Effects of Monetary Policy on Income Distribution: Evidence for Brazil

André de Melo Modenesi (IE/UFRJ)
Kleyton da Costa (DI/PUC-Rio)
Bernardo Modenesi (University of Michigan)
Maria Isabel Busato (IE/UFRJ)
Norberto Montani (IE/UFRJ)
Sylvio Kappes (IE/UFC)
Fernando Nogueira da Costa (IE/UNICAMP)

Abstract

This article investigates the impact of monetary policy on income distribution in Brazil. This investigation is critical for directing economic policies aimed at mitigating its adverse effects. We use macroeconomic variables and a Gini index calculated from microdata to measure income distribution. Our analysis employs vector autoregressive and Bayesian vector autoregressive approaches, regression analysis, and causality tests to find evidence of that impact. The results show that a shock to SELIC and inflation positively impacts the Gini index. However, an increase in economic activity and job generation has a negative impact on the Gini index, reducing income inequality.

Keywords: Monetary Policy, Income Distribution, VAR, BVAR, Causal Effects

Área Temática 1: Economia

1. Introduction

Mainstream economists see monetary policy as neutral in the long run: monetary policy has no long-lasting impact on real variables, such as GDP. In fact, the mainstream neutrality hypothesis may be generalized. Accordingly, major Central Banks are not *de facto* concerned with income distribution. Mainstream economics pays little attention to the distributional effects of monetary policy. For instance, O'Farrell (2016) considers that the distributional effects of monetary policy are simply a side effect and, therefore, should be ignored. According to Domanski (2016) "Redistribution decreases income inequality but does not affect trends". Mainstream economics is neither concerned with monetary policy effects on climate as well. In this sense, we may say that in mainstream economics money is neutral considering a multi-dimensional perspective. Accordingly, money affects nothing but inflation – and thus mainstream economics primary focus is price stability only.

On the other hand, non-mainstream economists of many branches – Marxist, Srraffian, Kaleckian, Post Keynesians, etc. – have been criticizing this reductionist view of monetary policy. Indeed, following the seminal work by Niggle (1989), many heterodox economists have been focusing on the effects of monetary policy on income and wealth distribution. For instance, Argitis and Pitelis (2001) bring evidence of the link between monetary policy and the distribution of income for the US and the U.K. Kappes (2022) reviewed the empirical literature on the topic. Rochon (2021) emphasizes that monetary policy "operates primarily through the revenue side, and more specifically, through income distribution". Although many other references are available, there is not enough empirical evidence on the distributional effects of monetary policy. Neither the income-distribution transmission channel is enough studied in an empirical way. In fact, more attention has been paid to the distributional effects of monetary policy, especially in the aftermath of the 2008 financial crisis. Indeed, orthodox economists are seeking for empirical evidence on this transmission channel. For instance, Hohberger (2020) and Bonifacio (2021) apply a DSGE model for several countries.

Our goal is to bring more evidence on this subject. We will apply a Vector Autoregressive (VAR) and a Bayesian Vector Auto-Regressive (B-VAR) model. More precisely, we aim to measure the distributional effects of the Brazilian Central Bank's (BCB) benchmark rate (SELIC) in personal income distribution. Our sample is relatively large, covering the inflation-targeting regime period (2012-2022). We use monthly data, for the SELIC rate, consumer price inflation (IPCA), and a distributional variable used as a proxy for personal income distribution. This variable is calculated using the "Relação Anual Informações Sociais" (RAIS) data on mean salaries. RAIS is a Brazilian microdata database that contains individual information for the workforce of a diverse set of economic activities. Data in RAIS can be segmented by race, gender, education, salary range, and occupation, among other variables. Doing so we pretend to measure the effect of monetary policy on income distribution based on different income strata and social characteristics. Accordingly, our contribution is twofold: to measure the distributional effect of SELIC, and to build a proxy for personal income distribution available in monthly frequency for Brazil.

This study is organized as follows: Section 2 presents the literature review; Section 3 describes the methodology; Section four presents the main results and discussion; and, finally, Section 5 shows the conclusions and paths for future research.

