Countercyclical Policy in Lula's Second Administration: assessing FINAME's economic impact based on input-output analysis

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Resumo:
O presente artigo combina uma abordagem quantitativa à Economia Política Marxista para examinar o papel da expansão da oferta de crédito do BNDES FINAME na recuperação econômica brasileira de 2010, após a crise de 2008-2009. Através da endogeneização do impacto intersetorial do uso de bens de capital no modelo de Leontief, mediu-se o impacto das operações de crédito do FINAME em cada atividade econômica usando a análise contrafactual. Nossos resultados mostraram reduções nos multiplicadores da produção, do valor adicionado e da ocupação na ausência dessas operações, assim como na ausência do seu uso como política anticíclica em 2010.

Abstract:
This paper combines a quantitative approach with Marxian economics to examine the part played by the expansion of BNDES FINAME's credit supply in the Brazilian economic recovery in 2010 after the 2008-2009 crisis. By endogenising the intersectoral impact of capital goods usage in Leontief's model, we were able to measure the impact of FINAME's credit operations on each economic activity through counterfactual analysis. Our results have showed decrease in the output, value added and occupation multipliers in the absence of these operations and in the absence of their use as countercyclical policy in 2010.

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

1. Introduction:

Having been triggered in the United States financial market in the second half of 2007, the 'so-called' Subprime Crisis spread to the rest of the world and 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; Cunha et al. 2011; Paula et al. 2015; Borghi 2017).

Although the crisis initial impact virtually stopped Brazilian GDP real growth, which amounted for −0.1 per cent in 2009, after the abovementioned policy response, the world witnessed a spectacular recovery of the economy, which grew at a real rate of 7.5 per cent in the following year (IBGE 2010). It is needless to say that such an event had to stimulate the scientific community to carry out a number of studies featuring the part played by the countercyclical policies of Lula's

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administration in said recovery. Gonçalves Júnior et al. (2014), Cunha et al. (2011), Paula et al. (2015), Borges and Montibeler (2014) and Borghi (2017) are examples of these studies.

Faced with Lula's election in 2022 while the Brazilian economy struggles to recover from the economic slowdown brought by the Covid-19 pandemic, it is safe to say that the analysis of the aforementioned policies will be returning to the social sciences' agenda soon. This becomes clearer if we recall that, even though much has been done in the past 12 years, there is still ground to be covered concerning the examination of the impact of those countercyclical policies, especially in relation to the credit expansion initiatives.

According to Barbosa (2010, p. 7), one of the first effects of the Subprime Crisis in Brazil was a credit crunch. So, in order to reverse the situation, at first the government provided liquidity in both domestic and foreign currency. 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 BCB's open market operations, since the base interest rate have not been reduced yet. In face of that, the government also started expanding the credit supply by the use of three state-owned banks: Banco do Brasil, Caixa Econômica Federal and Banco Nacional do Desenvolvimento Econômico e Social (hereinafter, BNDES), successfully reverting the credit crunch (Paula et al. 2015, p. 420).

However, to properly evaluate the part played by this policy in the Brazilian economic recovery in 2010, first of all, 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[3] (UN-Habitat 2013, p. 75). In light of that, it is safe to say that the analysis was already carried out by Gonçalves Júnior et al. (2014), who measures this program's economic impact using input-output analysis. The Banco do Brasil's and the BNDES' case, 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 among different BNDES' subsidiaries and each one of them finances activities of a variety of economic sectors (Cunha et al. 2011, p. 708; Borghi 2017, p. 65). Examining this measure's impact, therefore, demands data on each of these subsidiaries' credit operations on microeconomic level. Data with this level of detail, however, can be obtained by using a mechanism created by the Brazilian federal act

[3] 400,000 residencies were acquired by the government in housing projects and then passed along to poor families at subsidised prices and interest rates, meanwhile other 600,000 residencies could be bought by lower-middle-income families through the market with the government providing subsides and guaranteeing low interest rates. All these operations were financed by Caixa Econômica Federal (Barbosa 2010, p. 8).

nº 12,527 of November 18, 2011 that enables any citizen to be granted access to any information regarding state-owned companies' operations, provided that this information does not jeopardize any private agent (Subchefia para Assuntos Jurídicos 2011).

Given this, with the intent of contributing to the matter at hand, this article analyses the part played by the expansion of BNDES FINAME's credit supply in Brazil's economic recovery in 2010[4]. In other words, our goal is to understand how the referred expansion contributed to the aforementioned recovery process. To achieve this goal, firstly we calculate FINAME's credit operations' impact on economic activity's key variables—namely output, value added and occupation multipliers—following with the calculation of the expansion of these operations' impact on the same variables in 2010. This is accomplished by combining input-output and counterfactual analysis. Finally, we discuss these results considering the influence that this sort of policies has on the business cycle based on the Marxian theory of crisis. Our theoretical choice is also debated in the paper.

2. Theoretical Framework:

Since capitalist economies started developing through cycles of economic expansion and contraction, the most prominent theoretical explanations for this phenomenon have been changing alongside mainstream economics (Shaikh 1978, Ribeiro 2000). Nowadays, with the Neoclassicism as the mainstream, the lead explanation is the Real Business Cycle Theory, presented in works such as King and Plosser (1984), Plosser (1989) and Kydland and Prescott (1990). It basically states that the economic crises that mark the business cycle compass are a consequence of random negative supply shocks, which affect productivity and, consequently, economic activity.

