# The role of Public Bank Credit to Sustainable Growth in Brazil

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## Introduction

Brazil currently finds itself amid a period of optimistic expectations regarding economic growth. President Lula demonstrates enthusiasm for the strategy of credit expansion as a mechanism to stimulate economic activity. His government has initiated institutional innovations to stimulate credit, and himself has sparked public discussions and deep criticism regarding the Central Bank's inaction in reducing the basic interest rate, Selic. However, this economic optimism unfolds against the backdrop of an urgent climate crisis, requiring a huge transformative structural change.

There are several estimates for Brazil's climate finance needs. For instance, the World Bank (2023) estimates the investment needed for climate action at about 1.2 %of GDP per year over 2022–2050. Nonetheless, infrastructure spending has dropped dramatically in Brazil in the last decades, from approximately 4.8 percent of GDP in the 1980s to just over 2 percent in the 2010s, a volume insufficient to replace depreciated capital, let alone expand the infrastructure.

The history of Brazilian Public Banks is intertwined with the acknowledged incapacity of the private financial sector to offer credit under conditions conducive to Brazilian economic development. In the 1950s, the private financial markets struggled to keep pace with Brazil's rapid structural transformations, prompting solutions through public institutions that were absent in the private market. Today, climate and development challenges call for new solutions once again.

Post-Keynesian economics do not believe in a "financial crowding-out effect" of public banks credit expansion. We aim to demonstrate that the actions of public banks facilitate the execution of private banks' strategy.

The finance provided by public banks has essential characteristics, alleviating and mitigating the instability of the financial system. Firstly, as principle, it should operate counter-cyclically, expanding credit creation during periods of economic contraction when private banks reduce their willingness to extend credit. Therefore, they play a crucial role in alleviating uncertainty by providing liquidity during times of heightened liquidity preference, a common trait of the private sector in uncertain contexts.

Public Banks also encourage long-term investments, particularly in strategic sectors such as infrastructure and sustainability. Additionally, they help shape and create markets, developing sectors with high potential for economic and social impact, particularly those focused on sustainable development. The financing of these projects is often coordinated with public policies and state planning, ensuring a synergistic action between the public and private sectors to promote sustainable economic development (Paula, Raccichini, and Bastos, 2024).

The objective of this study is to analyze the role of banks and the impact of credit in stimulating aggregate demand and economic growth through the exploration of a Post-Keynesian theoretical framework, along with an empirical analysis. Specifically, we are interested in the role of public banks and their interaction with the strategies and behaviors of private banks, particularly during times of crisis. Accordingly, we will examine the policy responses and behavior of public banks during the 2008 financial crisis and the COVID-19 pandemic in Brazil.

We utilize a theoretical framework grounded in Keynes's Theory of Liquidity Preference and Minsky's Financial Fragility Hypothesis. We calculate the Credit Impulse to measure the impact of credit expansion on the economic activity and utilize the Disaggregated Banking Multiplier (DBM) (Alves Jr., Dimsky, and de Paula, 2008; Pimentel and Alves Jr, 2021) to analyze public and private banking strategies.

The first section of this paper presents the theoretical framework and the relationship between credit and economic growth. Keynes states that the transition from one level of economic activity to a higher level increases the demand for liquidity, which can only be satisfied, at a given interest rate, if banks are willing to lend more. He emphasizes that "in general, the banks hold the key position in the transition from a lower to a higher scale of activity" (Keynes, 1937, p. 668). The second section calculates the credit impulse, disaggregated between earmarked and non-earmarked credit, as well as for business firms and households, to analyze the effects of the credit market policy measures implemented during the COVID-19 crisis and the role of public banks. The third section presents the DBM and analyzes the strategies of public and private banks in Brazil during the global financial crisis of 2008. The final section discusses the role of public banks in climate transition. Finally, the concluding remarks summarize the findings of the paper.

## 1. Credit expansion and economic growth

We shall argue that the process of credit expansion arises from intertwined decisions taken by banks, businesses firms and households, reflecting Keynes's concept of liquidity preference (Keynes, 1936) between agents desires to hold more liquid or illiquid assets given their confidence levels in their profit prospects in a world of fundamental uncertainty. This movement of credit creation by banks follows then fluctuations in liquidity preference which entails risk perception according to Minsky's 'financial instability hypothesis' (Minsky, 1982, 1986).

If we assume that an economy at a steady state is faced with an optimistic exogenous improvement in profit expectations by businesses firms, an increased demand for capital goods by investors will arise, if it can be financed. Thus, even at this initial stage the improved expectations will derive an increased demand for means of payment, borrowing funds from banks. [1]

The difference in finance between a "steady rate of investment" and an "increased rate of investment", that ultimately will lead to a higher economic growth rate and the role of banks in providing the necessary finance for this change is described by Keynes (1937a)

> if investment is proceeding at a steady rate, the finance (or the commitments to finance) required can be supplied from a revolving fund of a more or less constant amount, one entrepreneur having his finance replenished for the purpose of a projected investment as another exhausts his on paying for his completed investment. But if decisions to invest are (e.g.) increasing, the extra finance involved will constitute an additional demand for money. Now, a pressure to secure more finance than usual may easily affect the rate of interest through its influence on the demand for money; and unless the banking system is prepared to augment the supply of money, lack of finance may prove an important obstacle to more than a certain amount of investment decisions being on the tapis at the same time (Keynes, 1937a, p. 247)

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[1] Davidson (1968) notes that these newly created funds will be used by the firms to make payments that ultimately become income, increasing money balances of households *pari passu* with the growth in investment expenditures.

Therefore, finance is only a revolving fund and there's no need to credit expansion as long as the rate of economic activity is unchanged. Later, Keynes will reinstate this fundamental role of banks providing the necessary expansion in finance to investments and economic growth.

This means that, in general, the banks hold the key position in the transition from a lower to a higher scale of activity. If they refuse to relax [i.e., to provide additional finance], the growing congestion of the short term loan market or the new issue market, as the case may be, will inhibit the improve no matter how thrifty the public purpose to be out of their future incomes. On the other hand, there will always be exactly enough ex-post saving to take up the ex-post investment and so release the finance which the latter had been previously employing. The investment market can become congested through shortage of cash. It can never become congested through shortage of saving. This is the most fundamental of my conclusions within this field. (Keynes, 1937b)

Following Keynes, Minsky (1982, 1986) developed his financial fragility hypothesis. Facing the optimistic exogenous improvement in profit expectations, the expansion of finance by banks produces two simultaneous effects: the pace of economic activity increases, and financial fragility intensifies. Optimism is manifested through a reduction in the *perception* of risk.

