of spread, along with the least observed variation, with average spreads ranging from 1.54% to 1.82%.

To further analyze the spread's behavior in different economic contexts, calculations of descriptive statistics for the spread were conducted, with data grouped according to levels of economic development, as presented in Table 04. This approach allows for a more precise and detailed comparison of spread behavior among different types of economies.

Table 4
Descriptive statistics of spread by economic development level

Level of Economic Development	Minimum	Mean	S.D	Maximum
Advanced	0.37%	1.72%	0.84%	5.07%
Emerging	0.23%	4.03%	1.87%	11.49%
Developing	0.17%	5.56%	2.58%	15.44%

The analysis of descriptive statistics for spread segregated by economic development level, as presented in Table 04, reveals significant differences in the mean values and data dispersion among the different groups. For advanced countries, an average spread of 1.72% is observed, with a standard deviation of 0.84%. This indicates that these economies have relatively low spreads and less variation around the mean. In contrast, emerging countries exhibit an average spread of 4.03% with a standard deviation of 1.87%, indicat-

ing slightly higher spreads and greater data dispersion around the mean. Finally, developing countries display an average spread of 5.56% with a standard deviation of 2.58%, signifying even higher spreads and greater data variability.

These results align with the findings of Afzal and Mirza (2012); Tarus and Manyala (2018); Dwumfour (2019), which suggested that financial intermediation spreads tend to be lower in advanced economies and higher in countries with lower levels of economic development.

Results of Applying the Hierarchical Models

Results for the Unconditional Model

The fitting of the unconditional model is the initial step in applying the hierarchical linear regression model. In this model, only an intercept and error terms are considered, without the inclusion of explanatory variables at different levels. This stage aims to assess the suitability of hierarchical modeling compared to traditional regression estimated through Ordinary Least Squares (OLS) method. The results of the unconditional model estimated for the data in this study are presented in Table 05.

Table 5
Results of the unconditional model

Spread	**Coef.**	**Standard-error**	**z**	**P>z**	**[Confidence Interval / 95%]**	
_cons	3.802578	1.138759	3.34	0.001	1.570652	6.034505
Random effects parameters			**Estimation**	**Standard-error**	**[Confidence Interval / 95%]**	
Levels of economic: Identity						
var (cons)			3.812788	3.893481	0.51526	28.21362
Country: Identity						
var (cons)			3.721506	0.4364041	2.957346	4.683119
var (Residual)			0.7534528	0.0347173	0.6883903	0.8246646
LR test (vs linear regression):	(2) = 1854.80				Prob >Sig.	= 0.0000

According to the results presented in Table 05, the Likelihood Ratio (LR) test for the unconditional model showed statistical significance at a 1% level. This indicates that the random intercepts are not equal to zero, leading to the rejection of the null hypothesis. Therefore, the application of the hierarchical model is considered the most suitable for the analyzed data.

With the use of the unconditional model, it is possible to test the first research hypothesis, which aims to determine whether the different levels of economic development among countries explain variations in spreads. This approach allows for the examination of significant spread variations related to different levels of economic development. For this analysis, the intraclass correlation is employed. The results of the intraclass correlation for the estimated unconditional model are presented in Table 06.

Table 6
Intraclass correlation in the unconditional model

Level	**ICC**	**Standard-error**	**[95% Confidence Interval]**	
Levels of economic development	0.4600512	0.2548797	0.1023672	0.8642353
Country / Levels of economic development	0.9090883	0.0431382	0.7823703	0.9652958

The results of the analysis presented in Table 06 indicate that approximately 46% of the variations in bank spreads can be explained by the different levels of economic development among countries. This suggests that the level of economic development is a determining factor for differences in spreads. Less developed economies face higher risks in the financial intermediation process, leading banks to operate with higher spreads as a form of protection against these risks. These findings are consistent with the idea that the maturity of the financial system varies among countries, influencing spread levels. Therefore, the level of economic development plays a crucial role in explaining variations in bank spreads.