This understanding, however, contrasts with the findings of empirical works that present evidence of regularity in the cyclical movement of industrialised capitalist economies (Juglar 1862; Korotayev and Tsirel 2010; Mendel'son 2013; Almeida and Almeida Júnior 2022) and others that identify the same essential elements in each of the referred crises (Ribeiro 1988; Mendonça 1990; Almeida Júnior 2016). 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.

[4] It is opportune to highlight that, at first, we intended to evaluate the economic impact of both FINAME's and FINEM's credit operations, since together they respond for the majority of BNDES' operations and are strictly used to finance expansion of productive capacity, while other BNDES' subsidiaries have a variety of other goals, such as financing cultural events and so on. With that in mind, we evoked the aforementioned federal act, asking the BNDES technicians for the annual disbursements of FINAME's and FINEM's credit operations disaggregated by demander and supplier CNAE-sector (Classificação Nacional de Atividades Econômicas or National Economic Activities Classification, in English). The BNDES employee responsible for responding to our request, however, evoked the federal decree nº 7,724, article 5, item III (Subchefia para Assuntos Jurídicos 2012), which stablishes that requests that demand additional work from the public institution regarding data treatment will not be fulfilled, and then informed us that they could not meet our demands for the FINEM data.

In opposition to the Neoclassical view, Marxian economics sees these economic crises as a necessary phenomenon of the capitalist mode of production. Its understanding is that capital accumulation tends to expand the conditions for surplus-value extraction while it narrows 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 the capital in excess. In this approach, therefore, each of these crises has overproduction as its essential characteristic and a cause in common that is indissociable of the capital accumulation process, which means that they are, to some extent, predictable (Marx 1956a, 1956b, 1969, 1973, 1991).

In Brazil, a particular interpretation of Marx's crisis theory has been used by some economists to analyse the economy's cyclical movement (Ribeiro 1988; Silva 2002; Almeida Júnior 2016, 2023). After emerging from the joint work of Mendonça and Ribeiro (1985), the Mendonça-Ribeiro interpretation developed through the works of Mendonça (1990), Ribeiro (1988, 2008) and Almeida Júnior (2013, 2016, 2019, 2023). According to its most recent version (Almeida Júnior 2019, p. 97-113, 2023, p. 7-18)[5], the cause for 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. 11).

To put in more concrete terms, while 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, therefore, generates overproduction crises and, since productive forces development depends on the renovation of fixed capital, the timelapse between each of these crises will be heavily influenced by the physical and moral depreciation time of that fixed capital (Almeida Júnior 2023, p. 14). Hence, the regularity characterises not only the occurrence of crises, but also the recovery process after each one of them. Based on that, the Mendonça-Ribeiro interpretation divides the business cycle into four stages: crisis, depression, recovery and peak[6] (Almeida Júnior 2023, p. 15-16).

According to Draguilev (1961), Shaikh (1978), Ribeiro (1988), Mendonça (1990), Almeida Júnior (2016, 2023) and other Marxian authors, however, even though this accumulation pattern integrates the 'laws of motion' of capitalist economies, it can be influenced or disturbed by exogenous

[5] It is not our aim to present this interpretation here. A more detailed presentation in Portuguese is made in Almeida Júnior (2019). For English, see Almeida Júnior (2023, p. 7-18).
[6] For a brief presentation of the characteristics of each business cycle stage, see Almeida Júnior (2023, p. 16-17).

shocks such as economic policies. Nevertheless, the Marxian theory is still opposed to the Neoclassical and even the Keynesian view.

Contrary to the Neoclassical understanding of the matter, in the Marxian view, economic policies can never become the determinant factor for the cyclical movement. They cannot prevent the economy to present the expected behaviour, but only distort it or determine its secondary characteristics such as its external appearance. When these policies are connected to the burst of an overproduction crisis, for example, it 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. 18). Furthermore, according to Almeida Júnior (2016, p. 212-13), when trying to prevent the burst of periodical overproduction crises by creating new stimuli to capital accumulation, economic policy is necessarily keeping the process that generates the content of the crisis phenomenon in motion, meaning it can only expand the limit of the mismatch between the conditions for extraction and realisation of surplus-value, but never prevent overproduction. The tendency to overproduction is indissociable from capitalism. Also, since the referred limit is being expanded, it will only postpone the crisis eruption at the expense of intensifying its violence.

Finally, given this article's goal, it is opportune to address the specific case of credit related countercyclical policies. Firstly, it is important to point out that credit operations basically advance, to capitalists and consumers, an amount of value that has not been realised or produced yet. By doing so, they will enable capitalists to carry out the expanded reproduction without having accumulated enough surplus-value to that purpose. They also enable consumers to anticipate 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 must function as the incarnation of social labour without any goods circulation later, when the payments need to be made. For goods to circulate in the present without the circulation of money, money must circulate in the future without the circulation of goods (Marx 1956a, p. 86-8; Mendonça 1990, p. 142; Ribeiro 2008, p. 16; Almeida Júnior 2023, p. 12-13, 33-6).