From the perspective of banks' asset portfolios, as their expectations become more optimistic, with a reduced liquidity preference they begin to prioritize profitability, and will increasingly rely on more aggressive financial structures, seeking to extend maturities and acquire higher-risk assets, thereby reducing the ratio of liquid to less liquid assets in their operations which results in an increased share of longer-term loans in their portfolios. Deliberately seeking to increase the mismatch between assets and liabilities, extending the maturity of assets more rapidly than that of liabilities, which allows them to widen spreads, i.e., the differential between borrowing and lending interest rates.

## 2. The role of credit in response to the COVID-19 crisis in Brazil

Brazil's policy responses to the public health emergency caused by the COVID-19 pandemic crisis encompassed many initiatives with the objective of supporting economic activity and improve living conditions for the population in the country as such as the separation of expenses incurred to combat COVID-19 from the budget of the Federal Government, creating an extraordinary regime to allowed the expansion of public expenditures and the reimplementation and expansion of Cash Transfer programs and the anticipation of payments of other social programs.

Among the responses a series of measures aimed at the credit market were introduced: (Brasil, 2020)

- Public, state owned, Federal Savings Bank ("Caixa") extended R$ 108 billion (US$20,3 billion[2]) in credit lines to small-and medium-sized firms aimed at working capital, purchase of payroll loan portfolios from medium-sized banks and agribusiness. The bank also cut interest rates on some types of credit and offered clients a grace period of 90 days.

- Public, state owned, "Banco do Brasil" extended R$ 100 billion (or US$ 18,8 billion) increase in its credit lines, aimed at working capital, investments, prepayment of receivables, agribusiness and credit to individuals. The bank also increased the credit limit for 13 million customers.

- Public, state owned, The National Development Bank ("BNDES"): implemented several measures, such as: i) opening of a working capital loan line for micro and small firms; ii) 6-month interruption of outstanding loan payments, with no late interest payment; iii) suspension of amortizations of R$ 19 billion (US$ 3.6 billion) for direct operations and R$ 11 billion (US$ 2.1 billion) for indirect operations.; iv) scope expansion of the "BNDES Credit Small Business" line, covering from micro to R$ 300 million annual turnover companies (US$ 56 million). The credit limit per year increased from R$ 10 million to R$ 70 million (US$ 13,2 million). The companies had a 24-month grace period and five years of total term to

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[2] For an Exchange rate of R$ 5,30/U$ as the average for the official World Health Organization (WHO) pandemic period of march/2020 to may/2023.

pay for these new loans; v) created a R$ 2 billion (U$ 378 million) credit line to increase emergency capacity, medical material and hospital equipment.

- Febraban, (Brazilian Federation of Banks) announced an agreement by which the five largest banks in the country (Banco do Brasil, Caixa, Itaú, Unibanco, Bradesco and Santander) responded to requests for a 60-day extension for the debt maturity of households and micro and small firms.

- PROGER/FAT: credit for Micro and Small Firms (R$ 5 billion, or US$ 950 million)

- Credit contracting requirements: simplification and waiver of documentation (CND) for credit renegotiation.

- Restructured loans: flexibilization of provisioning rules for a period of 6 months.

- Conservation Capital Buffer (CCB): reduction from 2.5% to 1.25% for 1 year and setting a transitional arrangement to restore the original 2.5% CCB in the subsequent year.

- Temporary reduction in the IOF tax rate on credit operations, with an expected impact of R$ 7 billion (US$ 1.3 billion).

### 2.1 A measurement: The Credit Impulse.

There is a body of empirical economic literature that fails to find a significant statistical relationship between credit expansion and economic growth. These results arise from the comparison of the expansion of the credit stock with developments in the flow of economic activity.[3] Biggs, Meyer and Pick (2010) proposes that to the extent that spending is credit financed, GDP will be a function of new borrowing, or the "flow of credit". The change in the flow of credit is the "credit impulse".

An approximation for these measures of "flow of credit" and "credit impulse" can be calculated from the stock of credit. This approximation was used originally

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[3] Calvo, Izquierdo and Talvi (2006a, 2006b) Claessens, Kose and Terrones (2008), IMF (2009)

by Biggs, Meyer and Pick (2010) and it is applied for Brazilian data by BNDES (2023) and Santos, Costa and Braga (2023).

$S_t$: Stock of credit

$\Delta S_t$: Flow of credit

$\Delta S_t - \Delta S_{t-1}$: Credit impulse

On the other hand, BCB (2021) calculates a much more precise measurement of the "flow of credit" and "credit impulse".

$$\Delta S_t = New\ Operations_t + Interest_t + f(Exchange\ Rate_t) - Payments_t - Writeoff_t$$
$$Flow\ of\ credit_t = New\ Operations_t - Payments_t$$

Changes in stock of credit changes based on new credit operations, amortizations, and other entries. According to the formula, it can be stated that the stock of credit in the end of period, $S_t$, is the sum of the stock of credit from the previous period, $S_{t-1}$, plus the value of new credit operations, accrued interest during the period, and the foreign exchange adjustment of contracts indexed to foreign currency, and minus the payments made and the balances written off as losses.

This "flow of credit" is then interpreted as the net volume of resources transferred to households and businesses by the national financial system (BCB, 2021)

To calculate the 'credit impulse' for Brazil from 2014 to 2024, we utilized data from the 'monetary and credit statistics tables' provided by the Brazilian Central Bank (BCB). The time period for analysis is determined by data availability.

The data available provides us directly: the stock of credit $S_t$, new credit operations, and the operations indexed in foreign currency. We can infer the accrued interest during the period, using a variable provided by the BCB, the Credit Cost

Index (in portuguese, ICC)[4]. We do not have data available on balances written off as losses by banks.

$$Interest_t = (1 + i) = \sqrt[12]{(1 + ICC)}$$

## 2.2 The Credit Impulse in Brazil amid the COVID-19 Pandemic

Since the data provided by the Central Bank for our methodology begins in 2014, we resorted to the approximate calculation by BNDES (2023) for a brief history of credit impulse in the previous years.

Between 2002 and 2008, the credit impulse was positive (except for 2003). This period was marked, especially from 2004 onwards, by an increase in formal employment and income levels, enabled by both economic growth and income redistribution policies such as the increase of the minimum wage and the expansion of income transfer social programs. It was also a period of decline in the basic interest rate Selic. BNDES (2023) also highlights that it was a moment of significant institutional changes, including the regulation of payroll loans, fiduciary alienation, and affectation assets in real estate financing, as well as the new bankruptcy law in 2005.