The findings of this study confirm the theory proposed by Agapova and McNulty (2016) that the relationship between the level of economic development and bank spreads can be explained by the characteristics of financial systems, such as the level of circulating capital and the volume of problematic loans. In emerging and developing economies, financial systems have low levels of capital and high volumes of problematic loans, which increase risks and costs for banks. This results in higher spreads as banks adopt higher interest rates to compensate for these risks. Differences in spreads are influenced by the different characteristics of financial systems and the risks associated with them. Advanced countries tend to have more stable financial systems with higher capitalization and lower volumes of problematic loans, resulting in lower spreads. On the other hand, emerging and developing economies face higher risks, leading to higher spreads. These differences affect financial intermediation activity and the flow of funds in the economy.

Furthermore, several theories provide additional explanations for this relationship between the level of economic development and bank spreads. Capital decision models, reserve management, and financial regulation address capital management and bank solvency, while credit rationing, information asymmetry, lending commitment, and gap management theories deal with challenges related to problematic loans. These theories emphasize that spreads tend to be higher in economies with low capital levels and high volumes of problematic loans due to default risks and the need for protection against market fluctuations.

Results for the Linear Trend Model with Random Intercepts

After estimating the unconditional model, the estimation of the linear trend model with random intercepts was conducted, adding the Level 1 variable (Year) to examine the potential relationship between spread and time. The results of this analysis are presented in Table 07.

Through Table 07, it is evident that the results of the linear trend model with random intercepts indicated a significant LR test at a 1% significance level, with a p-value of 0.000. This result suggests that the use of a traditional regression model can be discarded in favor of the hierarchical linear regression model, demonstrating its suitability for analysis. When applying the linear trend model with random intercepts, it was found that the annual variation of the spread is statistically significant, with an estimated annual decrease coefficient of -0.065 (for the Year variable), while keeping other factors constant. This highlights a decreasing trend in the spread over the years analyzed in the sample

countries.

Table 7
Results of the linear trend model with random intercepts

Spread	Coef.	Standard-error	z	P>z	[Confidence Interval / 95%]	
Year	-0.0658648	0.012916	-5.1	0.000	-0.0911906	-0.0405389
_cons	136.7177	26.10059	5.24	0.000	85.56144	187.8739
Random effects parameters			**Estimation**	**Standard-error**	**[Confidence Interval / 95%]**	
Levels of economic: Identity var (cons)			3.812788	3.893481	0.5152599	28.21363
Country: Identity var (cons)			3.724286	0.4364027	2.960066	4.685811
var (residual)			0.7339872	0.0338383	0.6705735	0.8033977
LR test (vs linear regression):	(2) = 1875.43				Prob >=	= 0.0000

This result emphasizes the importance of including the temporal variable (Level 1) and suggests that the three-level hierarchical model can be applied to test the second research hypothesis. This hypothesis seeks to verify whether the government's effectiveness index is negatively related to the spread, even considering countries with different levels of economic development.

Results for the Complete Three-Level Hierarchical Linear Model

The complete hierarchical linear model was developed to test the second research hypothesis. This model includes all three levels of analysis: Level 1 represents temporal variation, Level 2 encompasses countries, and Level 3 represents the level of economic development. Additionally, the model incorporates the research variable, the government effectiveness index, along with other explanatory variables considered determinants of financial intermediation spread. The results of the complete model are presented in Table 08.

Table 8
Results of the complete model

Spread	Coef.	Standard-error	z	P>z	[Confidence Interval / 95%]	
Year	-0.0715038	0.0123801	-5.78	0.000	-0.0957683	-0.0472394
GEI	-0.6036784	0.1599878	-3.77	0.000	-0.9172487	-0.2901082
CON	0.0020257	0.0041677	0.49	0.627	-0.0061428	0.0101941
CR	0.0360959	0.0113519	3.18	0.001	0.0138465	0.0583452
INF	0.0021489	0.0014644	1.47	0.142	-0.00500192	0.0007213
OC	0.0206512	0.0040391	5.11	0.000	-0.0285676	0.0227348
_cons	148.60710	24.94417	5.96	0.000	99.71741	197.4968
Random effects parameters			**Estimation**	**Standard-error**	**[Confidence Interval / 95%]**	
Levels of economic: Identity var (cons)			2.009983	2.134977	0.2506442	16.11859
Country: Identity var (cons)			3.66859	0.4474622	2.888531	4.659305
var (residual)			0.6460312	0.301332	0.5895904	0.7078749
LR test (vs linear regression):	(2) = 1487.02				Prob >=	= 0.0000

