Revista Pesquisa e Debate
ISSN 1806-9029

Countercyclical policy during Lula's second administration: An analysis of the impact of the 2010 Finame expansion on Brazilian Sectoral Multipliers

Política anticíclica durante o segundo governo Lula: uma análise do impacto da expansão do Finame em 2010 sobre os multiplicadores setoriais brasileiros

DOI: 10.23925/1806-9029.37in.2(68)74188

Autores: Lucas Milanez de Lima Almeida, UFPB, Departamento de Relações Internacionais. E-mail: lucasmilanez@gmail.com . ORCID: https://orcid.org/0000-0003-0715-4806; Antonio Carneiro de Almeida Júnior, UFR, Faculdade de Ciências Aplicadas e Políticas. E-mail: antonioalmeidajr1@gmail.com . ORCID: https://orcid.org/0000-0001-5712-4336 - Submissão: 02/2025 - Aprovação: 10/2025.

Abstract

This study combines input-output analysis with Marxian economics to examine the role of BNDES Finame's credit supply expansion in Brazil's economic recovery in 2010, following the 2008/2009 crisis. By endogenising the intersectoral impact of capital goods usage in Leontief's model, we measured the impact of Finame's credit operations on each economic activity through counterfactual analysis. Our results show decreased output, value added and occupation multipliers in the absence of these operations and in the absence of their use as a countercyclical policy in 2010.

Keywords: Countercyclical Policy; Input-Output; Marxian Economics; Brazilian Economy; Business Cycles.

Resumo

O presente trabalho combina análise insumo-produto com a Economia Política Marxista para examinar o papel da expansão da oferta de crédito do Finame na recuperação econômica brasileira de 2010, após a crise de 2008/2009. Endogenizando o impacto intersetorial do uso de bens de capital no modelo de Leontief, medimos o impacto das operações de crédito do Finame em cada atividade econômica através da análise contrafactual. Nossos resultados mostraram redução dos multiplicadores da produção, do valor adicionado e da ocupação na ausência das referidas operações e no cenário onde elas não são usadas como política anticíclica.

Palavras-chave: Política Anticíclica; Insumo-Produto; Economia Política Marxista; Economia Brasileira; Ciclos Econômicos.

JEL: D57, E65, E32, B51.

1. Introduction

The so-called subprime crisis, triggered in the United States' financial market in the second half of 2007, soon spread to the rest of the world. It struck the Brazilian economy in the fourth quarter of 2008. The immediate response of Luiz Inácio 'Lula' da Silva's (hereinafter, Lula) administration encompassed a series of countercyclical policies, such as liquidity-enhancing initiatives, fiscal stimuli, base interest rate reduction, and macroprudential and credit expansion policies (Barbosa, 2010; Borghi, 2017; Cunha; Prates; Ferrari-Filho, 2011; Paula; Modenesi; Pires, 2015).

Although the initial impact of the crisis virtually stopped Brazilian GDP real growth, which amounted to -0,1% in 2009, after the abovementioned policy response, the Brazilian economy recovered spectacularly, with a real growth rate of 7,5% in the following year (SCN/2010). Needless to say, such an event stimulated the research community to carry out a number of studies on the part played by the countercyclical policies in this recovery. Cunha, Prates and Ferrari-Filho (2011), Gonçalves Júnior *et al*. (2014), Borges and Montibeler (2014), Paula, Modenesi and Pires (2015) and Borghi (2017) are examples of such studies. However, even though much has been done in the past 15 years, there is still ground to be covered concerning the examination of the impact of those countercyclical policies, especially in relation to credit expansion actions. According to Barbosa (2010, p. 7), one of the first effects of the subprime crisis in Brazil was the credit crunch. To reverse the situation, the government provided liquidity in both domestic and foreign currencies. On the domestic side, this was accomplished by reducing banks' reserve requirements, which did not have any effect, because most of the money injection was absorbed by the Banco Central do Brasil's (BCB) open market operations, since the base interest rate had not yet been reduced. In this context, the government also started expanding the credit supply using three state-owned banks: *Banco do Brasil*, *Caixa Econômica Federal* and *Banco Nacional do Desenvolvimento Econômico e Social* (BNDES), reversing the credit crunch (Paula; Modenesi; Pires, 2015, p. 420).

However, to properly evaluate the role played by this policy in the recovery it is necessary to calculate the economic impact of the public sector credit supply expansion. Regarding the *Caixa Econômica Federal*, the great majority of its credit supply expansion was related to the *Minha Casa, Minha Vida*, a government housing program that built more than one million homes during 2009 and 2010 (UN-Habitat, 2013, p. 75). In light of this, it is safe to say that the analysis has already been carried out by Gonçalves Júnior *et al*. (2014), who measured this program's economic impact using input-output analysis. The *Banco do Brasil*'s and the BNDES' cases, in turn, present themselves as more complex, especially the latter.

The complexity of the BNDES case is related to the fact that the R$100 billion made available to the bank by the National Treasury in a capitalisation process were distributed to different BNDES subsidiaries, each of which finances activities in various economic sectors (Cunha; Prates; Ferrari-Filho, 2011 p. 708; Borghi, 2017, p. 65). Therefore, examining the impact of this measure requires data on each of these subsidiaries' credit operations at the microeconomic level. However, data with this level of detail can be obtained using a mechanism created by the Brazilian Federal Act no. 12,527 of 18 November 2011. This Act enables any citizen to be granted access to any

information regarding state-owned companies' operations, provided that it does not jeopardise any private agent (Brasil, 2011).

Given this, and with the intention of contributing to the matter at hand, this study analyses the expansion of the credit supply of BNDES' Agência Especial de Financiamento Industrial (Finame) in Brazil in 2010. Our objective is to understand how this expansion contributes to the aforementioned recovery process. This is accomplished through a counterfactual analysis of the sectoral multipliers of the Brazilian economy. These multipliers are calculated using Leontief's model with endogenised capital. Our approach compares the multipliers of the factual scenario with those of three hypothetical scenarios. The aim is to measure how the increase in Finame disbursements can alter the sectoral multipliers of production, value added and employment. Although this approach differs from the usual impact analyses, such as that of Miguez (2020), it allows us to assess the extent to which the credit expansion policy amplified the backward linkage effects of each economic sector – that is, how the policy contributed to changing the propagation power of sectoral stimuli. In other words, it enables us to measure how this countercyclical policy altered the potential for generating output, employment and income in Brazil. Finally, we discuss our results in light of the relationship between these policies and the business cycle, based on Marxian crisis theory. We also discuss our theoretical choice.

There are five contributions that stem from our study. In the field of input-output analysis, it contributes to the dissemination of the Gross Fixed Capital Formation (GFCF) endogenisation method developed by Lenzen and Treloar (2004), which was also applied by Södersten, Wood and Hertwich (2018), Miller *et al.* (2019), He and Hertwich (2019), Berrill *et al.* (2020) and Kang *et al.* (2020) in empirical research. Concerning the empirical study of the Brazilian economy, it sheds light on Brazil's economic recovery in 2010, particularly on how Finame influenced changes in the country's productive structure that year. In relation to the evaluation of public policies, our work contributes to the understanding of countercyclical policies by identifying and measuring the economic response to an expansion of credit supply for GFCF financing in times of crisis. Furthermore, since the results we obtained are expected in a Marxian perspective, they serve as empirical evidence for theoretical research developed by Marx (1956a, 1956b, 1969, 1973, 1991), Draguilev (1961), Shaikh (1978), Mendel'son (2013), Almeida Júnior (2016, 2019, 2023) and many others Marxian authors. Finally, our study also contributes to the advancement of economics as a science, since it combines a quantitative approach to the Marxian political economy, showing that there are no incompatibility issues between them.

2. Theoretical framework

The explanation of the development of capitalist economies through cycles has been changing alongside mainstream economics (Ribeiro, 2000; Shaikh, 1978). Nowadays, with neoclassicism as the mainstream, the leading theoretical explanation is the Real Business Cycle Theory, presented in works such as King and Plosser (1984), Plosser (1989) and Kydland and Prescott (1990). It states that the economic crises that mark the business cycle are a consequence of random negative supply shocks that affect productivity and

economic activity. However, this understanding contrasts with the findings of empirical studies that present evidence of regularity in the cyclical movement of industrialised capitalist economies (Almeida; Almeida Júnior, 2022; Juglar, 1862; Korotayev; Tsirel, 2010; Mendel'son, 2013) and others that identify the same essential elements in each of the referred crises (Almeida Júnior, 2016; Mendonça, 1990; Ribeiro, 1988). Taking this into account, when examining phenomena that interact with the business cycle, a more suitable approach would be to base the analysis on a theory that can explain not only the abovementioned regularity but also what these crises have in common.