In other words, credit operations basically have the tendency to enhance the conditions for extraction of surplus-value and the conditions for its realisation in the present, while, together with the accumulation effects, further narrows 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—as other countercyclical policies—can only postpone the crisis eruption at the expense of intensifying its violence. In its specific case, however, this happens in a greater degree.

3. Materials and Methods:

To measure the economic impact of FINAME's credit operations, we create alternative scenarios for the Brazilian economy in 2010 and use the input-output analysis to recalculate the values of the output, value added and occupation multipliers. The detailed presentation of our methodology begins by approaching the counterfactual analysis.

3.1. The Counterfactual Impact Evaluation:

In economics, the counterfactual analysis is usually 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 undertake this task. In both, the aim is to measure the impact of a specific event on specific variables (Cai and Wang 2008; Falco and Veronesi 2013; Bove and Nisticò 2014; Mohaddes and Pesaran 2016, Mardones and Muñoz 2018; Su and Liang 2021; Morita 2022; Wu et al. 2022; Mendonça and Valpassos 2022).

The first one begins by identifying a sample that was not exposed to the event whose impact is being measure and has characteristics that are similar to the ones of the sample in examination. Thenceforth, the alternative sample's behaviour is modelled so the variables values obtained in the simulation can be compared to the ones from the original sample. The event's impact is measured by the difference between them. This approach has the advantage to ensure that the analysis is of a high complexity level, since the samples differ from each other essentially regarding the exposure to the aforementioned event. Besides, it is not necessary to artificially alter any variable. Nevertheless, the approach cannot be use if the alternative sample does not exist.

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

Taking into account this article's object of study, it would be virtually impossible to find an economy whose characteristics were similar enough to Brazil's. Hence, as an alternative, we approach the matter at hand by creating alternative scenarios for the Brazilian economy in 2010. In each of the scenarios, we set different values for FINAME's credit operations. Then, we calculate how these changes affect output, value added and occupation—all in sectoral level—so we can compare these counterfactual scenarios to the factual one. Since FINAME finances expansion of productive

capacity, we use the input-output approach based on the Leontief's model with endogenised capital for these calculations, as described in the following subsection.

3.2. Endogenising Gross Fixed Capital Formation in Leontief's Model:

Traditionally, Leontief's inverse matrix (L) is calculated through the matrix of technical coefficients (A), which, in turn, is obtained through the use table (U). The latter presents the matrix of sectoral flow of intermediate consumption and the sectoral gross production vector (x), which allows us to calculate the market share matrix (S). To obtain Leontief's inverse matrix, we use the following equation:

$$L = [I - S'.U.\hat{x}^{-1}]^{-1} = [I - A]^{-1} \quad (1)$$

From L, we can estimate the total impact—direct and indirect—of intersectoral intermediate consumption on the economy in terms of output, value added, income, taxes, employment, among other variables (Miller and Blair 2009; Dietzenbacher et al. 2013; Oosterhaven 2019; Guilhoto 2021). To do it so, in an industry-by-industry structure, it is necessary to pre-multiply L by a matrix of coefficients (q), composed of row vectors whose elements are quotients between each variable-i of sector-j and the sector-j's production ($q_{ij} = v_{ij}/x_j$), as follows:

$$\Omega = q.L \quad (2)$$

Given this, each column in the Ω matrix presents the sectoral multipliers of each variable, which shows how each of the referred variables would change, directly and indirectly, as a consequence of a variation of one monetary unit in the production of a particular sector.

However, it is also possible to endogenise the intersectoral impact of capital goods usage in Leontief's model, estimating the direct and indirect impacts of the gross fixed capital formation (hereinafter, GFCF) on the economy. According to Lenzen and Treloar (2004), there are two different ways to accomplish this task.

The first one consists of expanding the use table's (U) dimensions by adding: 1) a column vector of the goods destined to GFCF and 2) a row vector of the amount of fixed capital demanded by each sector. This will expand the A matrix in one dimension. Thenceforward, Leontief's inverse matrix is calculated. This method is known as the augmentation method to capital endogenisation. It was used by Almeida (2018) to analyse the deindustrialization process in the Brazilian economy from 1995 to 2010. By the one hand, this is a simple method, since it only needs the addition of two vectors, which are usually made available by official institutions. By the other hand, the A matrix is expanded by adding an artificial sector assumed to produce homogeneous capital goods (Lenzen and Treolar 2004, p. 2).

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

$$L^k = [I - A + K]^{-1} \quad (3)$$

This is the flow matrix method to capital endogenisation, used by Södersten et al. (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, the multipliers with endogenised capital (Ω^k) are given by:

$$\Omega^k = q.L^k \quad (4)$$

This was the method we chose to measure the impact of FINAME's credit operations, since it overcomes the deficiencies of the first one presented by us. In the next subsection, we discuss how the Brazilian economy's capital flow matrices were used in our calculations.

3.3. The Brazilian Capital Flow Matrices:

For the period from 2000 to 2018, the Brazilian U^k matrices were already estimated by Miguez (2016) and Miguez and Freitas (2021). They were built from the Sistema de Contas Nacionais (National Accounts System), which has 2010 as the year of reference (SCN 2010) and is based in the fourth revision of the International Standard Industrial Classification (ISIC, Rev. 4). However, since these capital flow matrices were initially disaggregated into 25 goods and 49 economic activities, they needed to be made compatible to the Brazilian input-output tables regarding the number of goods categories as well as the number of economic activities (Miguez and Freitas 2021, p. 5). This compatibilization process resulted in matrices with 103 products and 38 economic activities and is summarised in table 1.