The results of the complete hierarchical linear model, as presented in Table 08, showed that the banking spread exhibits a trend of reduction over the years, corroborating the findings of the linear trend model. Additionally, it is worth noting that the Government Effectiveness Index (GEI) had a statistically significant negative relationship with

the spread, validating the second research hypothesis. This indicates that countries with a more efficient government tend to have lower spread levels. This result is consistent with the studies by Afzal and Mirza (2012); Tarus and Manyala (2018) and demonstrates that GEI affects the spread not only in developing economies but also in countries at different levels of economic development. This highlights the importance of a stable and efficient political environment in promoting good governance and reducing the social costs imposed by banks in the form of the spread, contributing to a more efficient financial intermediation activity. As proposed by Dwumfour (2019), government effectiveness is directly linked to stability and confidence in public policies, as government inefficiency can deter investors and potentially harm any country's economic situation. This result suggests that governmental inefficiency can be a factor in any country, not just in developing economies.

Furthermore, the results of the control variables showed that concentration was not significant, while operating cost had a positive and significant relationship with the spread. This indicates that the higher the cost associated with credit operations, the higher the spread is likely to be. The inflation variable did not show a significant relationship. A statistically significant and positive relationship between credit risk and the spread was also observed. These results are consistent with those obtained in the studies by Ho and Saunders (1981); Barajas et al. (1999); Dwumfour (2019). These results provide additional insights into the determinants of banking spread, emphasizing the importance of considering variables such as operating costs and credit risk in spread analysis.

Government effectiveness, along with other variables like operating costs and credit risk, plays a crucial role in determining the banking spread. An efficient and stable government contributes to reducing the social costs imposed by banks in the form of the spread, promoting more efficient financial intermediation and stimulating economic development.

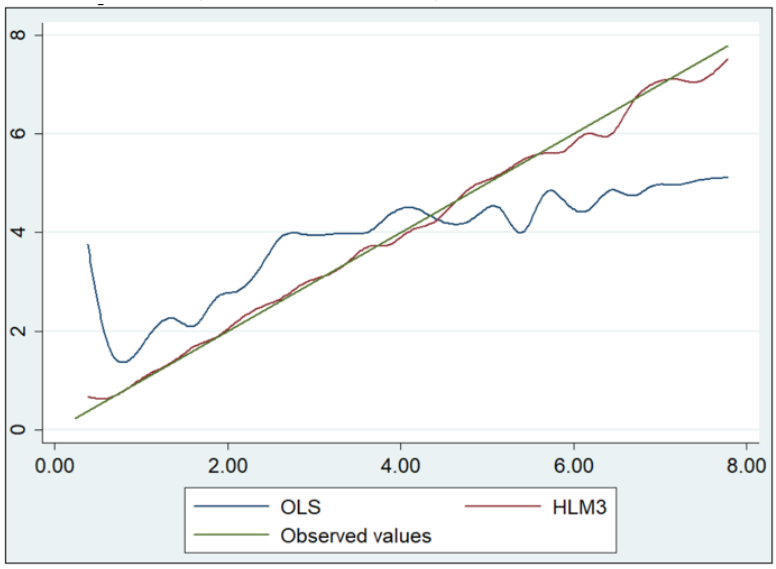
Finally, to emphasize the relevance of considering different levels of economic development as one of the determinants of the spread and to demonstrate the advancement achieved by this study by employing a methodology that allows for the analysis of grouped data, a comparison was made between the results of the three-level hierarchical modeling (HLM3) and the traditional regression model estimated by the ordinary least squares (OLS) method. The results show greater robustness when considering a grouped data structure, as evidenced in Figure 03.

In Figure 03, the green curve represents the observed values of the spread in each of the countries in the sample over different periods. The red curve represents the values estimated by the hierarchical linear model with three levels (Hierarchical Regression), while the blue curve represents the values estimated by the panel data regression model estimated by OLS (OLS Regression).

Through Figure 03, it becomes possible to infer the superiority of the hierarchical linear model, which considers the levels of economic development as determining factors of the spread, compared to the multiple linear regression model estimated by OLS with the same explanatory variables. This superiority of the hierarchical model is evidenced by the fact that the values estimated by the model (red curve) are closer to the green curve, which represents the actual data. This indicates that the model fits the real data better

than the OLS model, which deviates from the green curve. Due to the limitation of the OLS model, it is not applied to a clustered data structure, meaning that different levels of economic development are not considered as hierarchical levels in this model.