Contrary to the neoclassical view, Marxian economics sees these economic crises as a necessary phenomenon of the capitalist mode of production. It is understood that capital accumulation tends to expand the conditions for surplus-value extraction while narrowing the conditions for its realisation, generating overproduction. When this mismatch reaches a certain limit, a crisis occurs to re-establish the proper economic environment for capital accumulation by destroying excess capital. Therefore, in this approach, each of these crises has overproduction as its essential characteristic and a common cause that is indissociable from the capital accumulation process, which means that they are, to some extent, predictable (Marx, 1956a, 1956b, 1969, 1973, 1991).

In Brazil, a few economists have used a particular interpretation of Marx's crisis theory to analyse the business cycle (Almeida Júnior, 2016, 2023, 2025; Almeida Júnior; Almeida, 2025; Ribeiro, 1988; Silva, 2002). After emerging from the joint work of Mendonça and Ribeiro (1985), the Mendonça-Ribeiro interpretation was developed through the work of Mendonça (1990), Ribeiro (1988, 2008) and Almeida Júnior (2013, 2016, 2019, 2023). According to its latest version (Almeida Júnior, 2019, p. 97-113, 2023, p. 469-475), the cause of the repeated occurrence of overproduction crises in capitalist economies "is the shock between the opposite poles of capitalism's fundamental contradiction: the impulse to unrestricted development of the productive forces and the capitalist antagonistic relations of production and consumption" (Almeida Júnior, 2023, p. 471).

To put it in more concrete terms, while the competition between capitals drives capitalists to constantly seek the implementation of more productive techniques, greatly expanding productive capacity and the economy's goods supply, the effects of technological progress under capitalism tend to create barriers to consumption. This combination generates overproduction crises, and as productive force development depends on the renovation of fixed capital, the period between each of these crises will be heavily influenced by the physical and moral depreciation time of that fixed capital (Almeida Júnior, 2023, p. 472). Hence, the regularity characterises not only the occurrence of crises but also the recovery process after each one of them. Based on this, the Mendonça-Ribeiro interpretation divides the business cycle into four stages: crisis, depression, recovery and peak (Almeida Júnior, 2023, p. 473-474).

According to Draguilev (1961), Shaikh (1978), Ribeiro (1988), Mendonça (1990), Almeida Júnior (2016, 2023, 2025) and other Marxian authors, even though this accumulation pattern integrates the 'laws of motion' of capitalist economies, it can be disturbed by exogenous shocks such as economic policies. Nevertheless, Marxian theory is still opposed to the neoclassical and even the Keynesian view.

From the Marxian perspective, economic policies can never become the determinant factor for the business cycle. They cannot prevent the economy from exhibiting expected behaviour but can only distort it or determine its secondary characteristics, such as external appearance. For example, when these policies are connected to the burst of an overproduction crisis, they will only act as its non-essential cause – that is, the element that is subordinated to the essential cause, has limited impact on the phenomenon and, therefore, engenders only its peculiar and transitory characteristics (Almeida Júnior, 2023, p. 474-475).

Furthermore, taking into account what was developed by Mendonça (1990), Ribeiro (2008) and Almeida Júnior (2016, 2019, 2023, 2025), the attempt to prevent the burst of periodic crises by creating new stimuli to capital accumulation – since it aims to keep the process that generates the content of the crisis in motion – has only two possible outcomes. If the stimuli are not enough to convince capitalists that the realisation issues will disappear, they will only reduce the severity of the overproduction at the expense of reducing accumulation speed in the next expansion. On the other hand, if capitalists are convinced that those stimuli will take care of all realisation issues, the limit of the mismatch between the conditions for extraction and realisation of surplus-value will expand without preventing overproduction. This will postpone the crisis eruption at the expense of intensifying its severity. In this framework, the tendency toward overproduction is intrinsic to capitalism.

Finally, given this study's goal, it is opportune to address the specific case of credit-related countercyclical policies. First, it is important to point out that credit operations advance value to capitalists and consumers that has not yet been produced or realised. By doing so, they enable capitalists to carry out expanded reproduction without having accumulated enough surplus-value for that purpose. They also enable consumers to anticipate their future consumption. In both cases, however, if money functions only ideally – as money of account – to enable the circulation of goods for the time being, it has to function as the incarnation of social labour without any goods circulation later, when payments are due. For goods to circulate in the present without the circulation of money, money must circulate in the future without the circulation of goods (Almeida Júnior, 2023, pp. 472, 485-486; Marx, 1956a, p. 86-88; Mendonça, 1990, p. 142; Ribeiro, 2008, p. 16).

In other words, credit operations tend to enhance the conditions for the extraction and realisation of surplus-value in the present, while, together with the accumulation effects, they further narrow the conditions for surplus-value realisation in the future. Therefore, when used in a situation where the mismatch between these opposite poles has already reached a critical level, the expansion of credit supply has only the same two possible outcomes previously discussed. However, in this specific case, it intensifies the negative effects in each of these outcomes.

3. Material and methods

To measure the economic impact of Finame's credit operations, we created alternative scenarios for the Brazilian economy in 2010 and used the input-output analysis to

recalculate the values of the output, value added and occupation multipliers. A detailed presentation of our methodology is given below.

3.1. Counterfactual impact evaluation

In economics, counterfactual analysis is typically used to compare a particular observed economic performance (factual scenario) to alternative scenarios in which selected variables behave differently (counterfactual scenarios). In the context of impact evaluation, it is important to highlight two different ways to perform this task. In both methods, the aim is to measure the impact of a specific event on specific variables (Bove; Nisticò, 2014; Cai; Wang, 2008; Falco; Veronesi, 2013; Mardones; Muñoz, 2018; Mendonça; Valpassos, 2022; Mohaddes; Pesaran, 2016; Morita, 2022).

The first method begins by identifying a sample that was not exposed to the event whose impact is being measured and has characteristics that are similar to those of the sample under examination. Thereafter, the behaviour of the alternative sample is modelled so that the variables' values obtained in the simulation can be compared to those from the original sample and the impact of the event measured by the difference between them. This approach has the advantage of ensuring that the analysis is of a high complexity level and that no variables will be artificially altered. However, it cannot be used if an alternative sample does not exist.

The second method consists of creating alternative scenarios by changing the behaviour of selected variables in the examined sample. Thereafter, a comparison of factual and contrafactual scenarios is carried out, with the impact of the event being measured once again by the difference between them. As an alternative when a similar sample cannot be found, this approach requires careful consideration when representing the absence of an event through changes in variables' values.

Considering this study's research topic, it would be virtually impossible to properly use the first method. Hence, we approached this matter by creating alternative scenarios for the Brazilian economy in 2010. In each scenario, we set different values for Finame's credit operations. We then calculated how these changes affect output, value added and occupation, all at the sectoral level, so we could compare these counterfactual scenarios to the factual one. Because Finame finances the expansion of productive capacity, we used the input-output approach based on Leontief's model with endogenised capital for these calculations, as described ahead.

3.2. Endogenising Gross Fixed Capital Formation in Leontief's model

In traditional input–output analysis models, multipliers estimate the sectoral effects resulting from variations in final demand components. However, our work goes further by adopting the capital goods usage endogenisation model proposed by Lenzen and Treloar (2004). In addition to measuring the potential effects of a variation in final demand, our fundamental objective is to measure how Finame altered the structure of Brazilian multipliers in 2010.

According to Lenzen and Treloar (2004), there are two ways to endogenise the intersectoral impact of capital goods usage in Leontief's traditional model. The first consists of expanding the use table's (U) dimensions by adding a column vector of the goods destined for GFCF and a row vector of the amount of fixed capital demanded by each sector. This expands the matrix of technical coefficients (A) in one dimension. Thereafter, Leontief's inverse matrix (L) is calculated. This method is known as the augmentation method to capital endogenisation. Almeida (2018) used it to analyse the de-industrialisation process in the Brazilian economy from 1995 to 2010. On the one hand, it has the advantage of being a simple method. On the other, matrix A is expanded by adding an artificial sector assumed to produce homogeneous capital goods (Lenzen; Treolar, 2004, p. 2).

