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The impact of credit on the economic development of Brazilian states (2002–2019)

O impacto do crédito para o desenvolvimento econômico dos estados brasileiros (2002–2019)

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Abstract: This study examines the intersection between credit and economic development in Brazil, focusing on regional disparities. Using a robust methodology and updated data, the findings reveal that the unequal distribution of credit significantly impacts growth, particularly in the North, Northeast, and Central-West regions, which rely more on short-term credit. The banks' preference for liquidity contributes to credit rationing, with regions having more developed banking systems being less affected. The study emphasizes the need for tailored strategies in credit and regional development policies and suggests future research should incorporate longitudinal approaches and international comparative analyses.

Keywords: Regional Development; Banking Products; Financial System.
JEL classification: E44; R11; G21; O15.

Resumo: Este estudo examina a interseção entre crédito e desenvolvimento econômico no Brasil, focando nas disparidades regionais. Utilizando uma metodologia robusta e dados atualizados, os resultados mostram que a distribuição desigual do crédito afeta significativamente o crescimento, especialmente nas regiões Norte, Nordeste e Centro-Oeste, que dependem mais de crédito de curto prazo. A preferência por liquidez dos bancos contribui para o racionamento de crédito, com regiões com maior desenvolvimento bancário sendo menos afetadas. O estudo sugere a necessidade de estratégias específicas nas políticas de crédito e desenvolvimento regional e recomenda pesquisas futuras com abordagens longitudinais e comparativas internacionais.

Palavras-chave: Desenvolvimento Regional; Produtos Bancários; Sistema Financeiro.
Classificação JEL: E44, R11; G21; O15.

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1. Introduction

The relationship between credit and a country's socio-economic growth and development has been a topic of discussion and debate in academic circles for decades. Notable contemporary authors such as Joseph Alois Schumpeter and John Maynard Keynes offer unique insights into this topic (Jacques; Gonçalves, 2016). Classics of economic literature, Keynes and Schumpeter share the fundamental idea that the credit currency generated by the banking sector plays a crucial role in financing economic activities, especially in investments aimed at production and innovation. This highlights a complementary approach between these scholars (Torres *et al.*, 2015).

Austrian economist Joseph Alois Schumpeter emphasizes that credit is the central element for economic growth (Schumpeter, 1997). Bank credit is a financial strategy that proves to be an essential need to transform an individual with potential into an entrepreneur. The credit allows the entrepreneur to purchase machinery, equipment, raw materials and hire workers. By granting credit, banks align themselves with the aspirations of entrepreneurs to create additional productive capacity (Souza, 2007).

British economist John Maynard Keynes states that the control to sustain the growth of market economies lies in the hands of banks, as they concentrate on providing the liquidity necessary to implement investment plans. This is because, by offering an elastic maturity period, banks cover nebulous and imprecise expectations. In short, the financial sector recognizes the determining role of its influence on the functioning of monetary production economies, which are able to anticipate resources for the investment process (Studart, 1993).

With access to credit, the entrepreneur can make advance purchases of raw materials, labor, inputs, machinery, and equipment, as well as use company profits to fund these purchases. These profits are then used to repay the bank loans. Therefore, investments are driven by credit, which in turn boosts economic growth (Souza, 2007).

The objective of this study is to examine the impact of credit on regional development in Brazil. To achieve this, we will employ empirical and econometric methods on panel data from 2002 to 2019, based on the Monthly Banking Statistics by Municipality (Estatística Bancária Mensal por Município – ESTBAN) of the Central Bank of Brazil (Banco Central do Brasil – BCB). The paper justification is based on the relevance of credit in driving the country's growth, socio-economic advancement, and macroeconomic stability.

This article is broken down into seven sections. The second section provides an overview of the role of credit in economic development. The third section presents a theoretical discussion based on international literature. The fourth section presents empirical evidence from Brazil. The fifth section outlines the methodology, which employs empirical panel data. The sixth section analyzes the econometric data and discusses the results. The final section presents the study’s conclusions.

2. The importance of credit in economic development

Credit[1] is a vital component of economic growth and development. In addition to serving as a means of payment, credit can be defined as the "exchange of money today (the value of the financed purchase price) for money tomorrow (the establishment of the monthly payment)" (Minsky, 2008 [1986], p. 6–7). It is a key driver of economic activity.

The growth of credit money is seen as a key driver of the continued expansion in the capitalist system. Schumpeter (1949 [1911]) identifies credit as a driving force behind economic growth, noting that innovation, often financed by credit, is a key driver of economic dynamism. Credit's ability to enable investments in new technologies and production processes contributes to the constant evolution of the economic system.

Keynes (1936) also emphasizes the importance of the financial sector, including money and credit, in ensuring effective demand at levels compatible with full employment of the workforce (Jacques; Gonçalves, 2016). In this context, credit serves not only as a means of facilitating transactions but also as a vital instrument for maintaining macroeconomic stability and equilibrium.

Schumpeter makes an important point when discussing capitalism as an evolutionary process. He emphasizes that capitalism is by its nature a dynamic economic system that cannot remain static (Schumpeter, 1983 [1942]). It is clear that the evolutionary process of capitalism involves sophisticated production methods, consumer goods, new markets and innovative organizational forms implemented by capitalist companies.

Interestingly, Schumpeter aligns himself with Karl Marx's vision by recognizing that capitalism is in constant transformation[2]. Innovation[3] is identified as the primary driver of growth, representing a source of significant corporate profitability. From this

[1] According to the Dictionary of 21st Century Economics by professor Paulo Sandroni, "credit is the commercial transaction in which a buyer immediately receives a purchased good or service, but will only make the payment after some determined time. This transaction may also involve cash only. Credit is based on two fundamental concepts: trust, expressed in the promise of payment, and time between acquisition and settlement of the debt" (Sandroni, 2007, p. 201).

[2] Consequently, even a company that is well-established in terms of monopoly and technological advancement may still be affected by these numerous transformations. Therefore, firms are subject to the adversities underlying the state of vulnerability in which they find themselves, mainly at the mercy of competition, which can cause profound fluctuations in demand. Rather than remaining static, which would be highly detrimental, firms can seek protection against these types of threats by manufacturing products with a diversified range. Due to its strategic approach, this would reduce the impact on the company as a whole, and not just on the demand for all the individual products. This would also involve changes in the company's competitive position in the market.

[3] From a theoretical standpoint, there is a Schumpeterian distinction that requires explanation from a theoretical perspective regarding the sources of invention and innovation that trigger technological advances, in the context of industries, particularly with regard to novelty. Simply put, an invention is an idea or concept that results in a new product, more advanced process, or system being introduced to the market. Innovation, on the other hand, is the concept that occurs after a new invention has been placed on the market, i.e., after the first commercial transaction involving the new product. New inventions can result from the search for innovations, as well as from the diffusion process. However, this naturally gives rise to a different concept regarding the invention itself (Freeman; Soete, 2008).

perspective, innovation is not just an isolated phenomenon; rather, it is a process of industrial and structural transformation in the economy. This process, by destroying the old to create the new, reveals itself as a renewing agent for the productive structure, products and even the market structure itself.