After obtaining the referred U^k matrices, the next step is to build tables with an industry-by-industry structure, which gives us the sectoral multipliers of the Brazilian economy for 2010. It is interesting to highlight that, in a new approach to endogenising capital in the supply-use tables' structure, Södersten and Lenzen (2020) estimated a capital supply matrix, which presents the flow of capital goods by economic activity. With this matrix, the authors calculated the market share and transformed U^k 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 (103x38) of the Brazilian input-output matrix to transform U (103x38) as well as U^k (103x38) into square matrices (38x38). Our

approach is based on the assumption that each activity will meet the demand for a specific good in the same proportion of its share in the total production of the referred good. In other words, if, for example, the motor vehicles, trailers and semi-trailers activity produces 90 per cent of the products with the same nomenclature, it is reasonable to assume that 90 per cent of the motor vehicles, trailers and semi-trailers consumed as input or capital goods has been produced by the referred economic activity.

Table 1. Economic activities compatibilization between Miguez and Freitas (2021) U^k matrices, the ISIC, Rev. 4 and the input-output tables (IBGE)

Economic Activities	Miguez & Freitas (2020)	ISIC, Rev. 4	IO Tables (IBGE)
Agriculture, forestry and fishing	0101:02	A	0191:92-0280
Extraction of petroleum and gas and support activities	0201	B06-B09	0608
Other mining and quarrying	0202:03	B05-B07-B08	0508-0791:92
Food and beverages	0301	C10-C11	1091:1093-1100
Tobacco products	0302	C12	1200
Textiles	0303	C13	1300
Wearing apparel	0304	C14	1400
Leather and related products	0305	C15	1500
Wood products - excluding furniture	0306	C16	1600
Paper and paper products	0307	C17	1700
Printing and reproduction of recorded media	0308	C18	1800
Coke and refined petroleum products; alcohol	0309:10	C19	1991:92
Chemicals and chemical products	0311:12+14:17	C20	2091:93
Pharmaceutical products	0313	C21	2100
Rubber and plastic products	0318	C22	2200
Other non-metallic minerals	0319:20	C23	2300
Basic metals	0321:22	C24	2491:92
Metal products - excluding machinery and equipment	0323	C25	2500
Machinery and equipment - including repair and installation	0324	C28-C33	2800-3300
Electrical equipment	0325+27	C27	2700
Computer, electronic and optical products	0326+28:29	C26	2600
Motor vehicles, trailers and semi-trailers	0330:32	C29	2991:92
Other transport equipment	0333	C30	3000
Furniture and other manufacturing	0334	C31-C32	3180
Utilities	0401	D-E	3500-3680
Construction	0501	F	4180
Trade	0601	G	4580
Transport and storage	0701	H	4900-5000-5100-5280
Information and communication	0801	J	5800-5980-6100-6280
Financial and insurance activities	0901	K	6480
Real estate activities	1001	L	6800
Services provided to families and associations	1101+06	R-S	9080-9480
Accommodation and food services	1102	I	5500-5600
Services provided to businesses	1103	M-N	6980-7180-7380-7700-7880-8000
Education	1104	P	8592
Human health and social work activities	1105	Q	8692
Activities of households as employers	1107	T	9700
Public administration	1203	O-U-Z	8400-8591-8691

Source: elaborated by the authors.

Following the aforementioned methodology, from equations (1) and (3), we obtain the base equation hereby used to estimate Leontief's inverse matrix with endogenised capital for 2010:

$$L^k = \left[I - S'.(U + U^k).\hat{x}^{-1}\right]^{-1} = [I - A + K]^{-1} \quad (5)$$

Finally, the multipliers were calculated from equation (4) with L^k given by equation (5), and this concludes our presentation on the method we use for capital endogenisation. In the next subsection, after presenting a very brief description of the BNDES' subsidiary in whose activities we are focusing, the FINAME, we discuss the data we use.

3.4. The FINAME Data and Some Additional Methodological Procedures:

The Agência Especial de Financiamento Industrial (FINAME) is one of BNDES' subsidiaries and its main goal is to promote the Brazilian industry expansion, especially of the capital goods industry. It focuses in financing the purchase of national capital goods, although it also finances imported capital goods, provided they do not have similar models produced in Brazil. The data we use to measure the impact of FINAME on the economy, however, encompasses exclusively the financing of new capital goods produced in Brazil.

It is important to highlight that what we include in the capital flow matrices' (U^k) figures are the disbursements carried out by FINAME between 2004 and 2018—there is no reliable data for the preceding years—which means that the amount received in a specific year was not necessarily spent in that year. We, however, assume that it was. This was the only viable methodological choice since we did not have access to the data regarding the use of those resources.