The second method addresses this problem using the capital flow matrix (U^k), which presents information on how each product was destined for each sector's GFCF. In this table, each row provides information on the products destined for GFCF, whereas each column presents the activities which demanded these products. Thereafter, a matrix of coefficients (K) is built for the capital flow matrix and added to matrix A, so it can be used in Leontief's inverse matrix calculation as follows:

$$\mathrm{L^k} = [\mathrm{I} - \mathrm{A} + \mathrm{K}]^{-1} \qquad (1)$$

This is the flow matrix method to capital endogenisation, used by Södersten and Lenzen (2018), Miller *et al.* (2019), He and Hertwich (2019), Berrill *et al.* (2020) and Kang *et al.* (2020) to analyse problems related to the production process and environmental pollution. In this approach, with q being a matrix of coefficients composed of row vectors whose elements are quotients between each variable i of sector j and the production of sector j ($q_{ij} = v_{ij}/x_j$), multipliers with endogenised capital (Ω^k) are given by:

$$\Omega^k = q.\,L^k \qquad (2)$$

We chose this method to measure the impact of Finame's credit operations because it overcomes the deficiencies of the first one presented by us. We discuss how Brazil's capital flow matrices were used in our calculations next.

3.3. Brazilian capital flow matrices

For the period from 2000 to 2018, Brazilian U^k matrices were estimated by Miguez (2016) and Miguez and Freitas (2021). However, since they were initially disaggregated into 25 goods and 49 economic activities, they needed to be made compatible with the Brazilian input-output tables regarding the number of goods categories and the number of economic activities (Miguez; Freitas, 2021, p. 5). This compatibilization process resulted in matrices with 103 products and 38 economic activities.

After obtaining the U^k matrices, the next step is to build tables with an industry-by-industry structure, which provides the sectoral multipliers. Södersten and Lenzen (2020) argue that this should be accomplished by estimating a capital supply matrix that presents the flow of capital goods by economic activity. Then, the matrix is used to calculate the

market share so that U^k can be transformed into a square matrix. In the absence of such a matrix for the Brazilian economy, we used the market share matrix (S) obtained from the supply table (103 × 38) of the Brazilian input-output matrix to transform U (103 × 38) and U^k (103 x 38) into square matrices (38 × 38). Our approach is based on the assumption that each activity will meet the demand for a specific good in the same proportion as its share in the total production of the referred good. In other words, if, for example, the activity motor vehicles, trailers and semi-trailers' production accounts for 90% of the products with the same nomenclature, it is reasonable to assume that 90% of the motor vehicles, trailers and semi-trailers consumed as input or capital goods have been produced by the referred economic activity.

Following this methodology, with x as the sectoral gross production vector, we obtain the base equation used to estimate Leontief's inverse matrix with endogenised capital for 2010 from equation 1 as follows:

$$L^k = \left[I - S'.(U + U^k).\hat{x}^{-1}\right]^{-1} = [I - A + K]^{-1} \quad (3)$$

Finally, the multipliers were calculated from equation 2 with L^k given by equation 3. Once we have presented our method, let us discuss the counterfactual scenarios.

3.4. The factual and counterfactual scenarios

The data we used to measure Finame's impact on the economy exclusively encompasses the financing of new capital goods produced in Brazil. Furthermore, what we include in the capital flow matrices' (U^k) figures are the disbursements carried out by Finame, because we did not have access to data on the use of these resources.

The data we obtained from BNDES have two dimensions, providing information on the companies that demanded financing and those that supplied the capital goods. The companies were grouped according to the fourth revision of the International Standard Industrial Classification (ISIC, Rev. 4) and classified into 87 economic activities, according to their section and division levels. This information was then transformed into tables, where the rows present information on 87 economic activities that supply capital goods and the columns present information on 87 economic activities that demand capital goods. As the data were already in an industry-by-industry structure, the Finame tables in the 38 × 38 dimension (F) were built by aggregating rows and columns. Thereafter, the counterfactual analysis was carried out by simulating three alternative scenarios for the F matrix in 2010, while the data in the S, U, U^k and $\hat{x}$ matrices remained unchanged. To measure Finame's total impact on the economy, for the first scenario, we subtracted the 2010 F matrix from U^k. This simulates the total absence of GFCF financing from Finame in the referred year. From Equations 2 and 3, we can derive the counterfactual scenario 1 (c1), which is presented by Equations 4 and 5.

$$L^k_{c1} = \left[I - S'.(U + U^k - F_{2010}).\hat{x}^{-1}\right]^{-1} \quad (4)$$

$$\Omega^k_{c1} = q.L^k_{c1} \quad (5)$$

To measure the impact of Finame's credit supply expansion on sectoral multipliers, we develop two additional counterfactual scenarios. Counterfactual Scenario 2 (c2) assumes that the total amount of disbursements made by Finame in 2010 is equal to the value observed in 2009. This scenario is represented by Equations 6 and 7.

$$L_{c2}^{k} = \left[I - S'.(U + U^{k} - F_{2010} + F_{2009}).\hat{x}^{-1}\right]^{-1} \quad (6)$$

$$\Omega_{c2}^{k} = q.L_{c2}^{k} \quad (7)$$

Finally, in counterfactual scenario 3 (c3), we assumed that Finame's figures grew at the average growth rate observed in the pre-crisis period, 2004-08. We applied the average growth rate of each cell of the F matrices from the referred period to each cell of the 2009 F matrix, obtaining the 2010 counterfactual F matrix presented in Equation 8. This scenario is represented by Equations 9 and 10 as follows:

$$F_{ij,2010^{*}} = F_{ij,2009}.\left(1 + \sum_{t=2005}^{2008} \frac{F_{ij,t} - F_{ij,t-1}}{F_{ij,t-1}}/4\right) \quad (8)$$

$$L_{c3}^{k} = \left[I - S'.(U + U^{k} - F_{2010} + F_{2010^{*}}).\hat{x}^{-1}\right]^{-1} \quad (9)$$

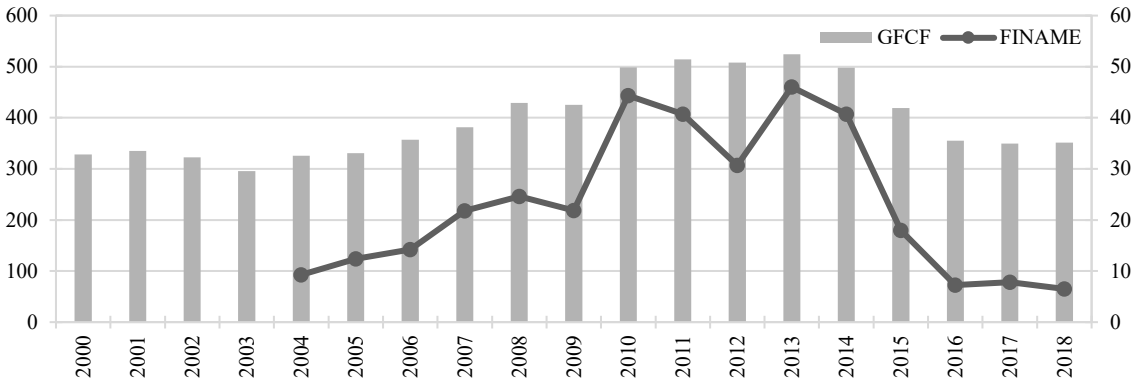
$$\Omega_{c3}^{k} = q.L_{c3}^{k} \quad (10)$$

Hence, from the scenarios described by Equations 4, 6 and 9, we calculated the sectoral multipliers, as presented in Equations 5, 7 and 10, to compare them to those obtained through Equations 2 and 3. As a result, the investment carried out by each sector is deducted from the value added. The share financed with Finame's resources is not included in this deduction, which means that we assume that part of the investment came from the value added, while the other share is exogenous, coming from Finame's resources.

4. Results and discussion

According to Almeida Júnior (2016, p. 212), the Brazilian economy's fifth business cycle can be classified as follows: 1997Q3-1999Q4: crisis; 2000Q1-2002Q2: depression; 2002Q3-2005Q4: recovery; 2006Q1-2008Q3: peak. In addition, the author also identifies the fourth quarter of 2008 as the beginning of Brazil's sixth cycle. By examining the data on GFCF for the period 2000-18, which is presented in Figure 1, it is possible to find that this variable's behaviour is compatible with the author's classification. On that note, the year of 2009 deserves special attention: it shows a GFCF real reduction of 12.7% because of the crisis.