2. Background and Literature

There are several channels through which monetary policy affects income distribution. We will call the direct channel the immediate effects of interest rate changes on personal income distribution. One of such effects is the change in the income obtained from interest-bearing assets after a given change in the base interest rate. Another effect is the influence over the cost of debt, thus affecting net financial income, which is income minus financial expenses. Finally, movements in the interest rate alter the price of financial assets, causing capital gains or losses.

The three effects that make up this direct channel affect the economy as a whole. For example, a reduction in the base interest rate reduces the income accrued from interest-bearing assets, thus reducing the consumption of its holders, and at the same time it reduces the cost of debt, thus increasing the disposable income of indebted agents. The probable increase in the price of financial assets will increase the wealth of its holders, while also affecting the balance sheets of companies and banks. All these developments will affect aggregate demand and, consequently, the unemployment rate; this, in turn, will alter the income of workers, with second-round effects on consumption, aggregate demand and unemployment. This is the basis of the so-called indirect channel. Figure 1 illustrates those two channels.

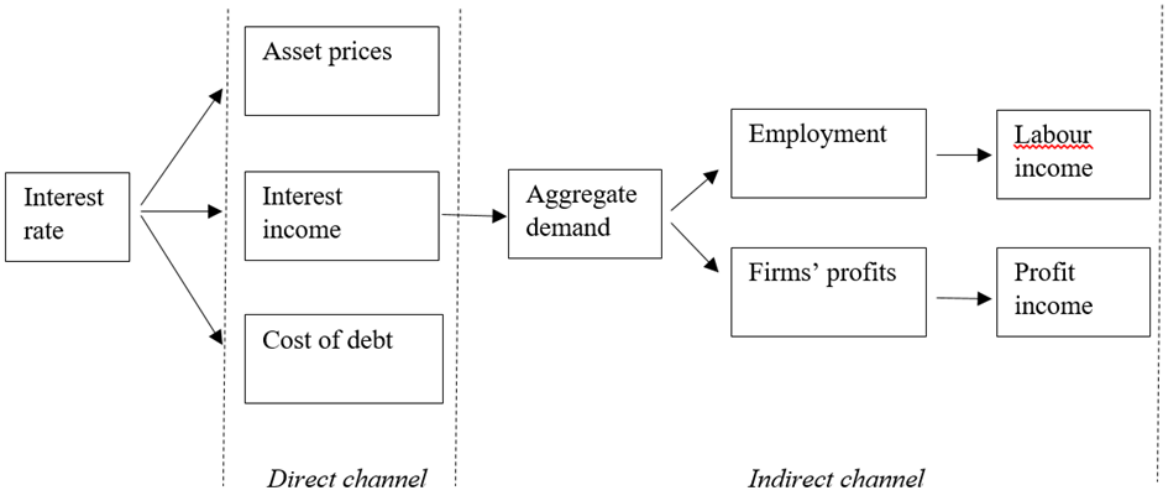

Figure 1: Distributive channels of monetary policy

These effects will have different magnitudes for each individual, as can be assessed in their net financial income. Figure 2 illustrates a general case, for a person who receives all types of income described here. The direct channel affects the interest income, capital gains, and debt service. The indirect channel, in turn, appears in wages and profits.