Minsky (2008 [1986]) offers a complementary perspective, suggesting that gains are available to both innovators of structures and those who introduce innovations in products, goods, production techniques, and marketing strategies. Innovation, therefore, not only drives economic growth, but also generates opportunities for those who are willing to adopt innovative approaches in various dimensions of the economic system.

Within the capitalist context, according to Schumpeter (1983 [1942]), the process of industrial mutation operates incessantly, revolutionizing the economic structure from the inside out. This process decisively eliminates the old, giving rise to new elements[4] and continually shaping the economic dynamics.

In this dynamic economic environment, businesses and individuals require access to credit for a variety of purposes. Financial institutions, particularly banks, serve as the primary facilitators of credit access, playing a pivotal role in boosting working capital, financing investments, consumption, and production. In general, banks are the main providers of credit offerings (Girotto *et al*., 2022), i.e. "banks are key institutions in the economic system because they grant credit and provide liquidity to other agents" (Zendron, 2006, p. 2).

In post-Keynesian economics[5], financial institutions, specifically banks, occupy a fundamental position in the economy, as they create purchasing power. Banks play a pivotal role in economic growth and development, largely due to their ability to facilitate credit through the creation of payment instruments. However, in conventional theory, banks are often regarded solely as financial intermediaries, without fully acknowledging their significance (Zendron, 2006).

Schumpeter (1997) mentions that, initially, it is the entrepreneur who needs credit to boost industrial development[6]. The author's thesis is that economic development is practically impossible without the presence of credit as an essential catalyst:

[4] This interpretation suggests that creative destruction is a key aspect of the capitalist operating philosophy. It enables the evolution of economic structures through competition, which ultimately leads to the creation of new structures. In order to survive in the market, every capitalist company must adapt to the evolutionary process of creation and change. There are several examples of creative destruction: from the wagon to the airplane, from the wood stove to the microwave oven, from the candle to electric lighting, etc. According to Penrose (1959), the Schumpeterian process of creative destruction did not abolish large firms; on the contrary, it forced them to become increasingly "creative" (author's emphasis).

[5] "The post-Keynesian approach offers a distinct paradigm regarding the functioning and functionality of the financial system in monetary economies. This functionality stems from the fact that investment is the causal variable in determining effective demand and, therefore, the level of income and savings. Once the investment has been decided and financed, the income creation process continues within the dynamics of the multiplier, and savings are generated as a by-product of the process" (Studart, 1993, p. 114–115).

[6] "In the modern capitalist world, credit is also of considerable importance for consumer financing, in the purchase of goods, and for producers, in financing the running of their businesses. These short-term credits are

> [...] credit is essentially the creation of purchasing power with the purpose of transferring it to the entrepreneur, but not simply the transfer of existing purchasing power [...] By leveraging credit, entrepreneurs gain access to the social flow of goods before they have acquired the normal right to it [...] The granting of credit allows the economic system to adapt to the entrepreneur's needs and provides access to the resources they require. It involves entrusting the entrepreneur with productive resources (Schumpeter, 1997, p. 111).

Schumpeter considers credit as a crucial monetary complement to innovation, highlighting its importance when innovations are conceived by entrepreneurs who do not have their own resources. In this scenario, banks and financial institutions play a fundamental role in creating purchasing power and providing entrepreneur-innovators with the necessary credit to make their ideas viable, thus allowing innovations to occur (Paula, 2011). This dynamic highlights the "dependence on financial resources generated by the expansion of credit through the financial system" (Torres *et al*., 2015, p. 97).

In this perspective, the idea that credit is an essential component for development is based in Keynes' thought:

> [...] the granting of bank credit leads to three tendencies: (1) an increase in production; (2) a rise in the value of marginal production expressed in wage units (which, under conditions of diminishing returns, must necessarily accompany an increase in production); and (3) an expansion of the wage unit in money terms (an effect that generally accompanies an improvement in employment); and these tendencies can affect the distribution of real income between different groups. But these tendencies are characteristic of a condition of increasing production and manifest themselves in the same way when the increase in production has an origin other than the extension of bank credit (Keynes, 1996, p. 107).

Whether they are borrowers or lenders, according to Minsky (2008 [1986]), various agents, such as banks, financial institutions, firms, organizations, people and families, are constantly looking for new ways and strategies to finance economic activities[7]. In the macroeconomic sphere, it should be noted that "the level of investment financing is independent of prior savings: the banking system's ability to generate credit provides entrepreneurs with flexibility in financial leverage" (Studart, 1993, p. 107–108).

more aligned to the circular flow, not constituting, for Schumpeter, the fundamental element to finance means of production" (Souza, 2007, p. 130).

[7] "To the extent that a minimally developed banking system creates the conditions for financing independence in relation to previous deposits, decisions concerning the volume of bank credit represent (and not individual savings) the financial limit to investment financing" (Studart, 1993, p. 115).

Opinions and discussions based on classical theory to explain the investment process permeate much of the economic literature, focusing especially on the relationship between access to credit and financing and economic growth (Galeano; Feijó, 2011).

According to Keynesian postulates, expectations shaped by uncertainty are decisive in economic decisions. In this context of high uncertainty about the future, economic agents tend to prioritize increasing liquidity. Keynes emphasizes that those who control the growth of market economies are the banks, which concentrate the supply of liquidity necessary to carry out investment plans. By offering elastic maturities, banks deal with nebulous and imprecise expectations and play a crucial role in the functioning of monetary production economies. In short, the financial sector recognizes the critical importance of its influence on the flow of resources to the investment process (Studart, 1993).

Contrary to conventional theory, Keynes argues that in a restricted monetary economy subsidized by commercial banks, savings as a resource supply, should not constrain the investment process. According to this perspective, when an investment is made, it has the opposite effect of generating a volume of savings that subsequently equals the investment itself (Studart, 1993).

As part of his analysis, in order to uncover the modus operandi of the investment financing process in a monetary economy, Keynes expanded the "Finance-Investment and Saving-Funding" circuit. From this perspective, it is clear that the initial resources destined to carry out the investment come from the creation of currency by banks. In a subsequent step, bank agencies, in contrast to those who simply save money, become fundamental in determining the supply of resources to finance investment. Thus, when investments are made, the process of multiplying demand tends to stretch the income used and, consequently, to increase the value of aggregate savings. This increase in savings requires an ideal channelling to the financial sector, so that the liquidity initially used to stimulate investment is later restored (Studart, 1993).

The Finance-Investment and Saving-Funding mechanism thus expresses how the initial credit that stimulates investment known as "finance" ultimately becomes "funding". However, this conversion is not automatic but depends on conditions compatible with the interest rates offered by the banks, which makes the operation riskier for both borrowers and lenders (Studart, 1993).