Figure 3
OLS Predicted Values, HLM3 Predicted Values, and Observed Values



Thus, it is clear how important it is to consider the clustered data structure when investigating the determining factors of the spread. By using the hierarchical linear regression method, this study highlights the relevance of considering the maturity of the financial system, represented by the levels of economic development, as a crucial factor for the spread. These results empirically corroborate what was discussed by Agapova and McNulty (2016), who explain that a more mature financial system provides security in the financial intermediation process, thus influencing spread levels in countries.

Final Considerations

This research aimed to investigate the relationship between the level of economic development, government effectiveness, and variations in financial intermediation spreads. To verify this relationship, econometric modeling of hierarchical linear regression with three levels was applied to a sample of 157 countries grouped by the level of economic development between the years 2015 and 2021.

The results of this study highlight the importance of the level of economic development and the government effectiveness index in determining banking spreads. The results showed that countries with higher levels of development tend to have lower spreads,

which is related to more stable financial systems with higher capitalization and lower volumes of problematic loans. On the other hand, in emerging and developing economies, spreads are higher due to the greater risks associated with financial intermediation.

A significant finding was the negative relationship between the government effectiveness index and the banking spread, which was empirically validated. This demonstrates that an efficient government, which promotes good governance and maintains a stable political environment, contributes to reducing the social costs imposed by banks in the form of spreads. This relationship was observed not only in developing economies but also in countries with different levels of economic development, expanding the understanding of the role of government in determining banking spreads.

Furthermore, variables such as operating costs and credit risk also influence spreads. Higher costs associated with credit operations lead to higher spreads, while higher credit risk is positively related to spreads. These results highlight the importance of considering factors beyond the level of development and government in the analysis of banking spreads.

From a practical perspective, the results emphasize the importance of governments and monetary policymakers in promoting a stable and efficient political environment, aiming to reduce the social costs represented by banking spreads. This allows the banking sector to operate with more affordable rates, thereby contributing to economic development.

From a long-term economic perspective, it is relevant to note that spread levels have a direct impact on the flow of money and are therefore related to economic development. Economies with lower spreads tend to experience an increase in social welfare due to reduced loan rates, facilitating access to reasonably priced loans for individuals and businesses, thus stimulating economic growth. On the other hand, high spreads can indicate inefficiencies in the banking sector, which can hinder domestic savings and investment, discouraging economic growth.

In terms of academic contribution, this research expands knowledge and stimulates theoretical and empirical discussion on the factors that influence spread variation. The use of econometric modeling of hierarchical linear regression opens new methodological perspectives and variables that can influence spreads, enriching the field of study and offering valuable insights for future research.

This study has some limitations that can be considered for future research. Firstly, the sample consisted of countries at different levels of economic development, which may generate heterogeneity in the results. Therefore, a suggestion for future research would be to analyze more specific samples, grouping countries according to more detailed categories of economic development. Furthermore, this study focused mainly on macroeconomic variables and did not consider microeconomic aspects that can influence banking spreads, such as bank and client characteristics. Therefore, a more detailed approach, considering microeconomic factors, could enhance understanding of the determinants of banking spreads. Finally, it is important to note that this study was based on historical data and econometric analyses but did not consider specific events or economic shocks that may have impacted banking spreads. Therefore, future research could explore more dynamic approaches, considering specific events and changes in the economic environ-

ment for a more comprehensive understanding of the determinants of banking spreads.

It is expected that the evidence found contributes to understanding the determinants of banking spreads, providing empirical evidence of the influence of the level of economic development and government effectiveness. The results highlight the importance of a stable political environment, efficient governance, and robust financial systems in promoting efficient financial intermediation and stimulating economic development. These conclusions have important implications for public policymakers and financial regulators, emphasizing the need to promote good governance practices and create a favorable environment for the banking sector, aiming to reduce spreads and promote economic activity.

References

Afzal, A., & Mirza, N. (2012). Interest rate spreads in an emerging economy: The case of Pakistan's commercial banking sector. *Economic Research-Ekonomska istraživanja*, *25*(4), 987–1004.

Agapova, A., & McNulty, J. E. (2016). Interest rate spreads and banking system efficiency: General considerations with an application to the transition economies of Central and Eastern Europe. *International Review of Financial Analysis*, *47*, 154–165.