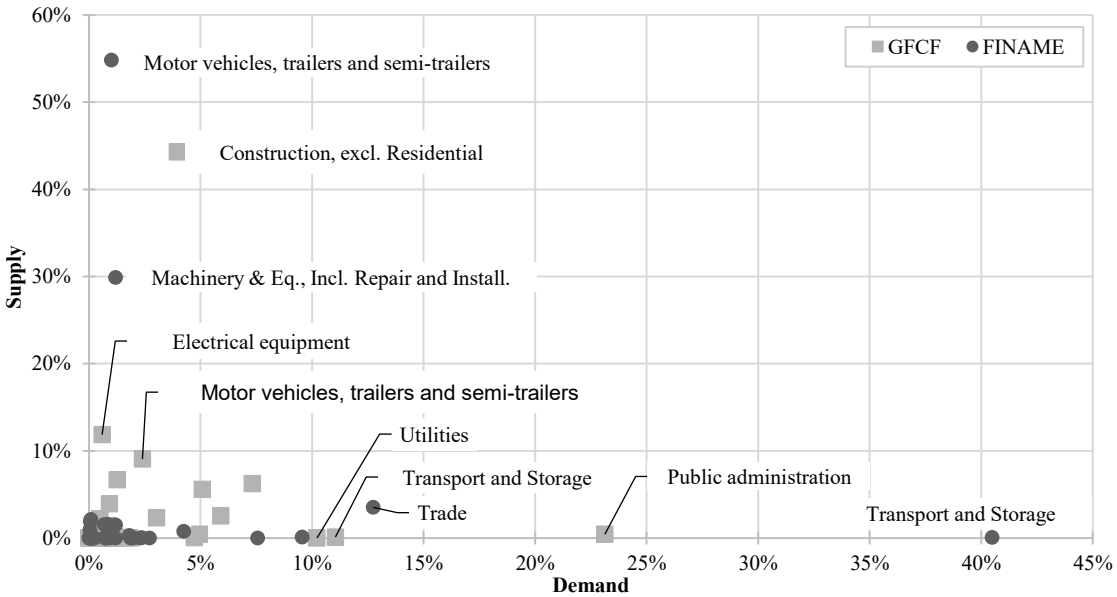
Figure 1. Gross Fixed Capital Formation (left vertical axis) and Finame's expenditures (right vertical axis) in Brazil (R$ billions of 2010)



Source: elaborated by the authors based on IBGE/SCN 2010.

Another important information brought by Figure 1 are Finame's disbursements values in the period 2004-18. This variable's growth rate of 102.7 per cent in 2010 indicates it largely contributed for GFCF's recovery in the same year. Following that, the years from 2011 to 2014 are characterised by some stability in both Finame's disbursements and GFCF's values. From 2015 onwards, in turn, the strong reduction in GFCF coincides with an even stronger reduction in Finame's disbursements.

Figure 2. Share of economic activities in the supply and demand of capital goods at FBCF and FINAME expenditures (2010)



Source: elaborated by the authors based on IBGE/SCN 2010.

Figure 2, in turn, shows us the per cent share of each of the 38 economic activities in both Finame's disbursements and GFCF's figures in 2010. For the GFCF, the horizontal axis represents the activity per cent share in the economy's demand for capital goods,

while the vertical axis represents the activity's per cent share in the economy's supply of capital goods. For Finame's disbursements, in turn, the horizontal axis presents the activity's per cent share in the demand for capital goods financing, while the vertical axis presents the activity's per cent share in the supply of financed capital goods. The first thing we notice by examining Figure 2 is that none of the activities presented itself as a great supplier and a great demander simultaneously.

As we can see, in general, economic activities had all their multipliers reduced in the counterfactual scenarios (there are a few exceptions). If we focus on table 1, these results attest Finame's significance for the consolidation of the Brazilian productive structure as it increases the economy's output multipliers, which implies a higher backward linkage between each sector and the rest of the economy. Tables 2 and 3, in turn, show that Finame enhances activities capacity of generating valued-added and occupations.

Table 1. Backward output multipliers of the Brazilian economy in 2010

Economic Activities	Factual		Counterfactual 1		Counterfactual 2		Counterfactual 3	
	Total	Rank	Total	Diff.	Total	Diff.	Total	Diff.
Agric., forest. And fish.	2,037	22º	2,016	-1,03%	2,025	-0,59%	2,031	-0,32%
Ext. of petrol. And gas; supp. activ.	1,984	25º	1,966	-0,93%	1,975	-0,46%	1,981	-0,16%
Other mining and quarrying	1,873	29º	1,844	-1,57%	1,858	-0,83%	1,870	-0,19%
Food and beverages	2,771	1º	2,728	-1,54%	2,748	-0,82%	2,760	-0,38%
Tobacco products	2,469	6º	2,451	-0,73%	2,459	-0,40%	2,465	-0,18%
Textiles	2,335	13º	2,309	-1,08%	2,320	-0,61%	2,326	-0,36%
Wearing apparel	1,974	26º	1,957	-0,85%	1,965	-0,47%	1,969	-0,25%
Leather and related products	2,296	14º	2,274	-0,99%	2,285	-0,51%	2,291	-0,24%
Wood products - excl. furniture	2,234	16º	2,191	-1,91%	2,215	-0,87%	2,226	-0,33%
Paper and paper products	2,576	3º	2,543	-1,30%	2,560	-0,64%	2,572	-0,17%
Printing and reprod. of record. media	2,153	18º	2,135	-0,86%	2,144	-0,44%	2,151	-0,10%
Coke and ref. petrol. prod.; alcohol	2,636	2º	2,614	-0,84%	2,624	-0,47%	2,631	-0,17%
Chemicals and chemical products	2,364	11º	2,337	-1,12%	2,350	-0,57%	2,358	-0,26%
Pharmaceutical products	1,924	28º	1,906	-0,98%	1,915	-0,51%	1,921	-0,20%
Rubber and plastic products	2,362	12º	2,332	-1,27%	2,345	-0,71%	2,352	-0,42%
Other non-metallic minerals	2,378	10º	2,335	-1,84%	2,355	-0,98%	2,368	-0,46%
Basic metals	2,522	5º	2,492	-1,20%	2,507	-0,63%	2,515	-0,28%
Metal products – excl. M&Eq	2,283	15º	2,257	-1,15%	2,269	-0,59%	2,277	-0,26%
M&Eq – incl. repair and install.	2,129	19º	2,104	-1,17%	2,116	-0,59%	2,122	-0,31%
Electrical equipment	2,392	9º	2,365	-1,14%	2,378	-0,59%	2,395	0,11%
Computer, electronic and optical prod.	1,927	27º	1,912	-0,82%	1,919	-0,42%	1,924	-0,17%
Motor vehicles, trail., and semi-trail.	2,462	7º	2,439	-0,93%	2,450	-0,49%	2,456	-0,24%
Other transport equipment	2,206	17º	2,188	-0,85%	2,197	-0,45%	2,202	-0,20%
Furniture and other manufacturing	2,036	23º	2,008	-1,35%	2,021	-0,74%	2,026	-0,46%
Utilities	2,565	4º	2,539	-1,00%	2,551	-0,53%	2,561	-0,15%
Construction	2,047	21º	2,018	-1,45%	2,031	-0,80%	2,043	-0,21%
Trade	1,701	34º	1,669	-1,92%	1,686	-0,88%	1,694	-0,44%
Transport and storage	2,423	8º	2,269	-6,35%	2,347	-3,17%	2,387	-1,52%
Information and communication	2,108	20º	2,092	-0,75%	2,099	-0,42%	2,105	-0,13%
Financial and insurance activities	1,622	35º	1,614	-0,47%	1,618	-0,24%	1,621	-0,05%
Real estate activities	1,162	37º	1,160	-0,17%	1,161	-0,09%	1,162	-0,03%
Serv. provided to families and assoc.	1,837	30º	1,818	-1,02%	1,827	-0,52%	1,833	-0,21%
Accommodation and food services	1,992	24º	1,975	-0,86%	1,983	-0,45%	1,988	-0,21%
Services provided to businesses	1,740	32º	1,720	-1,15%	1,729	-0,63%	1,733	-0,37%
Education	1,593	36º	1,581	-0,76%	1,587	-0,38%	1,591	-0,13%
Human health and social work	1,728	33º	1,719	-0,53%	1,723	-0,26%	1,726	-0,10%
Activities of households as employers	1,000	38º	1,000	-	1,000	-	1,000	-
Public administration	1,807	31º	1,794	-0,74%	1,799	-0,43%	1,813	0,32%
Average	**2,096**	**-**	**2,070**	**-1,23%**	**2,083**	**-0,64%**	**2,091**	**-0,26%**

Source: elaborated by the authors.