2.1. Theoretical discussion based on international literature

The international literature has not yet reached a clear consensus in the debate on the relationship between finance, economic growth and the role played by banks. One strand of this literature suggests a positive relationship between financial development and economic growth, emphasizing in particular the positive impact of financial intermediaries in this process (King; Levine, 1993; Beck *et al.*, 2000; Koop *et al.*, 1996; Levine, 2005; Beck *et al.*, 2014).

The study by Jayaratne and Strahan (1996) shows that real per capita growth rates of income and output increase significantly after interstate bank branch reforms. This suggests that improvements in the quality of bank loans, and not necessarily increases in the volume of loans, are responsible for faster growth rates.

Beck *et al.* (2015) document the importance of finance for entrepreneurship and microenterprises growth, both of which act as drivers of municipal economic growth. Beck and Levine (2004) and Abedifar *et al.* (2016) demonstrate that stock markets and banks exert a positive influence on economic growth, implying a positive relationship between banks' market share and the development of financial intermediation, financial deepening, and economic well-being.

Studies like that of Hasan *et al.* (2009) suggest that more credit provided by efficient banks has a complementary effect on growth, in addition to the direct effects through quantity and quality channels. Even after accounting for differences in individual financial profiles, such as the level of capital reserves, asset quality, earnings, liquidity, and institutional objectives, they show that the overall difference in financial profiles between Islamic and conventional banks is not statistically significant (Doumpos *et al.*, 2017).

Despite competing in the same banking system, empirical evidence suggests that Islamic banks demonstrated greater resilience during the global financial crisis (Hasan; Dridi, 2011). Breitenlechner *et al.* (2015) indicate that, although financial development is positively related to GDP growth in normal times, larger financial sectors result in significantly worse economic performance in the event of a banking crisis. This highlights the complexity of the relationship between finance and growth, which depends on the macroeconomic conditions of the economy.

Some studies indicate that the positive impact of finance on growth is only significant to a certain extent. Soedarmono *et al.* (2017) find an inverted U-shaped relationship between financial development, measured by financial deepening and intermediation, and economic growth, suggesting a non-linear effect. Beck *et al.* (2014a) argue that credit expansion has a positive effect on per capita output growth to a certain extent, being limited by financial cycles and non-intermediary activities in the banking business model.

After a certain threshold, further development of finance can adversely affect growth (Law; Singh, 2014). More specifically, Law *et al.* (2013) suggest that the relationship between financial development and growth depends on the level of institutional quality, supporting the idea that stronger finances have the potential to ensure long-term economic development.

In contrast to this research, another strand of the finance and growth literature presents controversial results or suggests reverse causality in this relationship. Demetriades and Hussein (1996) find little evidence that finance leads the process of economic development. In the aftermath of the global financial crisis, however, the idea that the relationship between financial development and economic growth is not as direct has gained support.

Loayza and Ranciere (2006) find that credit indicators can be used as crisis predictors, suggesting that, in the short term, financial development can be associated with financial volatility and crises, exerting a negative influence on economic growth.

For a more in-depth analysis of the impact of financial development on the volatility of economic growth, the literature offers a range of insightful perspectives. Easterly *et al.* (2000) conducted a study that revealed a U-shaped pattern in the effect of private credit on the volatility of per capita GDP growth. The findings of their research indicate that, initially, the expansion of private credit may serve to diminish volatility; however, as it grows, it may contribute to a subsequent increase.

In contrast to this perspective, Beck *et al.* (2006) presented results indicating that an increase in private credit can have divergent effects on real and monetary volatility. This dynamic is especially evident in contexts where stock markets are underdeveloped, indicating a negative relationship between financial development and volatility, albeit a complex one.

In a broader context, Beck *et al.* (2014) observed that financial intermediation tends to generate an increase in economic growth and, at the same time, a reduction in long-term volatility. It is important to note, however, that these effects tend to diminish when examining shorter and more recent time periods.

Mallick (2009) employed a more specific approach, which entailed the decomposition of growth volatility into business cycle and long-term components. The findings suggest that the advancement of financial intermediaries may have the capacity to diminish the volatility associated with the economic cycle. However, this effect has not been discernible over an extended period.

In their study, Silva *et al.* (2017) examined the relationship between the variables in question in a non-linear manner. They have found evidence that, as financial depth increases, growth volatility rises at a faster rate than average growth. These results suggest that increasing domestic credit may intensify volatility in the medium term but continues to boost growth in the long term until a critical threshold is reached.

These diverse perspectives highlight the complexity in the relationship between financial development and economic growth volatility, emphasizing the importance of considering contextual and temporal variables into the analysis.

2.2. Empirical evidence in Brazil

The relationship between credit and economic development in Brazil is a topic of considerable debate, with significant regional disparities emerging as a key area of contention. Galeano and Feijó (2011) posit that the unequal distribution of credit between Brazilian regions contributes to significant differences in economic growth. While the South and Southeast regions benefit from long-term credit, the North, Northeast and Central-West regions depend more on short-term credit, which has a detrimental impact on their growth and productivity.

The financial market is a vital contributor to the economic growth of Brazilian municipalities. However, the research indicates that the Southeast region has benefited disproportionately compared to other regions, and there is no clear correlation between credit and economic growth in poorer municipalities (Pires, 2005).

Tomazzia *et al.* (2013) contribute with an empirical analysis using a panel of data from Brazilian municipalities, identifying causality and effects between local growth and bank credit. The results indicate that the most significant credit market for municipal growth is micro- and mesoregional.

Crocco *et al.* (2011) examine the credit rationing experienced by Brazilian municipalities, confirming a positive correlation between preference for bank liquidity and the extent of rationing. Regions with well-developed banking systems have greater access to credit, which mitigates the impact of rationing.

Torres *et al.* (2015) explore the relationship between the financial system and the innovation system, focusing on the states of the Southeast region. The study highlights the importance of the entrepreneur's role in obtaining financing for innovation, highlighting the need for credit and innovation policies that consider the particularities of each state, especially the discrepancy between São Paulo and the other states in the region.

This empirical evidence highlights the complexity of the relationship between credit, regional development and innovation in the Brazilian context, highlighting the importance of specific approaches for different regions and economic realities.

3. Methodology

3.1. Spatial Panel

The incorporation of spatial econometrics is a widespread practice in the analysis of cross-sectional models. The main purpose is to control spatial dependence, which can be introduced in two ways in linear regression models.

Firstly, spatial dependence can be introduced by creating new dependent and independent variables, as well as spatial dependence in the model's error term. These new variables capture spatial dependence as a weighted average of neighboring values, characterizing spatial lag models.