Between September 2008 and 2009, in the context of the global economic crisis, the credit impulse became significantly negative, led by the non-earmarked credit, illustrating the elevation of liquidity preferences that occurred in the Brazilian banking market. From 2009 to 2010, following the implementation of counter-cyclical credit measures (which will be discussed in more detail in section 3), the credit impulse returned to positive territory. Between 2011 and 2013, the credit impulse was closer to neutrality but with slightly negative values and a declining trend, following the pattern of non-earmarked credit, while earmarked credit had a slightly positive contribution.

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[4] The ICC incorporates into the cost of credit for this period the interest rates of all active operations contracted in the current and previous periods. The ICC considers, from the debtor's perspective, the disbursements for interest payments, tax charges, and operational costs arising from the credit agreement. BCB (2018)

From 2014, as we can see in Graph 1, the credit impulse entered a contractionary phase, with a simultaneous retraction of the impulses generated by both "Livres" (non-earmarked) and "Direcionados" (earmarked) credit as show in Graph 3. This contractionary period for the credit impulse followed the economic slowdown in 2014 and the subsequently recessionary period of 2015-2016, amid a political crisis in Brazil and a reversal in economic policy.

Graph 1: Credit Impulse – Total (R$ Billions, June 2024)
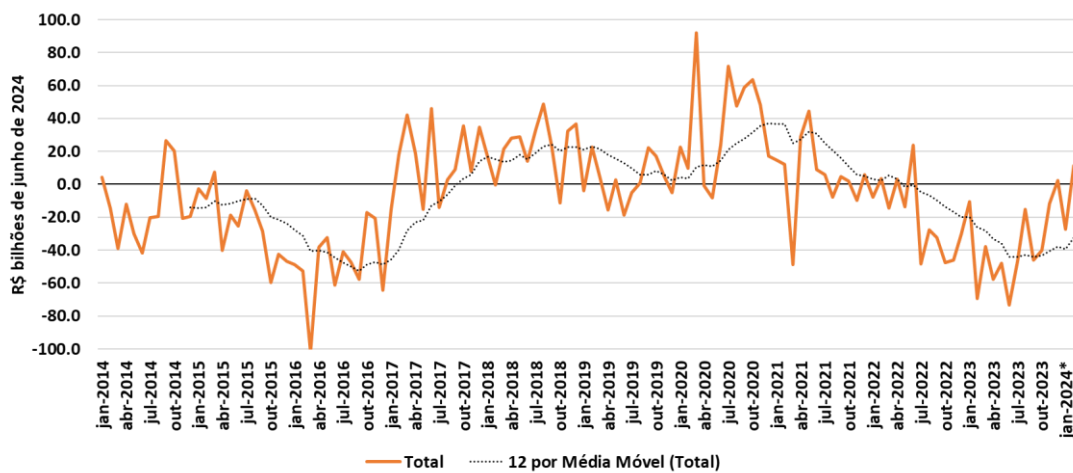


Source: BCB data deflated with CPI/IBGE, elaborated by authors.

Graph 2: Credit Impulse- earmarked ("Direcionado", red line) and non-earmarked ("Livre" blue line). R$ Billions, June 2024
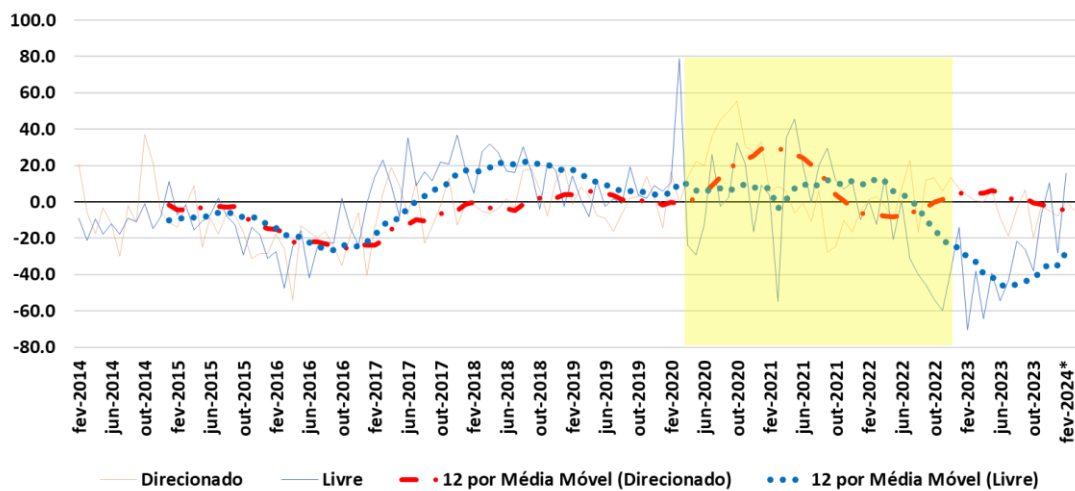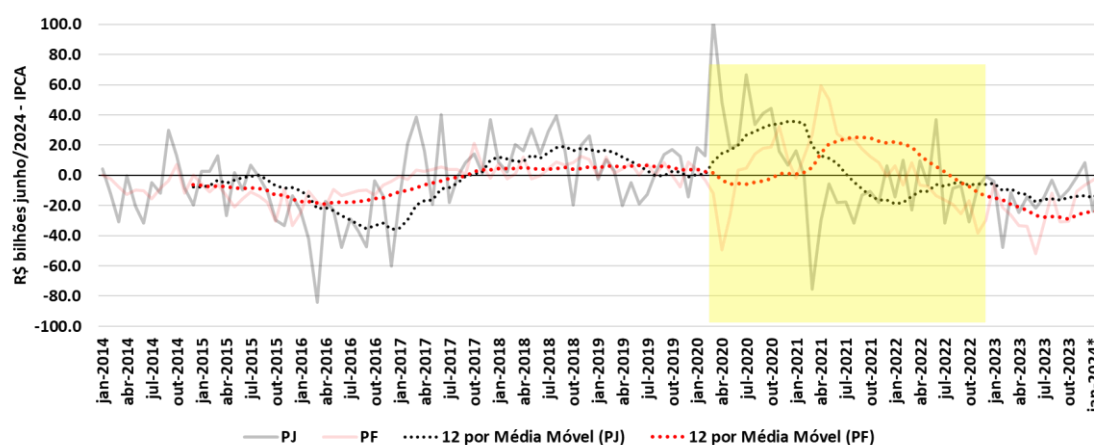


Source: BCB data deflated with CPI/IBGE, elaborated by authors.

In 2020, the credit impulse reached its highest value, both by our methodology calculations but also according to BNDES (2023). This was due to the policies adopted to ensure liquidity for companies during the crisis resulting from Covid-19, as evidenced by the substantial contribution of the earmarked segment ("Direcionados" in Graph 2).[5]

It is noteworthy that, in addition to the increase in lending, many implemented measures involved the postponement of debt payments (as discussed in the previous section), significantly improving the cash flow for business firms. This can be seen in the Graph 3 below, as "PJ" is credit to business firms while "PF" credit to households.