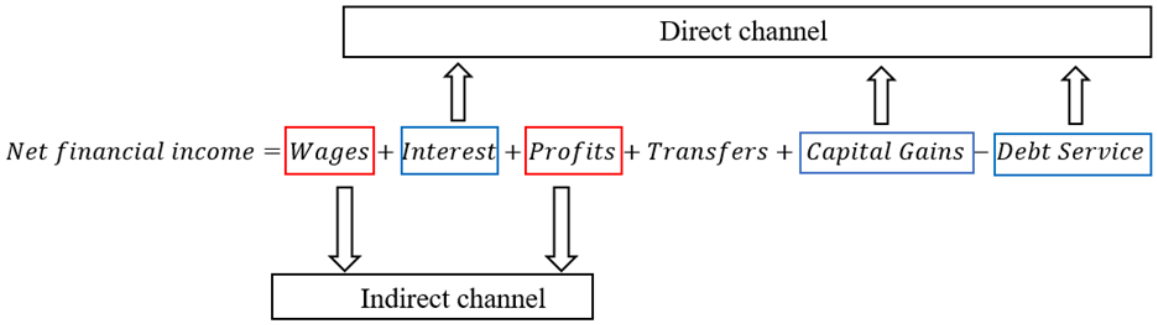

Figure 2: Net financial income and distributive channels

Through the direct channel, the effect of monetary policy on an individual's income depends on his exposure to interest rates and the composition of his asset portfolio. Agents with interest-earning assets will have an increase in income after an

increase in interest rates, while indebted agents will have a decrease in income. The capital gains or losses will depend on the portfolio composition and on the sensibility to changes in interest rates of each subjacent asset's prices. Through the indirect channel, impacts occur on wages and profits. For the former, the effect depends on how sensitive a given individual's job is to changes at the macroeconomic level. The same occurs with the profitability of companies, as some sectors lose more revenue than others in the downturns of the economic cycle.

The final impact of monetary policy on inequality depends on how all these effects occur on each percentile of the income distribution scale. This is an empirical question that drives a growing body of literature. The usual approach is to analyze separately the effects of conventional monetary policy (changes in the base interest rate) and those of unconventional monetary policy (such as asset purchases program).

For unconventional monetary policies (UMP) in Europe, three papers employ a similar empirical strategy: Casiraghi et al (2018) for Italy; Lenza and Slacalek (2018) for Germany, France, Italy and Spain; and Bunn, Pugh and Yeates. (2018) for the UK. The strategy is based on three steps. The first step is to estimate the effects of monetary policy on macroeconomic aggregates such as the unemployment rate, output growth and inflation. This was done with large-scale econometric models (Bunn et al, 2018; Casiraghi et al, 2018) or with VAR techniques (Lenza and Slacalek, 2018). The second step is to distribute those aggregate changes onto individual-level data, using household-level surveys and Logit/Probit models. Finally, in the third step, those individual changes are re-aggregated in inequality measures, making possible the comparison of inequality before and after the monetary policy shock. All three studies found that UMP slightly reduced inequality, mainly via the indirect channel. Other studies, using different methodologies[1], found opposite results for UMP in the USA (Montecino and Epstein, 2015) and Japan (Saiki and Frost, 2014, 2018; and Taghizadeh-Hesary et al., 2018).

For conventional monetary policies, there are both country-level and panel data studies. Furceri, Loungain and Zdzienicka (2018) analysed a panel of 32 advanced and emerging economies. Using local projections, they found that contractionary monetary policy shocks increase income inequality. They also found an asymmetrical effect of monetary policy: increases in interest rates have statistically significant effects on income distribution, while the effects of reductions in interest rates are not statistically significant. Guerello (2018) works on a panel of 17 Euro Area countries, and finds that an expansionary conventional policy shock results in a reduction in income inequality. Samarina and Nguyen (2019) reach the same conclusion, but with a sample consisting of 10 Euro Area countries. Both studies employed VAR models. Opposite results are found by Hafemann, Rudel, and Schmidt (2018), who found that expansionary shocks increase income inequality for a panel of 6 countries.

There are also many studies focused on specific countries. For the USA, the conclusions are mixed. Galbraith, Giovannoni and Russo (2007), Coibion et al (2017), and Aye, Clance and Gupta (2019) found that contractionary shocks increase income inequality, whereas Davtyan (2016) found the opposite distributional impact. For the UK, Mumtaz and Theophilopoulou (2017) find that income inequality increases after contractionary shocks. For Japan, there is a consensus: both Inui et al (2017) and Taghizadeh-Hesary et al (2018) found that expansionary shocks increase inequality. Finally, for Mexico, Villareal (2014) found that contractionary shocks reduce income inequality.

[1] Montecino and Epstein (2015) used Recentered Influence Functions; Saiki and Frost (2014, 2018) used VAR; and Taghizadeh-Hesary et al. (2018) used VECM.