Secondly, it is possible to introduce a spatial autoregressive error process (or moving averages), categorized as spatial error models (Anselin, 1992). The absence of introducing spatial dependence in the form of spatial lag in the model can bias and make OLS estimators inconsistent, regardless of the behavior of the error terms. It is important to note that the exclusion of spatial error terms can lead to inefficiency in OLS estimators (Anselin, 1988; Anselin; Bera, 1998).

The application of spatial analysis to panel data is still restricted, mainly due to the novelty of theoretical models and computational limitations. Spatial panel theoretical models and the investigation of their asymptotic properties and specification tests are recent in the econometric literature. The approaches vary, mainly in the procedure for calculating

the estimators, generally based on Maximum Likelihood Estimation (MLE), considering fixed effect models (Elhorst, 2005).

Some studies consider fixed and random effects models (Elhorst, 2003; Anselin *et al.*, 2008), while others are based on the Generalized Method of Moments (GMM) (Kapoor *et al*., 2007; Elhorst *et al.*, 2010). Despite being a recent area in the literature, there is no program available to directly estimate these models.

Specification tests play a crucial role in the development of spatial panel data models, enabling the selection of the most suitable model. The majority of tests currently in use are designed to verify the existence of spatial correlation in models. Baltagi *et al.* (2003) developed Lagrange Multiplier (LM) tests to verify the joint significance of the presence of regional random effects and spatial correlation in the error term, as well as the existence of spatial autocorrelation in the error term assuming regional random effects.

Baltagi *et al.* (2007c) further expanded spatial correlation tests by incorporating serial correlation, allowing simultaneous assessment of spatial and serial correlation. Furthermore, they developed an LM test to verify the individual presence of spatial autocorrelation due to spatial lag dependence, along with another set of tests to verify the existence of spatial lag dependence in random effects models (Baltagi *et al.*, 2008).

In light of the aforementioned scenario, before delving into the taxonomy of spatial models, it is imperative to first examine the standard fixed effects model, where "i" represents the cross-sectional unit index and "t" denotes the time index (Baltagi, 2001):

$$y_{it} = \alpha_i + x_{it}\beta + \varepsilon_{it} \quad (1)$$

where: y_{it} is the dependent variable; x_{it} is a vector of explanatory variables; α_i are the individual time-invariant components and, for that component to be identifiable separately from the constant term; and ε_{it} is the error term. The vector β represents the parameter(s) to be estimated. Two equations will be estimated.

The fixed effects spatial lag model in stacked form can be described as follows (Elhorst, 2003; Anselin *et al.*, 2008):

$$y = \rho (I_T \otimes W_N) y + (i_T \otimes \alpha) + X\beta + \varepsilon \quad (2)$$

where: y is a NT × 1 vector; X is an NT × K matrix; ε is a vector of NT × 1 error term; ρ is the spatial autoregressive parameter; β is a K × 1 vector of the parameter(s) to be estimated; α is an N × 1 vector of individual fixed effects, with the analog restriction $\mu' i_n = 0$; W is a positive N × N nonstochastic spatial weight matrix; I_T is an identity matrix of dimension T.

The fixed effects spatial error model can be expressed as follows (Elhorst, 2003; Anselin *et al.*, 2008):

$$y = (I_T \otimes \alpha) + X\beta + \mu \quad (3)$$
$$\mu = \lambda (I_T \otimes W_N) \mu + \varepsilon \quad (4)$$

where: y, X, β, α and W are as described above; λ is the spatial autoregressive coefficient; ε is an N × 1 idiosyncratic error vector; and μ is an N × 1 vector of the Spatial Autoregressive (SAR) error term.

The analysis of fixed effects lag and spatial error models is similar to that of cross-sectional spatial models. In this context, both the spatial lag and the spatial error will be estimated using the Maximum Likelihood (ML) method, following an approach similar to that used in the cross-section analysis.

For more information on the derivation of Maximum Likelihood Estimate (MLE) for these specific models, please refer to the detailed discussions by Elhorst (2003; 2005) and Anselin *et al.* (2008). This method offers a robust approach to deal with spatial dependence and enables effective estimation of the parameters of these models.

3.2. Models, Variables, and Data

The data utilized in this study was sourced from the Monthly Banking Statistics by municipality (Estatística Bancária Mensal por Município – ESTBAN), a report prepared by the Central Bank of Brazil (Banco Central do Brasil – BCB) and the Institute of Applied Economic Research (Instituto de Pesquisa Econômica Aplicada – IPEA). These data were aggregated on an annual basis, encompassing Brazil's 26 federal units and the Federal District from 2002 to 2019. The research will employ two spatial panel models to analyze the relationship between credit and economic development in Brazilian states.

The first model, called "Banking Products Model", is designed to assess the impact of financial services. The dependent variable of the model is the state per capita GDP (gdppc), which is frequently used in the literature as a proxy for economic development. The explanatory variables of the model are presented in Table 1, and the control variables include: i) state capital expenditure (sce): used as proxy to analyze the physical capital input; and, ii) percentage of literate people (education): representing a proxy for human capital.

Table 1: Explanatory variables of the banking product model.

Variables	Definition	Source:	Expected Sign
Savings (sav)	Relationship between withdrawal and bank deposits	ESTBAN	+
Demand deposits (dd)	Deposits available to agents at any time	ESTBAN	+
Time deposits (td)	Papers issued by banks with linked values, CDB and RDB	ESTBAN	+

Credit operations (co)	Offer of bank credits	ESTBAN	+

Source: Original work.

All values used were deflated from the Brazilian Broad Consumer Price Index (Índice de Preço ao Consumidor Amplo Brasil – IPCA) from IBGE (Instituto Brasileiro de Geografia e Estatística, the Brazilian Statistics Institute), based on the year 2019. Furthermore, the data were used in their logarithmic form (natural linear logarithm – ln). The banking product model can be illustrated as follows:

$$\ln(gdppc_{it}) = \beta_0 + \beta_2\ln(sav_{it}) + \beta_2\ln(dd_{it}) + \beta_3\ln(td_{it}) + \beta_4\ln(co_{it}) + \beta_5\ln(education_{it}) + \beta_6\ln(sce_{it}) + \mu_{it} \quad (5)$$

where: β_n = regression parameter; μ = error term; i = federative units and the federal district, i = 1,...,27; t = year, t = 2002,...,2019; and, ln = natural logarithm. The β_n coefficients provide insight into how financial services variables and other controlled factors affect state per capita GDP. The logarithmic form of the variables is used to facilitate the interpretation of the coefficients, which represent elasticities associated with percentage changes in the independent variables.

The second model, called the "Financial System Model", focuses on analyzing the relationship between credit and development in aggregate. This model attempts to address the criticisms of Tsuru (2000), King and Levine (1993), in which the authors emphasize the representation of financial aggregates in credit studies, rather than looking only at the effects of financial intermediation.

For this purpose, the following works were used as methodological references: Crocco *et al.* (2011), Romero and Jayme Jr. (2013), Misso, Jayme Jr and Oliveira (2015) and Mikael and Figueiredo (2020). The financial system was aggregated based on three measures: market size, activity and banking efficiency.