Graph 3: Credit Impulse- Firms (black lines, PJ) and Households (red lines, PF)
R$ Billions, June 2024



Source: BCB data deflated with CPI/IBGE, elaborated by authors.

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[5] Earmarked credit is primarily provided by public banks. Caixa, for instance, is the main provider of housing credit. A significant portion of earmarked credit comes from development bank, BNDES.

## 3. Public banks strategic behavior: lessons from the 2008 crisis response in Brazil.

Another dimension of analysis is through the comparison of the strategic behavior of public and private banks. Keynes (1930) highlights the fact that banks generally exhibit similar strategic behaviors regarding the pace of credit expansion. One risk faced by banks that expand credit at a faster rate than others is the potential loss of reserves to more conservative banks.

When faced with a crisis and heightened uncertainty, banks' liquidity preference increases, leading them to adopt pro-cyclical behavior by contracting credit creation. Various authors argue that, in times of crisis, public banks should assume a counter-cyclical stance, in contrast to the behavior typically adopted by private banks. They highlight the positive aspect of maintaining the necessary credit expansion to sustain economic activity and employment, thereby indirectly benefiting private banks by enabling the refinancing of borrowers and mitigating increases in default rates.

Alves Jr., Dimsky, and de Paula (2008) revisit Keynes (1930) argument to highlight another important aspect of the counter-cyclical role of public banks, one that has been less explored in the literature: the migration of reserves from banks that expand their loans to those that adopt a more conservative stance. Using a Disaggregated Bank Multiplier (DBM) approach, the authors demonstrate that the balance sheets of individual banks depend not only on individual decisions but also on the actions of other banks. In this sense, during a crisis, when a public bank maintains or even increases its lending rate, part of its reserves migrates to private banks, providing them with the reserves they seek to satisfy their heightened liquidity preference.

This original DBM assumes that the market share of deposits captured by each bank remains stable over time. Alves Jr. and Pimentel (2021) expand the DBM model by incorporating two scenarios: i) the market share of more aggressive banks increases as they reduce their reserves; ii) aggressive banks lose market share as they decrease their reserve ratios.

### 3.1 *The disaggregated bank multiplier*

Traditionally, the money multiplier is the mathematical expression of the banking system's ability to expand the means of payment, given the monetary base, the reserve requirements imposed by the monetary authority, and the banks' preference for maintaining liquid reserves, as well as the public's preference for state currency.

The concept of the money multiplier has been rightly criticized for quite some time. It is based on the idea that banks respond to an increase in their reserves by expanding loans through a stable relationship. Consequently, the banking system's ability to expand the money supply could be controlled by the monetary authority through regulation of both the monetary base and reserve requirements. However, this conception of the money creation process faces several well-known difficulties, as noted by Moore (1988).

The first criticism is that the Central Bank, in practice, always supplies the banking system with the reserves it needs, thus lacking control even over the monetary base. The banks themselves do not have full control over the volume of their loans, as they negotiate pre-approved lines of credit, the utilization of which depends solely on the clients. This is particularly true for overdraft protection and credit cards, where limits are pre-established. Therefore, unless banks intend to restrict the granting of new lines of credit to accommodate the demand stemming from pre-approved lines, they will be compelled to seek reserves in the market or from the Central Bank. Considering the externalities of the banking system, the risk that a restriction on credit could lead to a crisis prompts the Central Bank to adopt a more accommodative stance. Ultimately, the only measure the Central Bank can employ to control bank credit is to set the cost at which banks access reserves (Moore, 1988).

Another criticism relates to the relevant concept of money that should be controlled through regulation of the monetary base. In modern financial systems, demand deposits are not the only deposits functioning as money issued by banks. Gurley and Shaw (1955), Minsky (1982, 1986), Moore (1988), Alves Jr. (1993), and Carvalho (2015), among many others, have argued that there are various definitions of money in light of the financial innovations introduced by financial institutions in

contemporary monetary economies. These are new assets for the public, and liabilities of financial institutions, which share properties of money and emerge in response to demand.

Although the money multiplier has lost its conceptual status, there is an important logic inherent in its construction that, when revisited, illuminates critical aspects of the functioning of the financial system. The multiplier is founded on the principle that it is the banking system, rather than individual banks, that creates a significant portion of the money currently in circulation. This creation always relies on the interaction between financial institutions and their relationship with the Central Bank

The interaction among banks, financial institutions, and non-financial institutions has garnered the interest of modern regulators, particularly since the 2008 crisis. This interaction represents a crucial avenue for assessing potential contagion within the financial system and systemic risk. Consequently, there is an effort to develop methodologies for evaluating the extent of these interactions and the associated risks.[6]

Ironically, the conventional money multiplier, while synthesizing one aspect of banking interaction, ultimately obscures it. It can even be understood as if the money creation process were occurring within a banking system comprising only one large bank or, alternatively, as if banks were rigorously identical. The process of money creation encapsulated in the multiplier disregards any considerations of the differences among banking strategies and the economic and financial interdependence that would emerge from such differences. The focus of the multiplier analysis has never shifted to anything other than establishing a causal relationship between the monetary base and money creation.

Nevertheless, the study of the interdependence within the banking system, which is established during the money creation process, can be enhanced through adaptations of the multiplier, provided that the focus shifts from controlling money creation and stock to elucidating the interactions among financial institutions. The Disaggregated Banking Multiplier (DBM), developed by Alves Jr., Dymski, and Paula

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[6] Silva, Silva, and Tabak (2017) for the Brazilian context, and the critical review of the literature by Jackson and Pernoude (2020).

(2008), aims precisely to identify the consequences of changes in the strategies of certain banks on the balance sheet structures of each bank, as well as the effects on loan supply and deposit creation throughout the entire system.