The data we were able to obtain from BNDES has two dimensions: it presents information on the companies which demanded financing and on the ones which supplied the capital goods. The companies were grouped according to the ISIC, Rev. 4. They were classified into 87 economic activities according to section and division levels. Then, we were able to transform this information into tables, whose rows present information on 87 economic activities that supply capital goods and whose columns present information on 87 economic activities that demand capital goods. Since the data was already in an industry-by-industry structure, the FINAME tables in the 38x38 dimension (F) were built by aggregating rows and columns.

Thenceforth, the counterfactual analysis is 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 remains unchanged. We describe these scenarios in the following subsection.

3.5. Counterfactual Analysis Scenarios:

With the intent of measuring FINAME's total impact on the economy, for the first scenario, we subtract the 2010 F matrix from U^k. This simulates the total absence of GFCF financing by FINAME in the referred year. From equations 4 and 5, we can derive the counterfactual scenario 1 (c1), which is presented in equations 6 and 7.

$$L_{c1}^{k} = \left[I - S'.(U + U^{k} - F_{2010}).\hat{x}^{-1}\right]^{-1} \quad (6)$$

$$\Omega_{c1}^{k} = q.L_{c1}^{k} \quad (7)$$

To measure the use of FINAME's credit supply expansion as a countercyclical policy, in turn, we elaborate other two counterfactual scenarios. The counterfactual scenario 2 (c2) assumes that the total amount of FINAME's disbursements in 2010 were equal to the value observed in 2009. This scenario is represented by equations 8 and 9.

$$L_{c2}^{k} = \left[I - S'.(U + U^{k} - F_{2010} + F_{2009}).\hat{x}^{-1}\right]^{-1} \quad (8)$$

$$\Omega_{c2}^{k} = q.L_{c2}^{k} \quad (9)$$

Finally, in the counterfactual scenario 3 (c3), we assume that FINAME's figures grew at the average growth rate observed in the pre-crisis period, 2004-08. Hence, we apply 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 10. This scenario is represented by equations 11 and 12 as follows:

$$F_{ij,2010^{*}} = F_{ij,2009}.\left(1 + \sum_{t=2005}^{2008} \frac{F_{ij,t} - F_{ij,t-1}}{F_{ij,t-1}} \Big/ 4\right) \quad (10)$$

$$L_{c3}^{k} = \left[I - S'.(U + U^{k} - F_{2010} + F_{2010^{*}}).\hat{x}^{-1}\right]^{-1} \quad (11)$$

$$\Omega_{c3}^{k} = q.L_{c3}^{k} \quad (12)$$

Hence, from the scenarios described by equations 6, 8 and 11, we calculate the sectoral multipliers, as presented in equations 7, 9 and 12, to compare them to the ones obtained through equations 4 and 5. As a result of this procedure, the investment carried out by each sector is deducted from the value added. The share financed with FINAME's resources, however, is not included in this deduction, which means that we are assuming that part of the investment came from the value added while the other share is exogenous, coming from FINAME's resources. Let us discuss our results in the next section.

4. Results and Discussion:

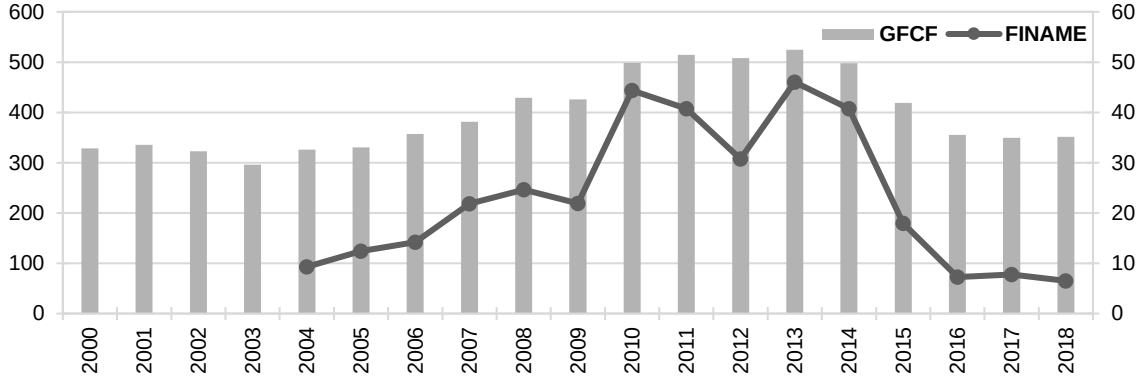
Before discussing the counterfactual analysis results, we briefly examine the GFCF and FINAME's disbursements behaviour in the period 2000-18, giving a closer look in the year of 2010 by desegregating the data by economic activity. This will facilitate the discussion that follows.

4.1. Preliminary Analysis:

According to Almeida Júnior (2016, p. 212), the Brazilian economy's fifth business cycle can be classified as follows: 1) 1997.Q3-1999.Q4: crisis; 2) 2000.Q1-2002.Q2: depression; 3) 2002.Q3-2005.Q4: recovery; 4) 2006Q1-2008Q3: peak. In addition, the author (Almeida Júnior 2016, p. 212) 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 per cent as a consequence of the crisis.