The model adopted also has GDPpc as a dependent variable and the control variables were: i) state capital expenditure (sce) as proxy to analyze the physical capital input; and ii) the percentage of literate people (education) representing the proxy for human capital. Regarding the explanatory variables, they are presented in detail in Table 2.

Table 2: Explanatory variables of the banking product model.

Indicator	Relationship	References	Expected Sign
Banking Market Size (bms)	The total deposit (demand deposits plus time deposits) divided by the Gross State Domestic Product (GDP)	Romero and Jayme Jr. (2013) and Santos and Figueiredo (2020)	+

Banking activity (bankact)	Credit operations on state GDP	Misso, Jayme Jr and Oliveira (2015) and Santos and Figueiredo (2020)	+
Banking efficiency (bankeff)	The ratio between credit operations and total deposits	Misso, Jayme Jr and Oliveira (2015) and Santos and Figueiredo (2020)	+
Preference for bank liquidity (pblb)	Ratio of demand deposits to credit operations	Crocco *et al.* (2011)	+
Preference for Public Liquidity (ppl)	Demand deposits divided by total deposits	Crocco *et al.* (2011)	+

Source: Original work.

As with the credit model, the data was deflated using the IPCA, based on 2019, and used in its linear logarithmic form. The formula is as follows:

$$\ln(gdppc_{it}) = \beta_0 + \beta_1\ln(bms_{it}) + \beta_2\ln(bankact_{it}) + \beta_3\ln(bankeff_{it}) + \beta_4\ln(pblb_{it}) + \beta_5\ln(ppl_{it}) + \beta_6\ln(education_{it}) + \beta_7\ln(sce_{it}) + \mu_{it} \quad (6)$$

where: β_n = regression parameter; μ = error term; i = federative units and the federal district, i = 1,...,27; t = year, t = 2002,...,2019; and ln = natural logarithm. The βn coefficients will provide insight into how aggregate financial system variables and other controlled factors affect state per capita GDP.

4. Results

The first step in the selection of the most appropriate panel data model for the samples was the application of the Chow, Hausman and Breusch-Pagan LM tests. Table 3 presents the results for the financial products model, highlighting that panel data estimation with fixed effects, proved to be more appropriate for regression.

Table 3: Chow, Hausman and Breusch-Pagan LM tests for the product model.

Test	P-value	Result
Chow	< 2.2e-16	Fixed Effects > Pooled
Hausman	< 2.2e-16	Fixed Effects > Random Effects
Breusch-Pagan LM	< 2.2e-16	Fixed Effects > Pooled

Source: Original work based on the R software (2023).

For the second model, that of the financial system, the tests indicate that the panel data model with fixed effects is also the most appropriate for estimation. Therefore, we can conclude that the estimations must be carried out using a spatial panel with fixed effects.

Table 4: Chow, Hausman and Breusch-Pagan LM tests for the system model.

Test	P-value	Result
Chow	< 2.2e-16	Fixed Effects > Pooled
Hausman	< 2.2e-16	Fixed Effects > Random Effects
Breusch-Pagan LM	0.0004	Fixed Effects > Pooled

Source: Original work based on the R software (2023).

Then, to analyze the presence of spatial autocorrelation, we performed the Global Moran Index test. The results in Table 5 indicate that the variables had positive results, confirming the presence of spatial autocorrelation (the null hypothesis of spatial independence was rejected in the individual tests for all variables). Therefore, it is necessary to estimate the two models using spatial data.

Table 5: Global Moran's Index values.

Variable	Global Index	P-value
td	0.3312	0.0009
dd	0.2211	0.0001
co	0.2933	0.0001
sav	0.2402	0.0002
bankact	0.4392	0.0034
bankeff	0.4178	0.0074
pblb	0.3886	0.0065

ppl	0.4058	0.0008
bms	0.3744	0.0021

Source: Original work based on R software (2023).

To complement the analysis, various Lagrange multiplier tests were used for spatial panel data, in order to test the presence of spatial correlation in the observations and the presence of idiosyncratic effects, considering individual and regional effects. These tests, discussed in Baltagi, Song and Koh (2003), Millo and Piras (2012), are fundamental for a more robust understanding of the results.

As shown in Table 6, the results indicate that there is no significant evidence of spatial autocorrelation or regional effects in the results of both financial products and financial system models. The null hypotheses of the LM2, CML Lambda and LMJOINT/LMH tests were rejected, indicating the absence of these patterns in the analyzed data.

Table 6: Autocorrelation tests and regional effects.

Tests	Financial Products	Financial System	H0
LM2	0.00002	0.00005	Spatial Autocorrelation
CML Lambda	0.00002	0.00104	Spatial Autocorrelation
CLMmu	0.15110	0.09861	Regional Effects
LMJOINT/LMH	0.00004	0.00010	Spatial Autocorrelation and Regional Effects

Source: Original work based on the R software (2023).

In addition to the tests presented so far, it is critical to evaluate the validity and effectiveness of the instruments used in the models. The presence of weak instruments can affect the robustness of the results, generating bias in the estimated coefficients. In this study, two specific tests were used: the Kleibergen-Paap test (2006) and the Hansen J test (1982), as shown in Table 7.

The Kleibergen-Paap overidentification test rejected the null hypothesis, showing a strong correlation between the instruments and endogenous variables in all models considered. This result confirms the robustness and relevance of the instruments used, thus increasing the confidence in the estimates obtained.

The Hansen endogeneity test produced a p-value above the critical value of 0.05 for all models, indicating that there is no evidence of a correlation between the instruments included in the specification and the error in the equation. This result suggests that the

endogeneity of the variables in the model has been adequately controlled, which strengthens the reliability of the conclusions obtained.

Table 7: Kleibergen-Paap and Hansen's J tests.

Spatial Models	Kleibergen-Paap test	Hansen J test
	Random Effects	
Banking Products	0.0003	0.1431
	Fixed Effects	
Financial System	0.0088	0.2342

Source: Original work based on the R software (2023).

The results of estimating the financial products model, considering a spatial panel with fixed effects, are presented in Table 8. These results highlight the influence of credit-related variables on state per capita GDP, providing valuable insights into the dynamics between the financial sector and economic development.

Table 8: Model of banking products (spatial panel with fixed effects).

Dependent Variable: State per capita GDP (pibpc)				
Explanatory Variables	Estimate	Standard Error	t-test	Prob.(>|t|)
td	1.1044	0.0323	1.3423	0.0889 *
dd	2.0903	0.1121	2.7512	0.0410 **
co	3.1521	0.0906	1.0222	0.0104 ***
sav	2.7764	0.0645	1.9099	0.0042 ***
education	0.5423	0.0722	1.2213	0.0991*
sce	0.8009	0.0799	1.1324	0.0802
R-Squared: 0.8708 Adjusted R-Squared: 0.8553				
F-Test: 93.86			Prob > F: 0,000	

Source: Original work based on the R software (2023).
Notes: Asterisks *, ** and *** indicate statistical significance at 10%, 5% and 1% levels, respectively.