### 3.2. DBM and Balance Sheet Interdependence

In the DBM model, the index 'i' in $M_i$ emphasizes that the multiplier is the result of the financial decisions made by various individual banks. In this model, the public's preferences for deposits are represented, as is customary, by the variable 'd' (demand deposits/M1). Each bank, or group of banks, is characterized by a market share of deposits, $\Gamma_j$, initially considered stable over the analysis period; in addition, the ratio of reserves $R_j$ to deposits is defined for each bank based on its liquidity preference. The overall reserve ratio of the banking system will be the average reserve ratio of each bank, weighted by its market share of deposits, or formally:

$$R = \Sigma\, R_j \Gamma_j$$

The DBM, whose value is exactly equal to the conventional banking multiplier, will thus be defined as.

$$M_i = 1/[1 - d(1 - \Sigma\, R_j \Gamma_j)]$$

$M_i$ is now relevant because its elements allow for the construction of the balance sheets of any individual bank or consolidated groups of banks. Considering any given bank $j$, represented by a simple structure in which the assets consist of reserves and loans, while the liabilities are comprised of third-party deposits and net worth, its balance sheet is as follows:

Table 1 - Balance Sheet of Bank $j$

| Assets | | Liabilities | |
|---|---|---|---|
| Reserves | $Rj\, d\, \Gamma j\, Mi$ | Deposits | $d\, \Gamma j\, Mi$ |
| Loans | $(1 - Rj)d\, \Gamma j\, Mi$ | Net Worth | NW |
| TOTAL | $d\, \Gamma j\, Mi$ | TOTAL | $NW + d\, \Gamma j\, Mi$ |

Table 1 demonstrates that the items on the balance sheets depend on individual decisions, represented by the decision to maintain reserves $R_j$, which is a

result of Bank $j$'s liquidity preference and the reserve requirements set by the monetary authority, in addition to the market share $\Gamma_j$, considered constant by Alves, Dymski, and Paula (2008). Beyond individual decisions, by incorporating the DBM in the definition of assets and liabilities, the influence of the strategies employed by other banks on Bank $j$'s balance sheet is explicitly acknowledged.

Bank $j$ can represent either an individual bank or a consolidated group of banks. If it decides to become more or less aggressive—specifically, if it chooses to reduce or increase its reserves—one could not only inquire about the implications for the multiplier but also about the effects on the balance sheets of other banks.

$M_i$ will increase in value if the reserve ratio of any individual bank or consolidated group of banks decreases, as this will lead to a reduction in the reserve ratio of the banking system as a whole ($\Sigma\ R_j\Gamma_j$), given the constant $\Gamma_j$. Consequently, the assets and deposits of the entire banking system will increase. Furthermore, by reducing its reserves, *ceteris paribus*, this bank or consolidated group will contribute to an increase in the share of loans in the total assets, represented by $\frac{(1-Rj)d\,\Gamma j\,Mi}{d\,\Gamma j\,Mi}$ or $(1-Rj)$, and in leverage, assuming that net worth remains unchanged.

Alves Jr., Dymski, and Paula (2008) conclude that the effects of reductions in the reserves of a consolidated group of banks produce both global effects and asymmetries among banks. All else being equal, this would result in an increase in the banking multiplier, the total assets and liabilities of the system, the volume of credit operations, and deposits. All banks, not only those that are Aggressive (which have reduced their reserves) but also conservative ones (which have maintained their reserves), would exhibit greater leverage of assets (assets/NW) and loans (loans/NW). However, asymmetries will arise, as Aggressive banks become more leveraged (loans/NW) than their Conservative counterparts. This asymmetry is also reflected in the liquidity ratio, which, by definition (reserves/deposits), will deteriorate in the more Aggressive banks.

In the simulations of the DBM by Alves Jr., Dymski, and Paula (2008), the assets of banks and their deposits evolve concurrently when changes occur in the reserve coefficients. This occurs due to the assumption of stability in the market share $\Gamma_j$. By relaxing this simplifying assumption and acknowledging that market

share may shift when banks alter their financial strategies, the growth of assets and deposits—rather than just bank loans and reserves — exhibit asymmetric behavior.

The relaxation of the constant market share hypothesis contributes to the development of a more realistic model, as it is not possible to dismiss a priori the likelihood that the market share of deposits may change. This could occur either due to shifts in lending policies and the effectiveness of marketing strategies or because of external shocks that affect each bank's capacity to attract deposits.

During economic crises, for instance, a typical public response is to transfer part of their financial assets to banks perceived as more secure. In Brazil, public banks are regarded as safer, likely due to the implicit guarantee of immediate government support. Large private banks, in times of banking stress, may also benefit from this type of implicit guarantee, as they are considered too big to fail. Furthermore, as banks encourage borrowers to maintain average balances in deposits, an increase in the loan market share can be reflected in a corresponding increase in the deposit market share.

The alteration of the deposit market share influences the asymmetric effects of changes in reserve requirements by affecting the intensity of reserve migration between Aggressive and Conservative banks.

Pimentel and Alves Jr. (2021) demonstrate that when the Aggressive Banks gains market share, the expansion of loans and deposits within the system is amplified. However, the migration of reserves to the Conservative Banks is reduced.

If the increase in market share of deposits benefits the Conservative Bank, on one hand, the growth of loans and deposits in the system is mitigated due to the dampening effect on the multiplier resulting from the reduced market share of the Aggressive Bank, which has decreased its reserves. On the other hand, the slower expansion of the money supply eases the leakage of reserves from the financial system to the public. Additionally, the migration of reserves from aggressive banks to public banks increases, improving the chances for Conservative Banks, to build a more liquid asset structure.

### 3.3. Public vs Private Banks Behavior in response to the 2008 financial crisis in Brazil

After a period of accelerated credit expansion between 2003 and 2008, Brazilian banks faced a sudden negative shift in the economic environment, triggered by two major events. The first was the collapse of Lehman Brothers in the last quarter of 2008, which plunged the global economy into its most severe crisis since the 1930s. The second was the Greek crisis at the end of 2010, which dashed hopes for a swift economic recovery. In response to the growing uncertainty, Brazilian private banks, as expected, exhibited a greater preference for liquidity, slowing the pace of credit issuance, increasing provisions, and boosting liquid assets on their balance sheets, as highlighted by Freitas (2009), Vasconcelos, Klauman, and Ipiranga (2018), and Paula and Alves Jr. (2020), among others.

To prevent the private banking adjustment from turning into a negative credit shock, the federal government, as part of its counter-cyclical policies, instructed public banks—primarily BNDES, Caixa Econômica Federal, and Banco do Brasil (BB)—to expand credit supply under favorable conditions. In the government's assessment, this was a necessary condition to maintain economic activity and avert a financial crisis. Not only would policies aimed at stimulating investment and consumption decisions face no financing constraints, but also the refinancing needs of domestic companies would be facilitated.

The overall impact of public banks' actions, along with other counter-cyclical economic measures, was positive. Not only was the level of credit maintained (Mendonça and Deos, 2012; Paula and Alves Jr., 2020), but formal and informal employment levels also grew rapidly. Additionally, investments, which tend to plummet in such circumstances, were elevated to over 20% of GDP from 2010 to 2014.[7]

The positive role of public banks in the government's counter-cyclical policy, however, faced objections. The first is that the large amount of funding provided to public banks would have increased the gross public debt and, therefore, was responsible for keeping the Selic rate (Brazil Central Bank's base interest rate) higher than would have been appropriate. The entire yield curve would have been

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[7] IBGE/CNT

affected, raising the cost for firms to access credit lines from private banks or funding from the capital markets.