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

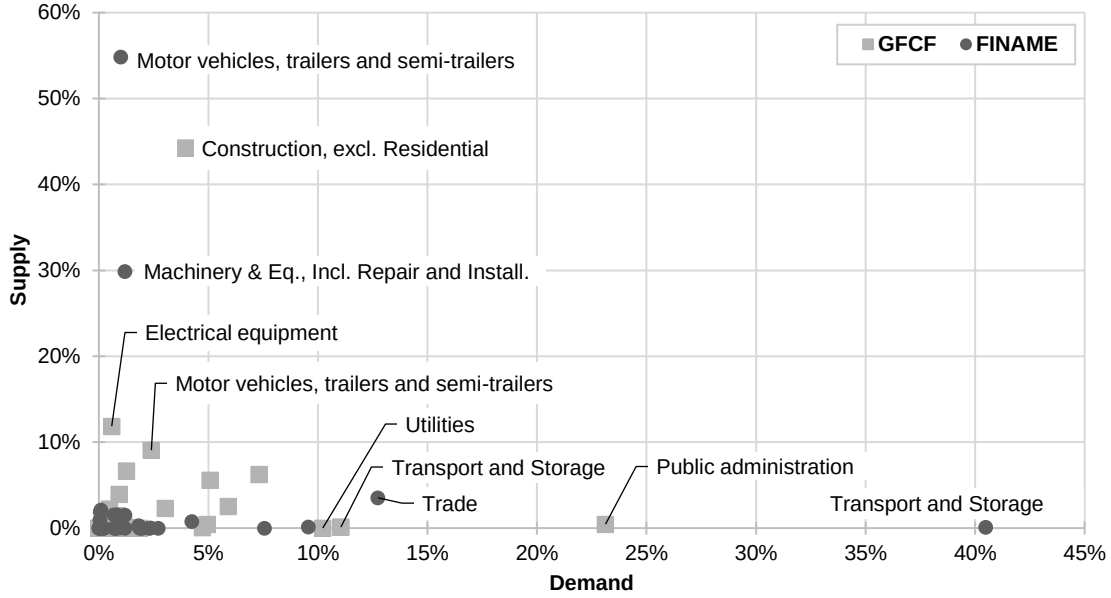


Source: elaborated by the authors based on IBGE/SCN 2010.

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, 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.

Figure 2. Economic activities per cent share in the supply and demand of capital goods and FINAME's financing in the year of 2010



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

Regarding the GFCF's figures, construction stands out as the biggest capital goods supplier in 2010 (44.3 per cent), followed by electrical equipment (11.9 per cent) and motor vehicles, trailers and semi-trailers (9.1 per cent). The biggest demanders, in turn, were public administration (23.1 per cent), transport and storage (11 per cent) and utilities (10.2 per cent). In relation to FINAME's disbursements, on the other hand, the activities that received the resources' highest share were transport and storage (40.5 per cent), trade (12.7 per cent) and construction (9.6 per cent). The majority of those resources were used to acquire goods from two specific activities: motor vehicles, trailers and semi-trailers (54.8 per cent) and machinery and equipment, including repair and installation (29.9 per cent).

4.2. The Output Multipliers:

Let us recall how to interpret the multiplier of a given variable in an input-output analysis so we can proceed with the discussion of our results: taking the output multipliers as an example, if the 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. With that being said, let us focus on table 2, which brings us the Brazilian economy output multipliers.

Table 2. Economic activities' backward output multipliers of the Brazilian economy in each 2010 scenario

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.

The examination of table 2[7] shows us that all activities had their multipliers reduced in the counterfactual scenario 1 (c1). The highest reductions were transport and storage (−6.35 per cent), trade (−1.92 per cent) and wood products – excluding furniture (−1.91 per cent). The same happens, in a smaller scale, in the counterfactual scenario 2 (c2), with the highest reductions represented by transport and storage (−3.17 per cent), other non-metallic minerals (−0.98 per cent) and trade (−0.88 per cent). The counterfactual scenario 3 (c3), in turn, presents a slightly different situation. Although

[7] The activity called activities of households as employers is an exception for the entire analysis, since it does not demand any capital goods or input, nor financing from FINAME.

most activities presented with a reduction in their multipliers—with the highest reductions occurring in transport and storage (−1.52 per cent), furniture and other manufacturing (−0.46 per cent) and other non-metallic minerals (−0.46 per cent)—two of them presented with an increase: public administration (0.32 per cent) and electrical equipment (0.11 per cent). The reason behind this is that, for 11 activities, the amount of FINAME's financing operations in the c3 scenario surpassed the factual scenario.

Lastly, it is important to draw the reader's attention to table 2's last row, which compares the multipliers' average. All counterfactual scenarios presented with lower averages. These results reveal FINAME's importance for the consolidation of the Brazilian productive structure, since it increases the economy's multipliers, which implies a higher backward linkage between each sector and the rest of the economy.

4.3. The Value Added Multipliers:

Table 3 presents us the value added multipliers. In c1, the three activities with higher loses in their capacity of generating value added are transport and storage (−6.62 per cent), other non-metallic minerals (−3.03 per cent) and rubber and plastic products (−2.69 per cent). On average, the economy's capacity of generating value added dropped 1.48 per cent in this scenario. In c2, in turn, the highest reductions in the capacity of generating value added were observed in the three following activities: transport and storage (−3.37 per cent), other non-metallic minerals (−1.65 per cent) and textiles (−1.47 per cent). The average multiplier decrease was 0.77 per cent in this scenario. Finally, in the c3 scenario, one sector presented with higher capacity of generating value added, which was public administration (0.16 per cent), while all others presented with reduction of the referred capacity. The highest reductions occurred in transport and storage (−1.43 per cent), textiles (−1.04 per cent) and rubber and plastic products (−1.01 per cent). On average, the economy lost 0.36 per cent of its capacity of generating value added.