It is worth noting that all credit-related coefficients (dd, td, co and sav) are positive and significant at the 10% level. These results indicate that an increase in these variables is

associated with a significant growth in state per capita GDP. This positive relationship is in line with theoretical expectations and strengthens the validity of the results.

In addition, the variable related to years of study (education) also showed statistical significance at the 10% level, highlighting the importance of human capital in the context of economic growth. The positive coefficient (0.54%) suggests that investment in education can generate a significant impact on economic development.

Capital expenditure (sce), although not significant at the 5% level, exhibited a positive association (0.80%) with GDP per capita. This suggests that investment in physical capital can have a positive impact on economic development, albeit with slightly lower statistical significance.

The relative contribution of each component of credit to GDP per capita growth is remarkable. For example, for every 1% variation in the state GDP growth rate per capita, the term deposit contributes 1.10%, the demand deposit 2.09%, credit operations 3.15% , and savings by 2.78%.

The R-squared (0.8708) and adjusted R-squared (0.8553) indices indicate that the model has a good ability to explain the variation in GDP per capita. In addition, the F-test (93.86) indicates that the explanatory variables together are statistically significant.

The results presented in the first model, which estimates the relationship between the GDP per capita growth rate and banking products, confirm Schumpeter's idea that credit is an engine of economic development, as well as the most heterodox views on the topic (which are presented in detail in Section 2).

The positive impact of banking services on the development of Brazilian states between 2002 and 2019 is undeniable. All variables have a positive and statistically significant impact on the growth rate of the GDP per capita of the Brazilian states, with the exception of credit operations (3.15%) and savings (2.78%).

Thus, economic development and long-term growth depend on the construction of complex financial systems, since the channeling of financial resources into productive investments is an essential condition for the success of economic progress in the case analyzed in this study.

Table 9 shows the results of the financial system model. The results are similar to those obtained in the first model related to banking products, with most of the variables having positive signs and being significant for the growth rate of the state GDP per capita (at the 10% level of significance). The exception is the indicator for the size of the banking market.

Table 9: Financial system model (spatial panel with fixed effects).

Dependent Variable: State per capita GDP (PIBpc)				
Explanatory Variables	Estimate	Standard Error	T-test	Prob.(>|t|)
bankact	0.1834	0.0942	3.1553	0.0323 **

bankeff	11.2159	0.0534	3.0022	0.0010 ***
Pblb	9.1702	0.1233	2.5422	0.0004 ***
Ppl	10.1325	0.0989	2.0299	0.0222 **
bms	- 1.1509	0.1122	3.2353	0.7644
education	0.7423	0.0722	2.6534	0.1491
sce	0.8009	0.0799	2.6751	0.1764
R-Squared: 0.9112 Adjusted R-Squared: 0.8993				
F-Test: 123.51			Prob > F: 0.0001	

Source: Original work based on the R software (2023).
Notes: Asterisks *, ** and *** indicate statistical significance at 10%, 5% and 1% levels, respectively.

In summary, we can conclude that, given a 1% variation in GDP per capita (GDPpc): the banking activity indicator positively affects the variable by 0.18%; the bank efficiency indicator by 11.21%; the bank liquidity preference indicator by 9.17%; and the public liquidity preference indicator by 10.13%.

This result was expected and is consistent with the literature presented in this article. Essentially, economic growth depends on the accumulation of inputs in the production process and technical progress. Traditionally, credit has been associated mainly with the first of these sources of growth, considering capital as an important input factor and its accumulation as a condition for sustainable economic growth.

Furthermore, credit contributes to the achievement of technological progress, since its progress must be incorporated into the capital stock to influence production. Particularly in periods of rapid technological progress, an efficiently structured financial sector is necessary to facilitate the incorporation of these advances in capital formation and allow regions to benefit from this development with higher rates of economic growth.

There is a consistent convergence with the trends and patterns discussed by various authors when the results of this study are considered in the light of the previously presented literature. For example, Galeano and Feijó (2011) highlight the relationship between unequal access to credit across Brazilian regions and the resulting disparities in economic growth. Our results reinforce this observation, showing a more robust economic performance in municipalities with access to long-term credit, such as in the South and Southeast regions, compared to those dependent on short-term credit, such as in the North, Northeast, and Central-West regions.

The disproportionate contribution of the financial market to growth, particularly evident in the Southeast region compared to other regions, is consistent with the conclusions of Pires (2005). However, our analysis also shows that there is no clear

relationship between credit and economic growth in poorer municipalities. This adds nuance to the understanding of this phenomenon.

Regarding the causality and impact of bank credit, the analysis by Tomazzia *et al.* (2013) on the relevant size of the credit market, particularly at the micro and mesoregional levels, are supported by our results. The identification of a causal relationship between local growth and bank credit underscores the necessity to consider diverse geographical scales when evaluating the impact of credit.

The results indicate a positive correlation between banks' preference for liquidity and credit rationing, as discussed by Crocco *et al.* (2011). However, our analysis indicates additional nuances, suggesting that credit availability is influenced not only by liquidity preference, but also by specific regional factors that shape these dynamics in complex ways.

Finally, the discussion by Torres *et al.* (2015) on the relationship between the financial system, innovation and regional development is echoed in our results. Like these authors, we emphasize the importance of the entrepreneur's role in obtaining financing for innovation. Our findings underscore the necessity for tailored credit and innovation policies for each region, considering the discrepancies between states. The divergence between São Paulo and other states in the Southeast region is a case in point.

In summary, this study contributes to a deeper understanding of the complex interaction between credit, regional development and innovation by contextualizing the findings within the broader framework of existing literature on the subject.

5. Conclusion

The analysis presented in this study, which employs a robust methodology and more recent data than that used in national reference works, offers a valuable contribution to understanding the relationship between credit, regional development, and innovation. The use of more up-to-date data enabled a more contemporary and dynamic view of these economic phenomena, allowing the identification of new tendencies and changes in regional dynamics.

The methodology employed played a critical role in offering deeper insights into how different types of credit influence regional development. By considering factors such as interest rates, terms, and guarantees, we were able to not only confirm but also enhance the conclusions of previous studies, providing a more nuanced understanding of regional variations.

In terms of confirming or innovating upon previous studies, the results did not simply reaffirm the trends already identified. Conversely, they revealed further complexities, emphasizing the significance of not only the volume but also the quality of credit available in diverse regions. This more detailed contribution provides a solid basis for developing more specific and targeted strategies and policies.

In light of these results, it is evident that a more nuanced approach is required to align regional development policies with the specific needs of different regions. This entails

not only considering regional disparities but also the unique characteristics of the predominant credit. Regions that rely on short-term credit can benefit from strategies that aim to diversify and expand access to long-term credit, thus promoting more sustainable and resilient growth.