Summing up, we can argue that, for UMP, the literature points to region-specific results: all studies for Europe show that those policies reduce income inequality, while the opposite is found for the USA and Japan. As for conventional policies, most panel studies point to increases in inequality after contractionary shocks, or to decreases in inequality after expansionary shocks. The same is found in most country-specific studies, with the notable exception of Japan.

A literatura referente aos efeitos da política monetária em variáveis macroeconômicas, para o caso brasileiro e em outros países,

Moreira (2015) measure how the credibility of monetary policy is dynamically related to macroeconomic performance in the case of Brazil. Empirical results are obtained through a BVAR model with Litterman/Minnesota priors applied to series of expected inflation twelve months ahead, accumulated inflation in the last twelve months, Selic interest rate, GDP, and nominal exchange rate (USD/BRL) between January 2005 and July 2012. The results indicate that gains and losses in credibility of monetary policy are affected by inflationary shocks, and that the credibility of monetary policy is negatively impacted by domestic currency devaluations.

Mendonça (2010) The agnostic identification method proposed by Uhlig (2005) is used to investigate the effects of monetary policy shocks on the Brazilian economy. The empirical approach used monthly GDP, IPCA, Selic interest rate, exchange rate (USD/BRL), 180-day nominal interest rate, and private sector credit deflated by IPC as variables. The results indicate a 65% probability of an immediate decrease in GDP after the monetary shock, and a 35% probability of a 0.10% decrease in IPCA during the first six months after the shock.

A new approach to the BVAR model was proposed by Puonti (2019) to analyze the macroeconomic effects of using the central bank balance sheet as a monetary policy instrument. The study investigates such effects in Japan, the United States, and the eurozone, indicating different macroeconomic impacts among the analyzed regions. The analysis constructed by Costa (2018) aims to estimate the effects of a monetary shock on the US economy in relation to a set of sixteen Brazilian economy variables, observed between June 2000 and December 2016, in an attempt to identify the transmission channels of the shocks. The work uses the BVAR model identification methodology, and the results indicate a small impact of external shocks on the real variables of the Brazilian economy that were considered.

3. Methodology

Since the seminal work of Sims (1980), the vector autoregressive (VAR) model has become one of the most commonly used models among macroeconomists. However, the use of a VAR model requires a significant number of parameters, which can lead to over-parameterization and thus pose a research challenge in constructing models that are empirically relevant and flexible enough without excessive parameterization. For this purpose, there are several approaches, with shrinkage being the most common.

The Bayesian Vector Autoregression (BVAR) model is a type of time series model that allows for multivariate analysis of multiple related variables. In a BVAR model, each variable is modeled as a linear combination of its own past values and the past values of other variables in the model. The model is specified using a set of equations, known as the VAR(p) model, where "p" is the number of lags used in the model. The parameters of the model, such as the coefficients and the error variances, are estimated using Bayesian methods, which involve specifying prior distributions for the parameters and updating these priors with the data to obtain posterior distributions. One of the main

advantages of BVAR models is that they can account for the dynamic relationships between multiple variables, and can also be used to analyze the impact of exogenous shocks on the variables.

A VAR(p) model can be represented as a system of equations:

$$y_t = c + A_{1_{y_{t-1}}} + A_{2_{y_{t-2}}} + \cdots + A_p * y_{t-p} + e_t \quad (1)$$

where y_t is a $k \times 1$ vector of variables at time *t*, c is a $k \times 1$ constant vector, A_1 to A_p are $k \times k$ coefficient matrices, and e_t is a $k \times 1$ vector of error terms.

Each variable in the vector y_t is modeled as a linear combination of its own past values and the past values of other variables in the vector y_t. The coefficient matrices A_1 to A_p capture the dynamic relationships between the variables, and the error terms e_t capture any remaining uncertainty in the model. The BVAR model used in this study has its posterior distribution estimated through Monte Carlo Markov Chain (MCMC) using the Metropolis-Hastings algorithm.