The second argument in this "financial crowding-out" thesis is that the favorable conditions offered by public banks merely attracted demand for financing that would otherwise have been met by private banks at market costs, without the need for subsidies that would further burden public finances. In this sense, the reduction in the cost of public bank credit lines only led to a "shift in funding sources" (Lazarini et al., 2015; Salvador, 2017), without stimulating investment. It is argued that this inhibited the supply of long-term private financing and added strain to the public deficit.

We will use the framework of DBM presented in the previous section to analyze the strategic response of the five largest Brazilian banks to the 2008 financial crisis. The banks are consolidated into two groups: Aggressive Banks, representing those that decide to reduce their reserve ratios, Conservative Banks, representing those that maintain their cash reserve ratios. This classification aims to explore the positions adopted by Public banks (Banco do Brasil and Caixa), which expanded their loan portfolios throughout the crisis that began in 2008. In contrast, Private Banks (Itaú, Santander and Bradesco), as predicted by the liquidity preference theory, responded to increased uncertainty by controlling credit expansion, focusing less on growth and more on client selection, while also seeking to increase their liquid assets.

The model indicates that Brazilian Public banks, acting as the Aggressive Banks, sought to sustain the overall level of credit and acted countercyclically. They not only helped contain default rates but also facilitated the migration of their reserves to Private banks, whose strategy aligned with that of the Conservative Banks. In this analysis, the DBM is enhanced specifically to account for the impact of changing market share on reserve migration and loan expansion.

The actions of Public banks do not harm private banks. In fact, reports from private banks at the crisis time provide evidence of their successful adjustment to circumstances of increased uncertainty through partnerships with the BNDES, improved borrower selection, and the choice to enhance the liquidity of their assets. These observations should not come as a surprise, as the counter-cyclical policy

ultimately benefited the private financial system itself. Macroeconomically, the actions of public banks facilitated the execution of private banks' strategies after the 2008 crisis, which generally involved a more selective approach to granting financing and a focus on achieving a more liquid asset profile.

Based on the DBM, it is therefore possible to argue that the conservative adjustment of private banks was made easier by the expansion of credit from public banks, not only through the control of defaults. With the migration of reserves, private banks absorbed reserves from public banks, increasing their ability to hold more liquid assets.

In this section, data from the balance sheets of the five largest Brazilian banks (Public: Caixa and Banco do Brasil – BB, and Private: Itaú, Santander, and Bradesco, these five banks collectively held approximately 80% of the total assets) are used to explain the period following the financial crisis of 2008 according to the MBD approach.[8]

The data is provided by the Central Bank through 'IF.data.' that contains the balance sheet data of financial conglomerates and independent institutions on a quarterly basis starting from the year 2000.

According to the DBM model, the main theoretical variables to be empirically observed are the evolution of loan creation characterizing a bank as more aggressive or more conservative, and the variation in the market share of bank deposits, which will determine which countercyclical effect will be enhanced: that of reserve migration or credit creation.

The following data were considered for analysis: For Loans: Credit Operations and Leasing, net of provisions. For Deposits, the sum of Demand Deposits, Savings Deposits, and Fixed-term Deposits was considered.

The year 2004 marks the beginning of an eight-year period during which banks consistently showed real expansion in their loans on a year-over-year basis. In the years leading to the crisis, from 2004 to 2007, this growth was driven by

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[8] Several mergers and acquisitions in the banking sector have occurred since the year 2000. To consolidate the data for these five banks, the values of the acquired banks up to the acquisition period have been added to the values of Itaú, Bradesco, Santander, Caixa, and Banco do Brasil.

private banks, which exhibited growth rates higher than those of public banks, as shown in Graph 4.

Graph 4 – Growth Rate (%) of Credit Operations and Leasing over 12 months – average of the last 4 periods. Bold Line: Public Banks, Dotted Line: private Banks
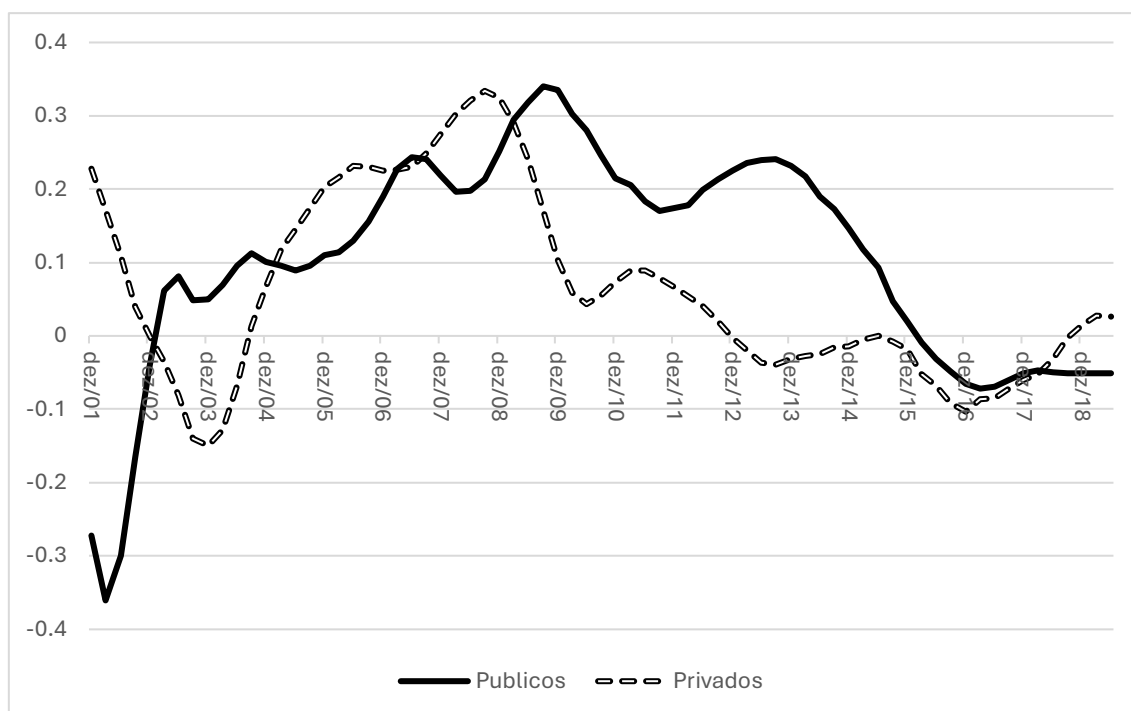


Source: BCB data deflated with CPI/IBGE, elaborated by authors.