Before presenting our results, it is worth recalling how to interpret multipliers in an input-output analysis. If activity X has an output multiplier of 2,35, it means that each R$1,00 produced by it generates, directly and indirectly, R$2,35 in production in the entire economy. Accordingly, if activity X has a valued-added multiplier of 0,824 it means that each R$1,00 produced by it generates, directly and indirectly, R$0,824 in value added in the entire economy. In turn, the occupation multipliers mean something slightly different: they represent occupations created, direct and indirectly, for each R$1 million produced by the activity. With that said, let us focus on Tables 1, 2 and 3, which bring us the output, value added and occupation multipliers for the Brazilian economy in each scenario.

Table 2. Value added multipliers of the Brazilian economy in 2010

Economic Activities	Factual		Counterfactual 1		Counterfactual 2		Counterfactual 3	
	Total	Rank	Total	Diff.	Total	Diff.	Total	Diff.
Agric., forest. and fish.	0,824	13º	0,814	-1,20%	0.819	-0,58%	0,821	-0,30%
Ext. of petrol. and gas; supp. activ.	0,780	25º	0,773	-0,89%	0.776	-0,44%	0,778	-0,15%
Other mining and quarrying	0,829	11º	0,814	-1,90%	0.821	-1,05%	0,825	-0,46%
Food and beverages	0,798	18º	0,778	-2,52%	0.788	-1,27%	0,793	-0,63%
Tobacco products	0,833	10º	0,825	-0,95%	0.829	-0,49%	0,831	-0,24%
Textiles	0,714	30º	0,697	-2,34%	0.703	-1,47%	0,706	-1,04%
Wearing apparel	0,787	24º	0,779	-1,00%	0.783	-0,56%	0,785	-0,33%
Leather and related products	0,788	22º	0,776	-1,54%	0.781	-0,88%	0,784	-0,57%
Wood products - excl. furniture	0,834	9º	0,812	-2,62%	0.822	-1,47%	0,826	-0,94%
Paper and paper products	0,738	28º	0,720	-2,38%	0.729	-1,22%	0,734	-0,50%
Printing and reprod. of record. media	0,787	23º	0,778	-1,20%	0.782	-0,62%	0,786	-0,20%
Coke and ref. petrol. prod.; Alcohol	0,558	37º	0,546	-2,03%	0.551	-1,24%	0,554	-0,66%
Chemicals and chemical products	0,601	36º	0,591	-1,73%	0.596	-0,86%	0,599	-0,37%
Pharmaceutical products	0,798	19º	0,790	-0,97%	0.794	-0,46%	0,796	-0,18%
Rubber and plastic products	0,697	32º	0,679	-2,69%	0.687	-1,45%	0,690	-1,01%
Other non-metallic minerals	0,792	21º	0,768	-3,03%	0.779	-1,65%	0,785	-0,95%
Basic metals	0,692	33º	0,678	-1,99%	0.685	-0,93%	0,689	-0,44%
Metal products - excl. M&Eq	0,768	27º	0,753	-1,91%	0.761	-0,89%	0,765	-0,44%
M&Eq - incl. repair and install.	0,708	31º	0,699	-1,35%	0.703	-0,66%	0,706	-0,35%
Electrical equipment	0,691	34º	0,678	-1,95%	0.685	-0,85%	0,691	-0,01%
Computer, electronic and optical prod.	0,497	38º	0,491	-1,22%	0.494	-0,61%	0,496	-0,24%
Motor vehicles, trail. and semi-trail.	0,714	29º	0,704	-1,51%	0.709	-0,73%	0,712	-0,37%
Other transport equipment	0,647	35º	0,639	-1,24%	0.643	-0,61%	0,645	-0,29%
Furniture and other manufacturing	0,816	15º	0,803	-1,59%	0.809	-0,85%	0,811	-0,58%
Utilities	0,772	26º	0,761	-1,44%	0.767	-0,71%	0,771	-0,21%
Construction	0,806	17º	0,791	-1,91%	0.799	-0,86%	0,804	-0,25%
Trade	0,896	6º	0,885	-1,25%	0.891	-0,58%	0,893	-0,28%
Transport and storage	0,796	20º	0,744	-6,62%	0.769	-3,37%	0,785	-1,43%
Information and communication	0,823	14º	0,817	-0,72%	0.820	-0,40%	0,822	-0,15%
Financial and insurance activities	0,901	4º	0,898	-0,31%	0.899	-0,15%	0,900	-0,04%
Real estate activities	0,970	2º	0,969	-0,09%	0.969	-0,04%	0,970	-0,02%
Serv. provided to families and assoc.	0,811	16º	0,804	-0,85%	0.807	-0,43%	0,810	-0,17%
Accommodation and food services	0,824	12º	0,817	-0,89%	0.821	-0,45%	0,822	-0,21%
Services provided to businesses	0,873	7º	0,866	-0,79%	0.869	-0,43%	0,871	-0,24%
Education	0,902	3º	0,898	-0,49%	0.900	-0,25%	0,902	-0,09%
Human health and social work	0,836	8º	0,833	-0,43%	0.835	-0,21%	0,836	-0,09%
Activities of households as employers	1,000	1º	1,000	-	1.000	-	1,000	-
Public administration	0,898	5º	0,893	-0,63%	0.895	-0,33%	0,900	0,16%
Average	**0,784**	**-**	**0,773**	**-1,48%**	**0.778**	**-0,77%**	**0,781**	**-0,36%**

Source: elaborated by the authors.

Regarding the GFCF's figures, Construction stands out as the biggest capital goods supplier in 2010 (44.3%), followed by Electrical equipment (11.9%) and Motor vehicles, trailers and semi-trailers (9.1%). The biggest demanders, in turn, were Public administration (23.1%), Transport and storage (11%) and Utilities (10.2%). In relation to

Finame's disbursements, on the other hand, the activities that received the resources' highest share were Transport and storage (40.5%), Trade (12.7%) and Construction (9.6%). Most of those resources were used to acquire goods from two specific activities: Motor vehicles, trailers and semi-trailers (54.8%) and Machinery and equipment, including repair and installation (29.9%).

Table 3. Occupation multipliers of the Brazilian economy in 2010

Economic Activities	Factual		Counterfactual 1		Counterfactual 2		Counterfactual 3	
	Total	Rank	Total	Diff.	Total	Diff.	Total	Diff.
Agric., forest. and fish.	71,23	2º	71,07	-0,23%	71,13	-0,14%	71,18	-0,07%
Ext. of petrol. And gas; supp. activ.	9,72	37º	9,58	-1,40%	9,65	-0,71%	9,70	-0,16%
Other mining and quarrying	11,64	35º	11,41	-1,97%	11,51	-1,10%	11,62	-0,15%
Food and beverages	41,53	7º	41,20	-0,79%	41,34	-0,44%	41,45	-0,18%
Tobacco products	35,84	11º	35,71	-0,39%	35,77	-0,22%	35,81	-0,08%
Textiles	35,92	10º	35,73	-0,55%	35,81	-0,32%	35,86	-0,17%
Wearing apparel	51,19	3º	51,07	-0,25%	51,12	-0,14%	51,16	-0,06%
Leather and related products	38,39	9º	38,22	-0,45%	38,30	-0,24%	38,36	-0,09%
Wood products - excl. furniture	45,06	6º	44,74	-0,70%	44,91	-0,33%	45,03	-0,06%
Paper and paper products	22,53	21º	22,27	-1,15%	22,40	-0,59%	22,51	-0,07%
Printing and reprod. of record. Media	24,39	19º	24,24	-0,59%	24,31	-0,31%	24,40	0,06%
Coke and ref. petrol. Prod.; Alcohol	13,82	33º	13,65	-1,23%	13,72	-0,72%	13,80	-0,20%
Chemicals and chemical products	15,62	31º	15,42	-1,29%	15,51	-0,68%	15,58	-0,22%
Pharmaceutical products	14,35	32º	14,21	-0,99%	14,28	-0,53%	14,33	-0,15%
Rubber and plastic products	20,44	24º	20,20	-1,18%	20,30	-0,69%	20,36	-0,38%
Other non-metallic minerals	23,84	20º	23,51	-1,39%	23,65	-0,80%	23,75	-0,38%
Basic metals	16,54	29º	16,31	-1,38%	16,41	-0,74%	16,49	-0,27%
Metal products - excl. M&Eq	22,33	22º	22,13	-0,90%	22,23	-0,47%	22,30	-0,17%
M&Eq - incl. repair and install.	19,14	25º	18,94	-1,04%	19,04	-0,53%	19,09	-0,24%
Electrical equipment	18,45	26º	18,23	-1,20%	18,34	-0,60%	18,47	0,13%
Computer, electronic and optical prod.	13,62	34º	13,51	-0,87%	13,56	-0,45%	13,60	-0,15%
Motor vehicles, trail. and semi-trail.	16,66	28º	16,48	-1,03%	16,56	-0,56%	16,62	-0,22%
Other transport equipment	16,09	30º	15,95	-0,88%	16,02	-0,48%	16,07	-0,17%
Furniture and other manufacturing	30,72	13º	30,50	-0,70%	30,59	-0,41%	30,65	-0,23%
Utilities	20,45	23º	20,25	-0,96%	20,34	-0,53%	20,43	-0,11%
Construction	29,46	15º	29,24	-0,77%	29,33	-0,45%	29,44	-0,09%
Trade	35,69	12º	35,44	-0,68%	35,57	-0,33%	35,64	-0,14%
Transport and storage	26,77	16º	25,69	-4,04%	26,22	-2,05%	26,60	-0,66%
Information and communication	17,48	27º	17,36	-0,69%	17,41	-0,40%	17,46	-0,11%
Financial and insurance activities	9,76	36º	9,71	-0,58%	9,73	-0,30%	9,76	-0,03%
Real estate activities	2,85	38º	2,84	-0,51%	2,85	-0,28%	2,85	-0,05%
Serv. provided to families and assoc.	47,96	5º	47,82	-0,29%	47,88	-0,15%	47,93	-0,04%
Accommodation and food services	48,40	4º	48,27	-0,27%	48,33	-0,15%	48,38	-0,06%
Services provided to businesses	26,33	17º	26,17	-0,59%	26,24	-0,33%	26,28	-0,17%
Education	38,96	8º	38,87	-0,23%	38,91	-0,12%	38,95	-0,03%
Human health and social work	29,57	14º	29,50	-0,24%	29,53	-0,12%	29,56	-0,03%
Activities of households as employers	168,10	1º	168,10	0,00%	168,10	0,00%	168,10	0,00%
Public administration	24,80	18º	24,69	-0,42%	24,74	-0,25%	24,84	0,17%
Average	**30,41**	**-**	**30,22**	**-0,64%**	**30,31**	**-0,35%**	**30,38**	**-0,11%**