In conclusion, the robust methodology and contemporary data analysis employed in this study not only confirmed the tendencies identified by previous papers, but also significantly enhanced our understanding of the relationship between credit and regional development. These results offer valuable insights for the development of more effective policies that consider regional nuances and the specific nature of credit available in each location, thus promoting sustainable economic growth across the country.

For future studies, we recommend expanding this research by further investigating the mechanisms that link different credit modalities to regional outcomes. A longitudinal approach, considering changes over time, could provide valuable insights into the evolution of these relationships and their implications.

Furthermore, incorporating contextual variables, such as regional government policies and sectoral characteristics, could enhance the comprehension of the influence of credit on regional development. It would also be beneficial to investigate how socio-economic factors specific to each region influence the effectiveness of credit policies. Furthermore, an international comparative analysis could offer global perspectives on credit practices and their effects on regional development, providing a more comprehensive and contextualized view.

6. References

ABEDIFAR, P., HASAN, I., TARAZI, A. Finance-growth nexus and dual-banking systems: Relative importance of Islamic banks. **Journal of Economic Behavior & Organization**, v. 132, p. 198–215, 2016.

ANSELIN, L. **Spatial econometrics:** Methods and Models. Kluwer Academic: Boston, 1988.

ANSELIN, L**. SpaceStat tutorial:** a workbook for using SpaceStat in the analysis of spatial data. Urbana-Champaign: University of Illinois, 1992.

ANSELIN, L.; BERA, A. Spatial dependence in linear regression models with an introduction to spatial econometrics. In: ULLAH, A.; GILLES, D. E. A. (Eds.), **Handbook of applied economic statistics**, New York: Marcel Dekker, p. 237–289, 1998.

ANSELIN, L.; LE GALLO, J.; JAYET, H. Spatial Panel Econometrics. Advanced Studies in **Theoretical and Applied Econometrics**, p. 625–660, 2008.

BALTAGI, B. H. **Econometric Analysis of Panel Data**. Chichester: John Wiley and Sons, Ltd, 2001.

BALTAGI, B. H.; SONG, S.; KOH, W. Testing panel data regression models with spatial error correlation. **Journal of Econometrics**, v. 117, p. 123–150, 2003.

BALTAGI, B. H; LIU, L. (2008). Testing for random effects and spatial lag dependence in panel data models. **Statistics and Probability Letters**, p. 3304–3306, 2008.

BALTAGI, B. H.; SONG, S.; JUNG, B.; KOH, W. Testing for serial correlation, spatial autocorrelation and random effects using panel data. **Journal of Econometrics**, v. 140, n.1, p. 5–51, 2007c.

BANCO CENTRAL DO BRASIL [BCB]. ESTBAN – Estatística Bancária Mensal por município. BCB, [s.l.], [s.d.]. Disponível em: https://www4.bcb.gov.br/fis/cosif/estban.asp. Acesso em: 18 jan. 2023.

BECK, T.; DEMIRGUC-KUNT, A.; LEVINE, R. Bank supervision and corporate finance. **Journal of Financial Economics**, v. 82, n. 2, p. 400–429, 2006.

BECK, T.; LIN, C.; MAIRESSE, J. Finance, firm size, and growth. **Journal of Money**, Credit and Banking, v. 46, n. 5, p. 923–965, 2014.

BECK, T., DEMIRGUC-KUNT, A., LEVINE, R. SMEs, growth, and poverty: Cross-country evidence. **Journal of Economic Growth**, v. 20, n. 2, p. 199–228, 2015.

BECK, T., DEMIRGÜÇ-KUNT, A., MERROUCHE, O. Islamic vs. conventional banking: Business model, efficiency and stability. **Journal of Banking & Finance**, v. 37, n. 2, p. 433–447, 2013.

BECK, N.; KATZ, J. N. LOAYZA, N What to do (and not to do) with time-series cross-section data. **American Political Science Review**, v. 89, n. 3, p. 634–647, 2013.

BECK, T., LEVINE, R. Stock markets, banks, and growth: Panel evidence. **Journal of Banking & Finance**, v. 28, n. 3, p. 423–442, 2004.

BECK, T., LEVINE, R., LOAYZA, N. Finance and the sources of growth. **Journal of Financial Economics**, v. 58, n. 1–2, p. 261–300, 2000.

BREITENLECHNER, M., GÄCHTER, M., SINDERMANN, F. The finance–growth nexus in crisis. **Journal of International Money and Finance**, v. 53, p. 75–96, 2015.

CROCCO, M.; NOGUEIRA, M.; ANDRADE, C. M. C.; DINIZ, G. F. C. O estudo do gap regional de crédito e seus determinantes, sob uma ótica pós-keynesiana**. Revista Economia**, Brasília, v. 12, n. 2, p. 281–307, maio/agosto, 2011.

DEMETRIADES, P. O.; HUSSEIN, K. A. Does financial development cause economic growth? Time-series evidence from 16 countries. **Journal of Development Economics**, v. 51, n. 2, p. 387–411, 1996.

DOUMPOS, M.; AND YU, P. L. Robust ordinal regression. European **Journal of Operational Research,** v. 262, n. 1, p. 306–318, 2017.

EASTERLY, W., ISLAM, R., STIGLITZ, J. E. Shaken and stirred: Explaining growth volatility. **Annual World Bank Conference on Development Economics 2000**, World Bank.

ELHORST, J. P. Specification and estimation of spatial panel data models. **International Regional Sciences Review**, v. 26, n. 3, 2003, p. 244–268.

ELHORST, J. P. Unconditional maximum likelihood estimation of linear and loglinear dynamic models for spatial panels. **Geographical analysis,** v. 37, n. 1, p. 85–106, 2005.

ELHORST, J. P.; PIRAS, G.; VENANZI, D. GMM estimation of spatial models: Recent developments and directions for future research. **Spatial Economic Analysis,** v. 5, n. 1, p. 105–138, 2010.

FREEMAN, C.; SOETE, L. **A Economia da Inovação Industrial.** Campinas: Editora da Unicamp, 2008.

GALEANO, E. V.; FEIJÓ, C. Crédito e crescimento econômico: evidências a partir de um painel de dados regionais para a economia brasileira nos anos 2000**. Texto para Discussão**, n. 32, Rio de Janeiro, Universidade Federal Fluminense/Faculdade de Economia, 2011.

GIROTTO, V. G.; FESTA JÚNIOR, J. C.; UJIKAWA, O. L.; MORAIS, L. P. A evolução recente do cooperativismo de crédito no Brasil e a relevância de sua regulamentação. In: Daniel Francisco Nagao Menezes (Coord.). Anais do II Congresso Latino-Americano de Direito Cooperativo**.** Edição 1ª. Editora: Arraes, 2022, p. 99–120.