After the 2008 crisis, there was a shift in the trend of loans from private banks, with the three banks behaving quite similarly (Graph 5): a temporary halt in their expansion trajectory in 2009, immediately following the crisis, followed by a resumption of growth from 2010 to 2012, albeit at more modest rates compared to pre-crisis levels.

In contrast, during this immediate post-crisis period, public banks reinforced their credit expansion trajectory, maintaining positive real growth rates until the end of 2014, two years after private banks had already halted their loan expansion.

Particularly noteworthy is the participation of Caixa during this period. While in 2008 Caixa had the lowest share of total loans at 8%, by 2017 it held the largest share, accounting for 30% of the total. The gain in Caixa's market share continued even during the period of loan contraction following 2014, thanks to a slower rate of contraction for Caixa compared to the others.

The end of 2015 marks the return of synchronized behavior between private and public banks, as both begin to exhibit negative credit growth rates.

Graph 5 – Share of Total Credit Operations and Leasing
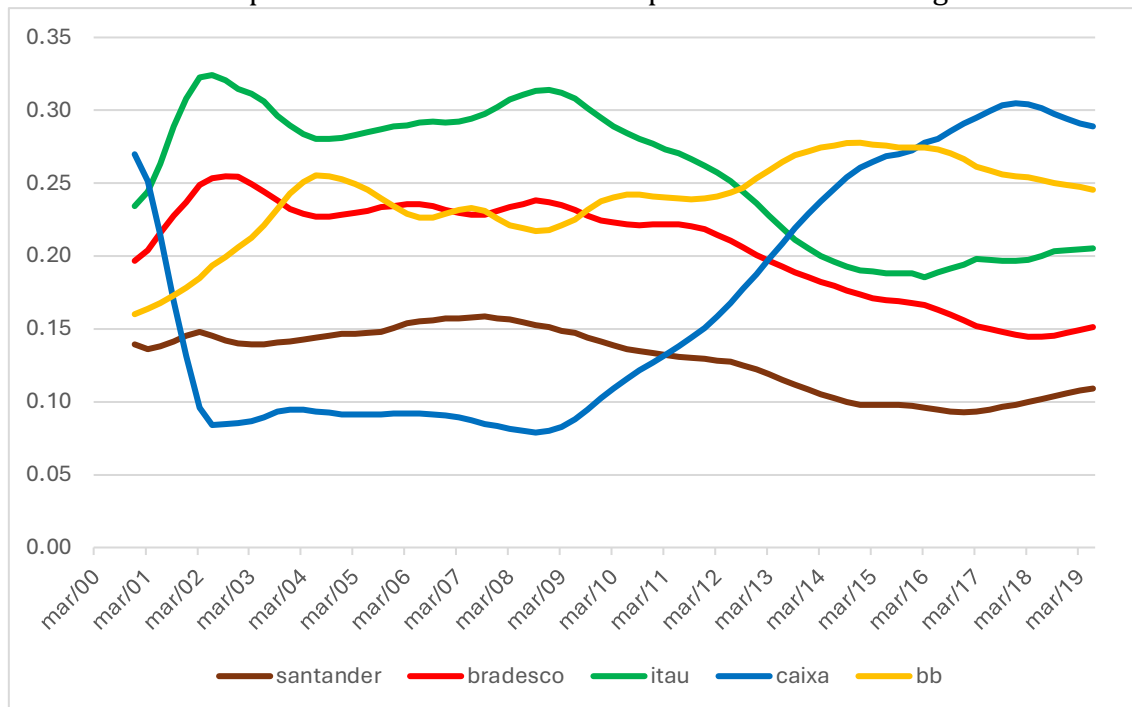
Another fundamental variable for the MBD analysis is the market share of bank deposits. Specifically, we want to know whether when banks expand their loans more rapidly than others, they gain market share of deposits, lose it, or if it remains constant. Graphs 6 and 7 show us that, during the period before the 2008 crisis, when loan growth was driven by private banks, resulted in a significant gain in market share for these banks compared to public banks. In contrast, from 2009 to 2013, when the credit expansion of public banks was significantly higher than that of private banks, public banks regained a portion of market share.
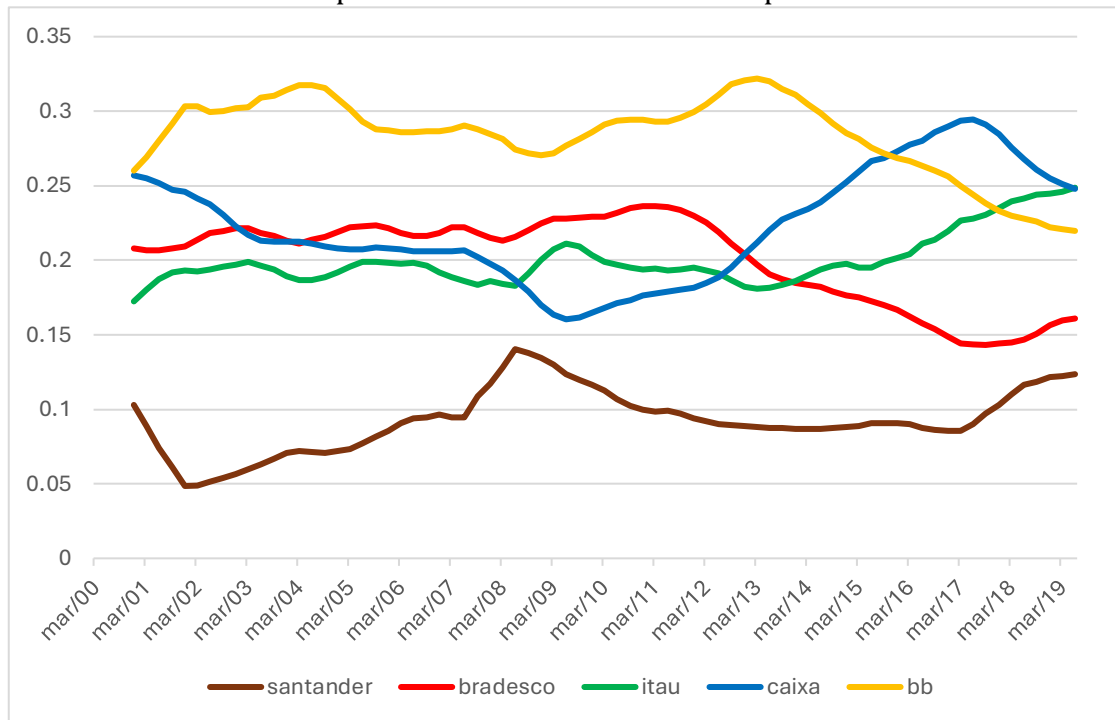
Graph 6 – Market Share of Bank Deposits – Public Banks (bold line) vs. Private Banks (dotted line)
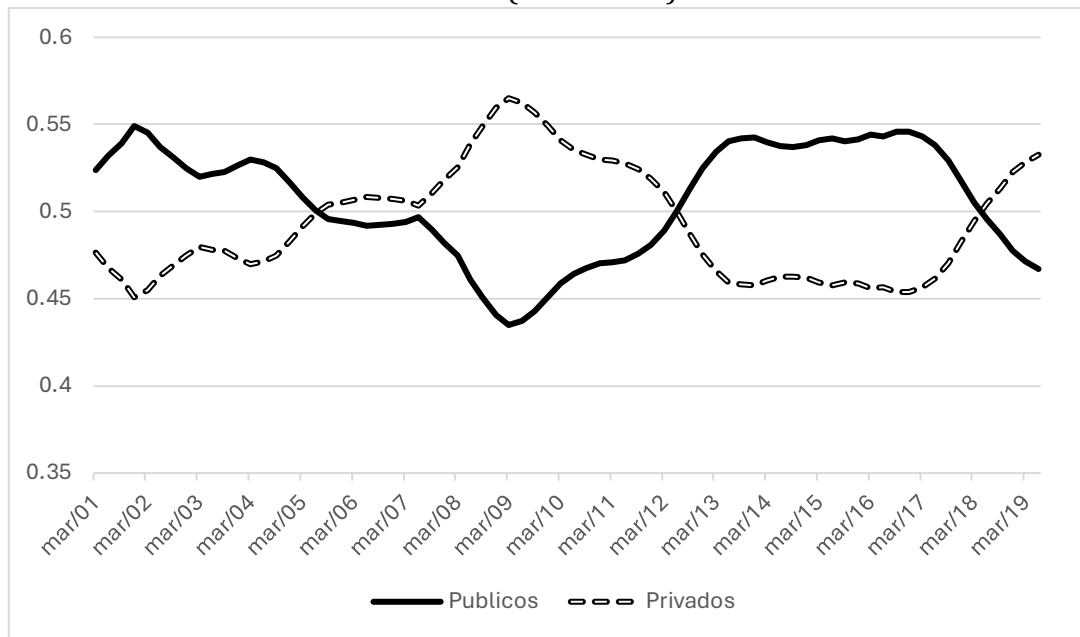