Source: elaborated by the authors.

By focusing on each counterfactual scenario, we can also extract essential information. Since counterfactual scenario 1 (c1) represents the absence of Finame, these results attest to the importance of the agency for the Brazilian economy. The difference between the multipliers in the factual scenario and in c1 represents the precise economic impact generated by the agency's operations. Furthermore, given that c2 and c3 represent scenarios in which Finame's credit supply expansion is not employed as a countercyclical policy, these results demonstrate that this policy played an important role in Brazil's economic recovery in 2010, as the programme contributed to further

amplifying the backward linkage effects of the Brazilian economy, particularly in those sectors with greater use of Finame's resources. However, to establish the exact impact of this policy on the backward linkage effects, we must determine whether c2 or c3 is more suitable to represent the absence of that credit expansion.

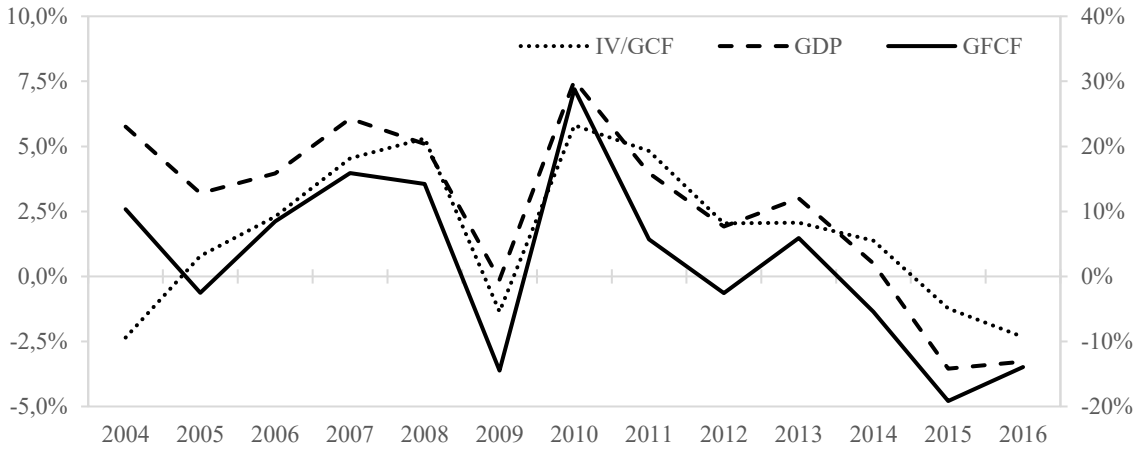
The first step towards implementing the policy examined here was taken in early 2009, when the Brazilian treasury opened a special credit facility to BNDES of 3,3% of GDP (Barbosa, 2010, p. 5). However, the data obtained by us shows that the impact of the abovementioned credit facility on Finame's credit operations did not occur in 2009, as these operations presented with the expected behaviour for a crisis scenario, falling by 11,06% in real terms.

As Almeida Júnior (2016, p. 198-207) and Almeida Júnior and Almeida (2025, p. 15-20) have shown, overproduction was the essential characteristic of the Brazilian 2008 crisis, indicating that the destruction of excess capital – and economic deceleration, consequently – should be expected in the following years. Hence, between counterfactual scenarios 2 (c2) and 3 (c3), the former seems more suitable for representing the absence of a countercyclical response by Finame It is not reasonable to assume that GFCF financing will grow in a crisis at the average rate it grew during economic expansion. Hence, the difference between the multipliers in the factual scenario and in c2 represents the economic impact of the examined countercyclical policy.

Once we know how the economy reacted to the policy hereby examined, it is important to explain why that happened. According to Almeida Júnior (2016, p. 198-207) and Almeida Júnior and Almeida (2025, p. 15-20), capital accumulation was already generating a latent overproduction in Brazil before it was affected by the US crisis. The examination of the data presented in Figure 3 suggests the same. As we can see, before the crisis was triggered, there was a rapid accumulation in progress combined with a progressive increase of the share of inventories variation in Gross Capital Formation (GCF). Hence, the US crisis acted as the trigger (non-essential cause) of the 2008 Brazilian crisis.

After the crisis began, the government adopted a stimulus package of 1,1% of the 2009 GDP to boost aggregate demand. The package included increase in government spending, tax cuts and other subsidies (Cunha; Prates; Ferrari-Filho, 2011, p. 705). These policies, together with the monetary countercyclical response, were not only preserved but enhanced in 2010 (Barbosa, 2010; Borges; Montibeler, 2014; Borghi, 2017; Paula; Modenesi; Pires, 2015). In our opinion, it is reasonable to assume that these actions were enough to convince capitalists that the realisation problems would disappear. Hence, when they were presented with an opportunity to increase productive capacity through a subsidised credit operation in 2009, they found that it would be highly lucrative to do so – given the low cost of the operation and the expected increase in aggregate demand – thus explaining the observed economic response.

Figure 3. Share of inventories variation in GCF, GDP growth rates and GFCF growth rates in the Brazilian economy (2010 prices, left axis correspond only to GFCF growth)



Source: elaborated by the authors based on IBGE/SCN 2010.

However, the examination of Figure 3 also shows that Brazil's recovery is followed by a progressive economic slowdown. Our theory suggests that this could be related to the use of countercyclical policies, especially the one examined here. As we already explained, capitalists are impelled by competition to increase productive capacity in such a way that also increases productivity. As a consequence of this process, an imbalance between the conditions for extraction and realisation of surplus-value will form. On the one hand, the increase in productivity would have greatly expanded the goods supply, rising the exigency under consumption. On the other, the demand of the vast majority of society, the working class, remains restricted to its usual limits because of the effects of productivity increase on the price of labour power. If the government extend this process using countercyclical policies, what basically happens is that the imbalance between the conditions for extraction and realisation of surplus-value continues to grow, intensifying the severity of the crisis to come. If the accumulation process is boosted by credit expansion measures, the referred imbalance tends to grow even further, since the consumption of indebted economic agents would be reduced in the future, as they need to pay their debt and interest.