Allen, F., & Santomero, A. M. (2001). What do financial intermediaries do? *Journal of Banking & Finance*, *25*(2), 271–294.

Al Shubiri, F. N., & Jamil, S. A. (2017). Assessing the determinants of interest rate spread of commercial banks in Oman: An empirical investigation. *European Research Studies*, *20*(2), 90-108.

Azumah, C. Y., Owusu-Ansah, A., Amewu, G., & Ohemeng, W. (2023). The effect of banking sector reforms on interest rate spread: Evidence from Ghana. *Cogent Economics & Finance*, *11*(1), 2175463.

Barajas, A., Steiner, R., & Salazar, N. (1999). Interest spreads in banking in Colombia, 1974-96. *IMF Staff Papers*, *46*(2), 196–224.

Beck, T., & Hesse, H. (2009). Why are interest spreads so high in uganda? *Journal of Development Economics*, *88*(2), 192–204.

Birchwood, A., Brei, M., & Noel, D. M. (2017). Interest margins and bank regulation in Central America and the Caribbean. *Journal of Banking & Finance*, *85*, 56–68.

Demirgüç-Kunt, A., & Huizinga, H. (1999). Determinants of commercial bank interest margins and profitability: some international evidence. *The World Bank Economic Review*, *13*(2), 379–408.

Diamond, D. W. (1984). Financial intermediation and delegated monitoring. *The Review of Economic Studies*, *51*(3), 393–414.

Dwumfour, R. A. (2019). Explaining banking spread. *Journal of Financial Economic Policy*, *11*(1), 139–156.

Fávero, L. P., & Belfiore, P. (2017). *Manual de análise de dados: estatística e modelagem multivariada com excel®, spss® e stata®*. Elsevier Brasil.

Gelman, A., & Hill, J. (2006). *Data analysis using regression and multilevel/hierarchical models*. Cambridge university press.

Gurley, J. G., & Shaw, E. S. (1955). Financial aspects of economic development. *The American Economic Review*, *45*(4), 515–538.

Ho, T. S., & Saunders, A. (1981). The determinants of bank interest margins: theory and empirical evidence. *Journal of Financial and Quantitative analysis*, *16*(4), 581–600.

Männasoo, K. (2013). Determinants of bank interest spreads in Estonia. *Eastern European Economics*, *51*(1), 36–60.

McShane, R. W., & Sharpe, I. (1985). A time series/cross section analysis of the determinants of Australian trading bank loan/deposit interest margins: 1962–1981. *Journal of Banking & Finance*, *9*(1), 115–136.

Obeng, S. K., & Sakyi, D. (2017). Macroeconomic determinants of interest rate spreads in Ghana. *African Journal of Economic and Management Studies*, *8*(1), 76–88.

Philippon, T. (2015). Has the US finance industry become less efficient? on the theory and measurement of financial intermediation. *American Economic Review*, *105*(4), 1408–1438.

Poghosyan, T. (2013). Financial intermediation costs in low income countries: The role of regulatory, institutional, and macroeconomic factors. *Economic Systems*, *37*(1), 92–110.

Raudenbush, S. W., & Bryk, A. S. (2002). *Hierarchical linear models: Applications and data analysis methods*. Sage.

Shayanewako, V. B., & Tsegaye, A. (2018). The impact of interest rate spread on the banking system efficiency in South Africa. *Cogent Economics & Finance*, *6*(1), 154-176.

Tarus, D. K., & Manyala, P. O. (2018). What determines bank interest rate spread? evidence from Sub-Saharan Africa. *African Journal of Economic and Management Studies*, *9*(3), 335–348.

Thierie, W., & De Moor, L. (2019). Determinants of bank loan spread in project finance. *International Journal of Managing Projects in Business*, *12*(1), 161–186.

Vera, L., Zambrano-sequín, L., & Faust, A. (2007). The efficiency-stability trade-off: The case of high interest rate spreads in Venezuela. *The Developing Economies*, *45*(1), 1–26.

Were, M., & Wambua, J. (2014). What factors drive interest rate spread of commercial banks? empirical evidence from Kenya. *Review of Development Finance*, *4*(2), 73–82.

West, B. T., Welch, K. B., & Galecki, A. T. (2022). *Linear mixed models: a practical guide using statistical software*. Chapman and Hall/CRC.