Source: BCB data, elaborated by authors.

When analyzing the separate data of the five banks, we can see that CEF also gained a significant market share of deposits from 2009 to 2017, paralleling its increase in share of total loans.

Graph 7 – Market Share of Bank Deposits



Source: BCB data, elaborated by authors.

## 4. The essential role of public finance in climate transition

Carney (2015) defines climate change as the "tragedy of the horizon," as its primary adverse effects will be felt by future generations, making it difficult to justify addressing them in the short term. Additionally, there is a divergence between the maturation period of a sustainable project and the timeframe in which private investors are willing to wait for a return on their investment. In this sense a well-structured, strong, and resilient financial system is essential for guiding investments in global public goods, such as the environment.

However, traditionally the financial system tends to reinforce the notion that climate change represents market failures; thus, it does not position itself as an adequate mechanism for addressing these issues in either the short or long term. In this context, Development Banks assume a crucial role by promoting public financing for the climate transition, innovating and creating foundations for the financial system to overcome barriers related to risk, investment timelines, and its transformative nature, in contrast to traditional brown investments (Chenet, 2019; Paula, Raccichini, and Bastos, 2024).

Regarding the financial risk associated with climate change, there are three possible pathways for the transmission of climate risk to the financial system. The first is physical risk arising from the impacts of climatic events, such as floods, droughts, and others that damage productive assets. The second is liability risk, which occurs when those affected by extreme events seek compensation and financial redress from those deemed responsible. Lastly, there is transition risk associated with political changes, alterations in legislation, and the emergence of new technologies capable of supplanting sectors classified as brown. (Carney, 2015; NGFS, 2018; Chenet, Ryan-Collins, and Van Lerven, 2019; Schneider et al., 2021; Bartelega, 2023).

The financing provided by Public Banks, particularly Development Banks, has essential characteristics, alleviating and mitigating the effects of risks on the financial system. Firstly, as stated in the previous sections, it should operate counter-cyclically, expanding credit creation during periods of economic contraction when private banks reduce their willingness to extend credit due to a higher liquidity preference. Public Banks also encourage long-term investments,

particularly in strategic sectors such as infrastructure and sustainability, generating positive externalities for the economy. Moreover, they play a crucial role in alleviating uncertainty by providing liquidity during times of heightened risk aversion, a common trait of the private sector in uncertain contexts. Additionally, they help shape and create markets, developing sectors with high potential for economic and social impact, particularly those focused on sustainable development. The financing of these projects is often coordinated with public policies and state planning, ensuring a synergistic action between the public and private sectors to promote sustainable economic development (Paula, Raccichini, and Bastos, 2024).

Therefore, as the financial market is usually oriented toward the short term, focusing on investments that generate quick returns, it hinders funding of projects with long-term horizons, such as those related to the green transition. In this way, green financing requires a support structure different from that which the financial system can provide. Climate impacts far exceed the typical time horizons of public and financial managers, whose decisions are guided by short-term cycles, usually ranging from one to five years (Crocco and Feil, 2020).

## Concluding Remarks

To achieve the climate transition objectives that will be necessary in the future, Brazil must reach new levels of investment rates. The low rates observed over the past decade will be insufficient to generate a productive structure compatible with the emerging challenges. Furthermore, given the uncertain and long-term nature of the required investment, it is essential to develop a robust financial system capable of providing innovations and solutions aligned with the new paradigm of sustainable development.

Throughout our exposition, we have argued three reasons why public banks play a crucial role in this process. First, they sustain aggregate demand at levels that maintain economic activity, income, and the necessary growth and investment rates when private banks retract with a contraction of credit creation driven by an rise in liquidity preference, endogenous to the economic cycle, as outlined in Minsky's Financial Instability Hypothesis. Second, Post-Keynesian economics does not subscribe to the notion of a "financial crowding-out effect" from public bank credit expansion. Through the Disaggregated Bank Multiplier framework, we demonstrate that the credit expansion of public banks facilitates the strategic actions of private banks by providing the liquidity necessary to support their own credit growth. Third, finance climate transition projects are often coordinated with public policies and state planning, fostering a synergistic interaction between the public and private sectors to promote sustainable economic development.

The data analysis demonstrated that during the two major recent crises—the 2008 financial crisis and the COVID-19 pandemic—credit through public banks played an essential role in mitigating adverse effects.

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