Therefore, when the countercyclical response restored the accumulation, it basically restored the process that generates overproduction. The limits of the mismatch between the conditions for extraction and realisation of surplus-value were just expanded, but not by much. The share of inventories variation in GCF continued to grow in 2010, which indicates the formation of latent overproduction again. In 2011, capitalists realise that it is time to stop investing. GFCF growth rates drop significantly and the economy prepares to re-enter the crisis phase. As Dilma Rousseff's first administration sustained most countercyclical policies, this process extended itself until 2015/2016. By then, the rest of the world had already recovered from the subprime and Eurozone crises, which gave the Brazilian crisis an atypical nature and stimulated the debate on its causes. Some substantial contributions to this debate are presented by Bonelli and Veloso (2016).

In conclusion, although our results showed that the expansion of Finame's credit operations had a positive impact in the short run, contributing to Brazil's economic recovery in 2010, our theory and some preliminary data suggests that it is necessary to conduct a more cautious investigation on its medium run impacts, as this policy could be related to the 2015/2016 crisis.

5. Concluding remarks

By combining the endogenisation of the intersectoral impact of capital goods usage in Leontief's model with counterfactual analysis, we calculated the impact of Finame's operations on Brazilian production chains, as well as the impact of Finame's credit supply expansion, used as a countercyclical policy in 2010, on sectoral multipliers.

First, our results showed that Finame's operations are crucial to the Brazilian economy, deepening its productive structure while enhancing activities' capacity to generate value added and increase occupation. This is demonstrated by the reduction in the economic activities' output, value added and occupation multipliers in counterfactual scenario 1 (c1), when the F matrix is deducted from the U^k matrix. Furthermore, the difference between the multipliers in the factual scenario and in c1 represent the total impact of Finame's operations on the economy.

Second, the decrease in the output, value added and occupation multipliers in counterfactual scenarios 2 (c2) and 3 (c3), with a few exceptions in the latter, shows that Finame's credit supply expansion played an important part in the Brazilian economic recovery in 2010. After consideration, we concluded that the total impact of this policy can be measure by the difference between the multipliers in the factual scenario and in c2. These results provide evidence that expanding credit supply for GFCF financing can successfully fight crisis effects in the short run. However, based on our theory and some preliminary data, we suggested further investigation on Finame's credit supply expansion medium run impacts, as the policy could be related to the 2015/2016 crisis.

References

ALMEIDA, L. M. L. Desindustrialização à Luz da Teoria Econômica Marxiana: conceitos, definições e um estudo do caso da economia brasileira pós-1990. 2018. 284p. Thesis (PhD) – Programa de Pós-Graduação em Economia, Universidade Federal da Bahia, Salvador, 2018. Available at: https://repositorio.ufba.br/bitstream/ri/26950/1/Tese-Lucas%20Milanez_Desindustrializa%C3%A7%C3%A3o%20-%20FINAL.pdf.

ALMEIDA, L, M. L.; ALMEIDA JÚNIOR, A. C. A Primeira Crise Endógena Brasileira e o Movimento Cíclico da Economia Mundial: novas evidências estatísticas. Revista Análise Econômica, v. 40, n. 82, p. 1–36, Jun. 2022. Available at: https://seer.ufrgs.br/index.php/AnaliseEconomica/article/view/97242/93160.

ALMEIDA JÚNIOR, A. C. O caráter financeiro das crises no capitalismo atual. In: REIS DE MENESES, J.; PINTO LYRA, R. (Org.) Marxismos na contemporaneidade: tópicos de política, economia e direito. João Pessoa: Editora da UFPB, 2013. p. 71–97.

ALMEIDA JÚNIOR, A. C. A Teoria Marxista das Crises Cíclicas de Superprodução: desenvolvimento e aplicação para o caso brasileiro. 2016. Thesis (PhD) – Universidade

Federal do Paraná, Curitiba, 2016. Available at: https://acervodigital.ufpr.br/xmlui/handle/1884/44136.
ALMEIDA JÚNIOR, A. C. A teoria marxista das crises cíclicas de superprodução: uma modificação da interpretação Mendonça-Ribeiro. Revista Marx e o Marxismo, v. 7, n. 12, p. 90–113, Aug. 2019. Available at: https://www.niepmarx.com.br/index.php/MM/article/view/277.
ALMEIDA JÚNIOR, A. C. Currency Crisis or Overproduction? A Marxian Analysis of the Exchange Rate Peg Collapse in Brazil. Review of Radical Political Economics, v. 55, n. 3, p. 466–489, Sep. 2023. Available at: https://doi.org/10.1177/04866134231167627.
ALMEIDA JÚNIOR, A. C.; ALMEIDA, L. M. L. Dating the Brazilian Economy's Business Cycle: 1997-2009. História Econômica & História de Empresas, v. 28, n. 2, 2025. Available at: https://doi.org/10.29182/hehe.v28i2.1001
BARBOSA, N. Latin America: counter-cyclical policy in Brazil: 2008-09. Journal of Globalization and Development, Berlin/Boston, v. 1, n. 1, artigo 13: p. 1-12, Jan. 2010. Available at: https://doi.org/10.2202/1948-1837.1052.
BERRILL, P.; MILLER, T. R.; KONDO, Y.; HERTWICH, E. G. Capital in the American carbon, energy, and material footprint, Journal of Industrial Ecology. v. 24, n. 3, p. 589-600, Jun. 2020. Available at: https://doi.org/10.1111/jiec.12953.
BONELLI, R; VELOSO, F. (Ed.). A crise de crescimento no Brasil. Rio de Janeiro: Elsevier, 2016.
BORGES, R. E. S.; MONTIBELER, E. E. Input–output matrix study: a theoretical frame to study the impact of Brazilian IPI reduction in final demand. EconomiA, v. 15, n. 2, p. 228-241, May/Aug. 2014. Available at: https://doi.org/10.1016/j.econ.2014.03.004.
BORGHI, R. A. Z. The Brazilian productive structure and policy responses in the face of the international economic crisis: An assessment based on input-output analysis. Structural Change and Economic Dynamics, v. 43, p. 62-75, Dec. 2017. Available at: https://doi.org/10.1016/j.strueco.2017.08.001.
BOVE, V.; NISTICÒ, R. Coups d'état and defense spending: a counterfactual analysis. Public Choice, Nova Iorque, v. 161, n. 3/4, p. 321-344, Dec. 2014. Available at: https://link.springer.com/article/10.1007/s11127-014-0202-2.
BRASIL. Subchefia para Assuntos Jurídicos. Lei nº 12.527, de 18 de Novembro de 2011. Brasília: Casa Civil, 2011. Available at: http://www.planalto.gov.br/ccivil_03/_ato2011-2014/2011/lei/l12527.htm. Accessed on: 12 Feb. 2025.
CAI, F.; WANG, M. A counterfactual analysis on unlimited surplus labor in rural China. China & World Economy, v. 16, n. 1, p. 51-65, Feb. 2008. Available at: https://doi.org/10.1111/j.1749-124X.2008.00099.x.
CUNHA, A. M.; PRATES, D. M.; FERRARI-FILHO, F. Brazil responses to the international financial crisis: a successful example of Keynesian policies?. Panoeconomicus, v. 5, n. especial, p. 693-714, Oct. 2011. Available at: https://doi.org/10.2298/PAN1105693M.
DIETZENBACHER, E.; LENZEN, M.; LOS, B.; GUAN, D.; LAHR, M. L.; SANCHO, F.; SUH, S.; YANG, C. Input-output analysis: the next 25 years. Economic Systems Research, v. 25, n. 4, p. 369-389, Oct. 2013. Available at: https://doi.org/10.1080/09535314.2013.846902.
DRAGUÍLEV, M. S. A crise geral do capitalismo. Varginha: Editora Alba, 1961.