4. Results and Discussion

4.1. Data Description

This section describes the variables used in this article. To measure the inequality observed in the Brazilian economy, the Gini coefficient was applied to the microdata from RAIS. The variable constructed to measure income inequality takes into account the monthly remuneration of all formal workers in Brazil between January 2007 and December 2019 (156 observations). For the other variables considered, the same period was also considered for the analysis.

Table 1: Variables description

Feature	Description	Source
SELIC	SELIC (Special System for Settlement and Custody) is the basic interest rate of the Brazilian economy and is defined by the Monetary Policy Committee (COPOM) of the Central Bank of Brazil	Central Bank of Brazil
Inflation	IPCA aims to measure the inflation of a set of products and services sold in the retail market, related to the personal consumption of families	IBGE
Employment Index	The formal employment index is an indicator of the occupation in the formal labor market over time	Ministry of Labour and Employment
Economic Activity Index	Economic activity is measured through the IBC-Br, an index calculated by the Central Bank of Brazil that measures the level of	Central Bank of Brazil

national economic activity

Gini Index	The Gini index seeks to measure the level of income inequality in the population. An index of value 1 represents perfect equality, and an index of value 0 represents perfect inequality	RAIS

Figure 3 presents a time series of the variables used to measure the impact of monetary policy, with the interest rate (SELIC) as an instrument, on income inequality. The period analyzed is before the increase in interest rates observed in Brazil during and after the Covid-19 pandemic. Analyzing the time series, it can be observed that with low interest rates, there was a recovery in employment and economic activity, as well as satisfactory inflation control. This suggests that an expansionary monetary policy, with lower interest rates, can have a positive effect on the economy and income distribution.

Thus, the preliminary observation of the data shows that the recovery of employment and economic activity can lead to an increase in income and, therefore, a reduction in income inequality if this increase is done in a way that includes and empowers more vulnerable segments of society who are more sensitive to employment and income public policies. In addition, inflation control can help maintain the purchasing power of workers and reduce pressure on the prices of goods and services.

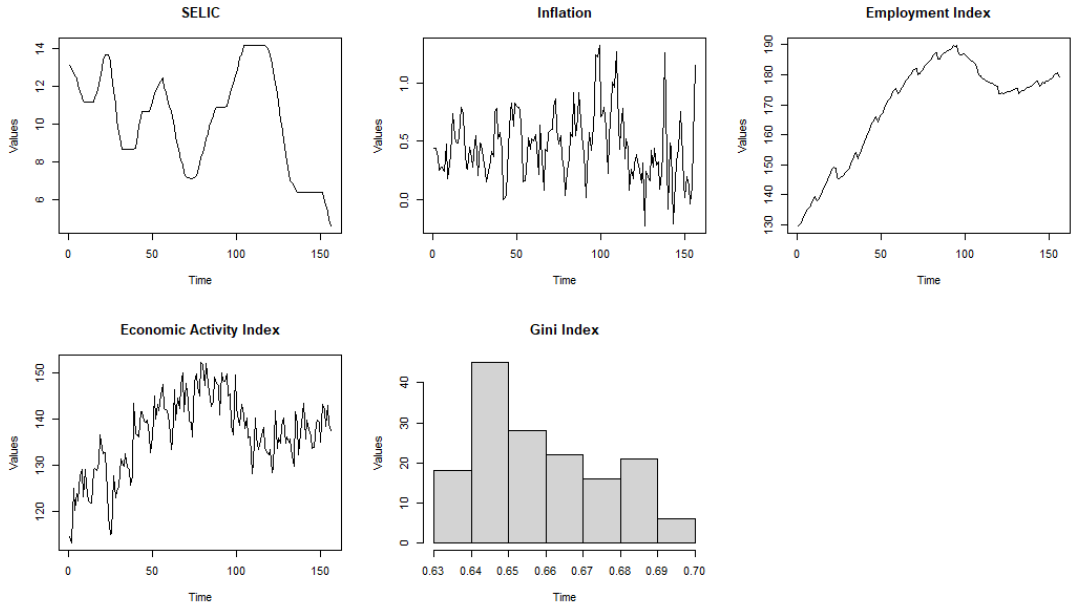

Figure 3: Plot to selected variables (SELIC, Inflation, Employment Index, Economic Activity Index, and Gini Index) from January 2007 to December 2019. Source: authors elaboration based on BCB and IBGE