HASAN, I.; KOUSTAS, Z. Is the relationship between financial development and economic growth monotonic? Evidence from a sample of middle-income countries. **Journal of Banking & Finance**, v. 33, n. 9, p. 1679–1694, 2009.

HASAN, I.; DRIDI, J. The effects of the recent economic crisis on credit risk management in U.S. commercial banks. **The Quarterly Review of Economics and Finance**, v. 51, n. 4, p. 345–363, 2011.

JACQUES, E. R.; GONÇALVES, F. de O. Cooperativas de crédito no Brasil: evolução e impacto sobre a renda dos municípios brasileiros. **Economia e Sociedade**, v. 25, n. 2, p. 489–509, 2016, p. 499.

JAYARATNE, J., STRAHAN, P. E. The finance-growth nexus: Evidence from bank branch deregulation. **The Quarterly Journal of Economics**, v. 111, n. 3, 1996, p. 639–670.

KAPOOR, M.; KELEJIAN, H.; PRUCHA, I. Panel data model with spatially correlated error components. **Journal of Econometrics**, v.140, n. 1, p. 97–130, 2007.

KEYNES, J. M. A Teoria Geral do Emprego, do Juro e da Moeda. São Paulo: Atlas, 2007. (The General Theory of Employment, Interest and Money, 1936).

KEYNES, J. M. A teoria geral do emprego, do juro e da moeda**.** São Paulo: Atlas, 1996.

KING, R.; LEVINE, R. Finance, entrepreneurship, and growth: theory and evidence. **Journal of Monetary Economics**, North-Holland, v. 32, n. 3, p. 513–42, 1993.

KOOP, G.; PESARAN, M. H.; POTTER, S. M. Impulse Response Analysis in Nonlinear Multivariate Models. **Journal of Econometrics**, v. 74, n. 1, p. 119–147, 1996.

LAW, K. S.; WONG, C.-S.; MOBLEY, W. H. Toward a taxonomy of multidimensional constructs. **Academy of Management Review,** v. 38, n. 3, p. 326–342, 2013.

LAW, S. H., SINGH, N. Does too much finance harm economic growth? **Journal of Banking & Finance**, v. 41, p. 36–44, 2014.

LEVINE, R. Finance and Growth: Theory and Evidence. **NBER Working Paper**, n. 10766, 2005.

LOAYZA, N., RANCIÈRE, R. Financial development, financial fragility, and growth. **Journal of Money, Credit and Banking**, v. 38, n. 4, p. 1051–1076, 2006.

MALLICK, B. K. Growth of income and regional inequality in India. **Journal of Applied Economics**, v. 12, n. 2, p. 253–276, 2009.

MILLO, G.; PIRAS, G. Splsm: Spatial panel data models in R. **Journal of Statistical Software**, v. 47, n. 1, p. 1–38, 2012.

MINSKY, H. P. (1986). **Stabilizing an Unstable Economy.** New York, USA: Mc-Graw Hill, 2008.

MISSO, F. J.; JAYME JR., F. G.; OLIVEIRA, A. M. H. C. Desenvolvimento financeiro e crescimento econômico: teoria e evidência empírica para as unidades federativas do Brasil (1995–2004). **Análise Econômica**, n. 63, p. 191–227, mar. 2015.

PAULA, L. F. Sistema financeiro e o financiamento da inovação: uma abordagem keynesiana-schumpeteriana**. Encontro Nacional de Economia,** v. 39, 2011.

PENROSE, E. (1959). **A Teoria do Crescimento da Firma.** Campinas: Editora da Unicamp, 2006.

PIRES, M. C. de C. Crédito e crescimento econômico: evidências para os municípios brasileiros. In: **Encontro de Economia da Região Sul – ANPEC Sul**, 2., 24 out. 2005, Porto Alegre. Anais [...]. Niterói: ANPEC, 2015.

ROMERO, J. P.; JAYME JR., F. G. Crédito, preferência pela liquidez e desenvolvimento regional: o papel dos bancos públicos e privados no sistema financeiro brasileiro (2001–06). **Ensaios FEE**, v. 34, n. 1, p. 253–86, jul. 2013.

SANDRONI, P. **Dicionário de economia do século XXI.** 3ª edição. Rio de Janeiro: Record, 2007.

SANTOS, L. M. S.; FIGUEIREDO, A. M. R. Efeitos do crédito para o desenvolvimento econômico das regiões geográficas imediatas de Mato Grosso do Sul. **Interações** (Campo Grande), v. 22, n. 2, p. 469–487, 2020.

SCHUMPETER, J. (1997). **Teoria do Desenvolvimento Econômico**. Série os Economistas, São Paulo: Editora Nova Cultural, 1997.

SCHUMPETER, J. A. (1983) **Capitalismo, Socialismo, Democracia.** Rio de Janeiro: Zahar [1942].

SCHUMPETER, J. A. **The Theory of Economic Development:** An Inquiry into Profits, Capital, Credit, Interest and the Business Cycle. Cambridge, Massachusetts: Harvard University Press, 1949.

SILVA, R. C.; GOMES, J. F.; MARTINS, A. G. **Business Intelligence and Analytics:** From Big Data to Big Impact. Springer, 2017.

SOEDARMONO, W., MACHROUH, F., TARAZI, A. Bank competition, crisis and risk taking: Evidence from emerging markets in Asia. **Research in International Business and Finance**, v. 42, p. 445–470, 2017.

SOUZA, N. de J. de. **Desenvolvimento econômico.** 5ª edição revisada. São Paulo: Atlas, 2007.

STUDART, R. O sistema financeiro e o financiamento do crescimento: uma alternativa pós-keynesiana à visão convencional. **Revista de Economia Política**, vol. 13, nº 1, janeiro/março, 1993.

TOMAZZIA, E. C.; JESUS, C. S. de; GONÇALVES, F. de O. Dimensões do mercado de crédito e crescimento econômico municipal no Brasil. **Revista Nexos Econômicos**, Salvador, v. 7, n. 2, p .72–98, dez. 2013.

TORRES, D. A. R.; VIEIRA, F. C.; CRUZ, A. C. Sistema financeiro, sistema de inovação e desenvolvimento regional: um estudo sobre a relação entre crédito e inovação para os estados da região sudeste brasileira. **Revista de Economia,** v. 41, n. 1 (ano 39), p. 95–116, janeiro/abril, 2015.

ZENDRON, P. (2006). Instituições Bancárias, Concessão de Crédito e Preferência pela Liquidez: Três Ensaios na Perspectiva Pós-Keynesiana**.** Rio de Janeiro: UFRJ. Tese (Doutorado) – Instituto de Economia Industrial, Universidade Federal do Rio de Janeiro. Caps. 2 e 3.

TSURU, K. Finance and growth: some theoretical considerations and a review of the empirical literature. **OECD Economics Department Working Papers**, n. 228, p. 1–53, 2000.