FALCO, S. and VERONESI, M. How can African agriculture adapt to climate change? A counterfactual analysis from Ethiopia. Land Economics, v. 89, n. 4, p. 743-766, Nov. 2013. Available at: https://www.jstor.org/stable/24243700.
GONÇALVES JÚNIOR, C. A.; DUTRA, R. L.; LOPES, R. L.; RODRIGUES, R. L. O impacto do programa minha casa, minha vida na economia brasileira: uma análise de insumo-produto. Ambiente Construído, v. 14, n. 1, p. 177-189, Mar. 2014. Acessed at: https://doi.org/10.1590/S1678-86212014000100014.
HE, K.; HERTWICH, E. G. The flow of embodied carbon through the economies of China, the European Union, and the United States. Resources, Conservation and Recycling, v. 145, p. 190-198, Jun. 2019. Available at: https://doi.org/10.1016/j.resconrec.2019.02.016.
JUGLAR, C. Des crises commerciales et de leur retour périodique en France, en Angleterre et aux États-Unis. Paris: Guillaumin Et CLE Libraires-Editeurs, 1862.
KANG, J.; NG, T. S.; SU, B.; YUAN, R. Optimizing the Chinese electricity mix for CO2 emission reduction: an input-output linear programming model with endogenous capital. Environmental Science and Technology, v. 54, n. 2, p. 697-706, 2020. Available at: https://pubs.acs.org/doi/10.1021/acs.est.9b05199?goto=supporting-info.
KING, R. R.; PLOSSER, C. I. Money, credit and prices in a real business cycle model. American Economic Review, v. 74, n. 3, p. 363-380, Jun. 1984. Available at: https://www.jstor.org/stable/1804013.
KOROTAYEV, A. V.; TSIREL, S. V. A spectral analysis of world GDP dynamics: Kondratieff waves, Kuznets swings, Juglar and Kitchin cycles in global economic development, and the 2008–2009 economic crisis. Structure and Dynamics, v. 4, n.1, p. 1-55. Available at: https://doi.org/10.5070/SD941003306.
KYDLAND, F.; PRESCOTT, E. Business cycle: real facts and a monetary myth. Federal Reserve Bank of Minneapolis' Quarterly Review, v. 14, n. 2, p. 3-18, Mar. 1990. Available at: https://doi.org/10.21034/qr.1421.
LENZEN, M.; TREOLAR, G. J. Endogenising capital: a comparison of two methods. Journal of Applied Input-Output Analysis, v. 10, p. 1-11, Dec. 2004. Available at: https://www.gakkai.ne.jp/papaios/en/img/jaia2004_10-1.pdf.
MARDONES, C.; MUÑOZ, T. Environmental taxation for reducing greenhouse gases emissions in Chile: an input–output analysis. Environment, Development and Sustainability, v. 20, n. 6, p. 2545-2563, Jun. 2018. Available at: https://link.springer.com/article/10.1007/s10668-017-0004-z.
MARX, K. Capital – book I. Moscou: Progress Publishers, 1956a.
MARX, K. Capital – book II. Moscou: Progress Publishers, 1956b.
MARX, K. Theories of surplus value. 2. ed. Moscou: Progress Publishers, 1969. *E-book*. Disponível em: http://digamo.free.fr/tpv.pdf. Acesso em: 26 ago. 2022.
MARX, K. Grundrisse: outlines of the critique of political economy. Londres: Penguin, 1973. *E-book*. Available at: https://www.marxists.org/archive/marx/works/download/pdf/grundrisse.pdf. Accessed on: 12 Feb. 2025.
MARX, K. Capital – book III. Londres: Penguin, 1991.
MENDEL'SON, L. A. Теория и история экономических кризисов и циклов. Moscou: Books on Demand Ltd, 2013.
MENDONÇA, A. A crise econômica e sua forma contemporânea. Lisboa: Editorial Caminho S.A, 1990.

MENDONÇA, A.; RIBEIRO, N. R. O marxismo e a crise econômica actual. *In*: BRANCO, J. F. O marxismo no limiar dos anos 2.000. Lisboa: Editora Caminho S.A.R.L., 1985, p. 33-100.
MENDONÇA, H. F.; VALPASSOS, I. S. Combination of economic policies: how the perfect storm wrecked the Brazilian economic growth. Empirical Economics, v. 63, n. 3, p.1135-1157, Jan. 2022. Available at: https://link.springer.com/article/10.1007/s00181-021-02167-4.
MIGUEZ, T. Evolução da formação bruta de capital fixo na economia brasileira 2000-2013: uma análise multissetorial a partir das matrizes de absorção de investimento (MAIs). 2016. 140 f. Tese (Doutorado em Economia) – Instituto de Economia, Universidade Federal do Rio de Janeiro, Rio de Janeiro, 2016. Available at: https://www.ie.ufrj.br/images/IE/PPGE/teses/2016/Thiago%20de%20Holanda%20Lima%20Miguez.pdf. Accessed on: 12 Feb. 2025.
MIGUEZ, T. Análise e impacto do BNDES FINAME a partir das empresas credenciadas, dos produtos financiados e da cadeia de fornecedores. Nova Economia, v. 30, n. 03, p. 833-869, 2020. https://doi.org/10.1590/0103-6351/5962
MIGUEZ, T.; FREITAS, F. Matrizes de absorção de investimento (MAIs): metodologia de estimação para o Sistema de Contas Nacionais Referência 2010. Texto para Discussão 024. Rio de Janeiro: Universidade Federal do Rio de Janeiro, 2021. Available at: https://www.ie.ufrj.br/images/IE/TDS/2021/TD_IE_024_2021_MIGUEZ_FREITAS.pdf. Accessed on: 12 Feb. 2025.
MILLER, T. R.; BERRIL, P.; WOLFRAM, P.; WANG, R.; KIM, Y.; ZHENG, X.; HERTWICH, E. G. Method for endogenizing capital in the United States environmentally-extended input-output model. Journal of Industrial Ecology, v. 23, n. 6, p. 1410-1424, Aug. 2019. Available at: https://doi.org/10.1111/jiec.12931.
MOHADDES, K.; PESARAN, M. H. Country-specific oil supply shocks and the global economy: a counterfactual analysis. Energy Economics, v. 59, p. 382-399, Sep. 2016. Available at: https://doi.org/10.1016/j.eneco.2016.08.007.
MORITA, H. On the relationship between fiscal multipliers and population aging in Japan: theory and empirics. Economic Modelling, v. 108, p. 105772, Mar. 2022. Available at: https://doi.org/10.1016/j.econmod.2022.105772.
PAULA, L. F.; MODENESI, A. M.; PIRES, M. C. C. The tale of the contagion of two crises and policy responses in Brazil: a case of (Keynesian) policy coordination?. Journal of Post Keynesian Economics, v. 37, n. 3, p. 408-435, Apr. 2015. Available at: https://doi.org/10.1080/01603477.2015.1000118.
PLOSSER, C. I. Understanding real business cycles. Journal of Economic Perspectives, v. 3, n. 3, p. 51-77, jun. 1989. Available at: https://www.aeaweb.org/articles?id=10.1257/jep.3.3.51.
RIBEIRO, N. R. A acumulação do capital no Brasil: expansão e crise. 1988. 668 f. Tese (Doutorado em Economia) – Instituto Superior de Economia e Gestão, Universidade de Lisboa, Lisboa, 1988. Available at: https://www.repository.utl.pt/handle/10400.5/11518. Accessed on: 12 Feb. 2025.
RIBEIRO, N. R. Da crise às flutuações: ciência ou ideologia?, Texto para Discussão. João Pessoa: Mestrado de Economia, 2000.
RIBEIRO, N. R. A crise econômica: uma visão marxista. João Pessoa: Editora Universitária da UFPB, 2008.

SHAIKH, A. An introduction to the history of crisis theories. *In*: The Union for Radical Political Economics. (Ed.). U.S. capitalism in crisis. New York: URPE Monthly Review Press, 1978, p. 219-241. Available at: https://crisistheory4anticaps.wordpress.com/wp-content/uploads/2013/05/shaikh_history-of-crisis-theories.pdf. Accessed on: 12 Feb. 2025.
SILVA, R. P. O movimento cíclico da economia brasileira e a indústria de bens de capital: 1980–2000. 2002. 98 f. Dissertação (Mestrado em Economia) – Centro de Ciências Sociais Aplicadas, Universidade Federal da Paraíba, João Pessoa, 2002.
SISTEMA DE CONTAS NACIONAIS 2010 (SCN/2010), Rio de Janeiro: IBGE. Available at: https://sidra.ibge.gov.br/tabela/6784#resultado. Accessed on: 12 Feb. 2025.
SÖDERSTEN, C.-J. H.; LENZEN, M. A supply-use approach to capital endogenization in input–output analysis. Economic Systems Research, v. 32, n. 4, p. 451-475, Jul. 2020. Available at: https://doi.org/10.1080/09535314.2020.1784852.
SÖDERSTEN, C.-J. H.; WOOD, R.; HERTWICH, E. G. Endogenizing capital in MRIO models: the implications for consumption-based accounting. Environmental Science and Technology, v. 52, n. 22, p. 13250-13259, Sep. 2018. Available at: https://pubs.acs.org/doi/10.1021/acs.est.8b02791.
UN-HABITAT. Scaling-up affordable housing supply in Brazil: The 'my house my life' programme, Nairobi: UN-Habitat, 2013.

Este trabalho está licenciado sob uma licença Creative Commons Attribution 4.0 International License.