Table 3. Economic activities' value added multipliers of the Brazilian economy in each 2010 scenario

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.

In general, table 3 shows us that FINAME's credit supply expansion played an important part in Brazil's economic recovery, since the added value multiplier of each activity was, on average, at least 0.36 per cent higher because of it.

4.4. The Occupation[8] Multipliers:

Following the same pattern as before, table 4 presents information on the occupation multipliers. They represent the number of occupations created for each R$1.00 produced in each activity.

Table 4. Economic activities' occupation multipliers of the Brazilian economy in each 2010 scenario

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.

[8] Number of people occupied in the activity as employer or employee.

In c1, the highest reductions in the activity ability of generating new occupation are observed in transport and storage (−4.04 per cent), other mining and quarrying (−1.97 per cent) and extraction of petroleum and gas and support activities (−1.40 per cent). In c2, the highest reductions occurred in transport and storage (−2.05 per cent), other mining and quarrying (−1.10 per cent) and other non-metallic minerals (−1.10 per cent). Finally, in c3, the highest reductions occurred in transport and storage (−0.66 per cent), rubber and plastic products (−0.38 per cent) and other non-metallic minerals (−0.38 per cent). In this scenario, however, public administration (0.17 per cent), electrical equipment (0.13 per cent) and printing and reproduction of recorded media (0.06 per cent) presented with increased occupation multipliers.

On average, the activities' capacity of creating occupations was reduced in 0.64 per cent, 0.35 per cent and 0.11 per cent in c1, c2 and c3 respectively.

4.5. Policy Evaluation in Light of the Marxian Crisis Theory:

Once we have presented our results and discussed them punctually, we can carry out an overall evaluation of the impact of FINAME's credit supply expansion on the Brazilian economy. Even though the referred economy has presented with lower multipliers in both counterfactual scenarios, in our opinion, it is important to define, between c2 and c3, which of them seems more plausible to represent the absence of countercyclical policy. To accomplish that we must resort to the Marxian crisis theory.

As Almeida Júnior (2016, p. 198-207) has shown, the overproduction was the essential characteristic of the Brazilian 2008 crisis, which means that the destruction of the capital in excess is what should be expected for the following years. Instead, what has been witnessed was, as has been said, a brief interruption of economic growth in 2009 followed by the return to the growth path of the first three quarters of 2008. As discussed in the second section of this article, this could be explained by the usage of economic policies that stimulate capital accumulation.

According to Barbosa (2010, p. 4-9) and Borghi (2017, p. 63-6), the government's first actions in response to the crisis took place at the end of 2008. Regarding the policy hereby examined, the first step to put it in action was given in the beginning of 2009, when the Brazilian treasury opened a special credit facility to BNDES of 3.3 per cent of GDP (Barbosa 2010, p. 5). As we saw in figure 1, however, the impact of the aforementioned special credit facility on FINAME's credit operations did not occur in 2009, since these operations presented with the expected behaviour for a crisis scenario, falling 11.06 per cent in real terms in the referred year.

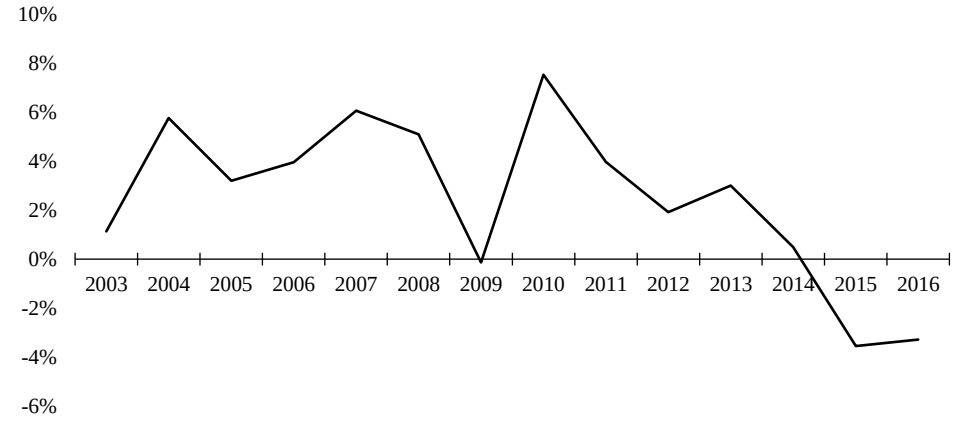
Faced with this information, between the counterfactual scenarios c2 and c3, the former seems more suitable to represent the absence of countercyclical response. It is not reasonable to

assume that GFCF financing will grow in the crisis period at the average rate it grew during the economic expansion. Lower figures for GFCF financing are what should be expected.

With that in mind, we recall that, in the c2 scenario, the economy presented with reduction of multipliers in all activities. On average, the reduction of the output, value added and occupation multipliers were 0.64 per cent, 0.77 per cent and 0.35 per cent respectively. This demonstrates that the expansion of FINAME's credit supply played an important part in the Brazilian economic recovery, and also presents evidence that countercyclical policy can successfully fight crisis effects in the short run, as theoretically expected.

Finally, we would like to explore the existence of a medium run impact of this policy on the Brazilian economy. As we saw in figure 1, FINAME's disbursements remained more or less stable during the 2011-14 period. That is because, as pointed out by Borghi (2017) and Paula et al. (2015), Dilma Rousseff's first administration sustained most of the countercyclical policies, especially after the Eurozone crisis. The Brazilian economy's response to those policies, however, seems to have deteriorated over time. If we examine figure 3, we will notice that, after the quick recovery in 2010, the economic growth rapidly declined, culminating in a severe GDP decrease in 2015-16, a period in which the rest of the world had already recovered from the Subprime and the Eurozone crisis. Given its atypic nature, this behaviour of the Brazilian economy was extensively debated by several important economists. Some substantial contributions to this debate are presented in Bonelli and Veloso (2016), Borges (2016) and Barbosa Filho (2017).

Figure 3. Annual growth rates of the Brazilian GDP (2010 prices)



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

As discussed before, according to the Mendonça-Ribeiro Interpretation, it is theoretically expected for this kind of policies to have an 'expiration date'. That is because the process they are designed to preserve and enhance, which is capital accumulation, is the very process that generates overproduction. In other words, they can only postpone the crisis at the expense of intensifying its

violence, since the accumulation will continue to pressure for the mismatch between the conditions for extraction of surplus-value and the conditions for its realisation. The case of credit expansion policies is even more concerning since they can only improve the conditions for realisation of surplus-value in the present by further narrowing them in the future. With that in mind, we can conjecture about the Brazilian economy's medium run response to FINAME's credit supply expansion.

When presented with an opportunity to increase productive capacity through a subsidised credit operation, capitalists are impelled to do it in such a way that increases productivity as well. What impels them to do so is competition. It is the concern that his/her competitors use that credit to increase productivity and, by doing so, becomes able to steal his/her market share—by reducing prices, for example. This is especially true for scenarios in which an increase in demand is expected for the future, and, as we know, the expansion of FINAME's credit supply came along with several other countercyclical policies, such as expansion of consumer's credit and value added tax reduction. Hence, it is reasonable expect that the investment wave supported by FINAME's credit supply expansion has been characterized by the development of productive forces.

If that was the case, from this point forward, the only thing that could be expected would be an imbalance between supply and demand. First of all, because of the subsequent effects of accumulation in the conditions for realisation of surplus-value. Finally, because of the effects of credit in future consumption. On the one hand, the increase in productivity would have greatly expanded goods supply by increasing the produced value and the number of goods in which a given amount of this value is materialised. On the other hand, two factors would be narrowing the conditions for the realisation of this value. Firstly, while goods supply expansion rises the exigency under consumption, the demand of the vast majority of society, the working class, would remain restricted to its usual limits. Secondly, the indebted economic agents would have their consumption reduced, since they need to pay their debt and its interest.

Taking that into account, it is possible that what happened to the Brazilian economy in the 2015-16 period was the price paid for the use of countercyclical policies to fabricate the economic recovery in 2010. If that was the case, as a credit policy, the expansion of FINAME's operations played an even more important part in generating this medium run outcome. However, only further investigation could confirm our conjectures.

5. Concluding Remarks:

In this section we highlight some important contributions given by the analysis carried out by us and presented in this article. By combining the endogenisation of the intersectoral impact of capital goods usage in Leontief's model with counterfactual analysis, we were able to calculate the

impact of FINAME's operations on the Brazilian economy and also the impact of the use of the expansion of FINAME's credit supply as a countercyclical policy in 2010.

First of all, our results have shown that FINAME's operations are of great importance to the Brazilian economy, since its existence deepens the Brazilian productive structure, while enhances its activities' capacity to generate value added and increase occupation. This is evidenced by the reduction of the economic activities' output, value added and occupation multipliers when the F matrix is deducted from the U^k matrix in the counterfactual scenario 1.

Second of all, the decrease of the output, value added and occupation multipliers in the counterfactual scenarios 2 and 3, with a few exceptions in the latter, showed that the expansion of FINAME's credit supply played an important part in the Brazilian economic recovery in 2010. In the counterfactual scenario 2, the more suitable to represent the absence of countercyclical policy, the variations of the aforementioned multipliers' averages were −0.64 per cent, −0.77 per cent and −0.35 per cent, respectively. These results also contributed to the understanding of the use of credit expansion actions as countercyclical policies in moments of economic crisis.

Another important contribution of our work was to explore, based on the Marxian theory of crisis, a possible medium run impact of the use of FINAME's credit supply expansion as countercyclical policy. The contribution here consists of pointing out the need for further investigation of this policy's medium run impact and of the nature of the Brazilian GDP decrease in 2015-16 based on the hypothesis that the use of countercyclical policies cannot prevent an overproduction crisis, but only postpone it at the expense of intensifying its violence.

Finally, in our opinion, this paper has an implicit contribution to the economic thought, since it combines the quantitative approach to the Marxian political economy, and, therefore, contributes to the advance of Economics as science.

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