4.2. Model Estimation and Causality

We estimated a set of regressions for explanatory variables for income inequality. Table 1 presents the results for the estimated coefficients and the associated p-value. The

four estimated models have the Gini index as the dependent variable and the following explanatory variables: (1) model I has the SELIC as the explanatory variable; (2) model II has the SELIC and inflation as explanatory variables; (3) model III has the SELIC, inflation, and the employment index as explanatory variables; and (4) model IV has the SELIC, inflation, the employment index, and the economic activity index as explanatory variables.

The regression results indicate that the explanatory variables considered are statistically significant in explaining income inequality measured by the Gini index. Except for the employment index in model III and inflation in model IV, all other variables were statistically significant. This suggests that income inequality can be explained by macroeconomic variables such as inflation, the level of employment in the economy, and the level of economic activity, as well as by the conduct of monetary policy through the interest rate.

These results can be useful in understanding the determinants of income inequality in the economy and identifying possible channels of transmission of the effects of economic policies on income distribution. The insignificance of the employment index in model III and inflation in model IV may indicate that other variables not considered in the analysis may have an important role in determining income inequality. Additionally, it is important to note that regression analysis does not establish a causal relationship between variables, but only a statistical association. However, to seek causal relationships between variables, a Granger test was applied, a method for testing causality between two variables in economic time series, using regression models and cross-spectral analysis (GRANGER, 1969).

Table 2: Summary results for regression models (p-value <.05)

Feature	**Model I**	**Model II**	**Model III**	**Model IV**
(Intercept)	0.6774	0.6793	0.7071	0.8476
Economic Activity	-	-	-	-0.0019
	-	-	-	(0.00)
Employment Index	-	-	0.00	0.00
	-	-	(0.0924)	0.00
Inflation	-	-0.0084	-0.0067	-0.0105
	-	(0.0963)	(0.1939)	(0.0179)
SELIC	-0.0014	-0.0012	-0.0014	-0.002
	(0.014)	(0.037)	(0.0138)	(0.00)

Applying the test for the SELIC variable, we tested whether this variable has a causal effect on the other variables analyzed. The test result considers the null hypothesis: Granger causality H0: SELIC does not Granger-cause variable of interest. We observed a p-value of 0.0331, indicating the existence of causality between the interest rate in Brazil and the level of employment, economic activity, inflation, and income inequality. The Granger test does not present definitive causality, but we found evidence of a statistical

relationship between this set of variables and the conduct of monetary policy through the interest rate.

4.3 Impulse-Response

Using impulse-response function (IRF), we can observe how an impulse in one variable affects the other variables in the model over time, and we can also identify the strength and direction of the relationship between the variables. In this study, we considered the impulse of the variables SELIC, Inflation, Employment Index, and Economic Activity and observed the response in the Gini Index variable. Additionally, the ordering of the variables (a sensitive aspect in autoregressive vector models) was modified in search of evidence of robustness. For this, two orderings were proposed: (1) SELIC, economic activity index, employment index, and inflation; (2) SELIC, inflation, employment index, and economic activity. The generated results were similar, and the interpretations will be presented below.

The results presented in the figure below show the IRF of the effect of an impulse in the SELIC rate on income inequality. The IRF indicates that an impulse in the SELIC rate has the effect of increasing income inequality in the first periods immediately after the shock. This increase in inequality persists at higher levels and does not dissipate completely at the end of the twelve periods. The magnitude and duration of the shock effects on income inequality are shown in the IRF over time. The initial increase in income inequality suggests that the SELIC rate can affect income distribution in the economy. The persistence of the increase in income inequality at higher levels may indicate that the effect of the shock is long-lasting and may also affect the economy in the long term.

Considering an impulse of inflation on income inequality shows a bivalent response. In the first periods, the impulse generates an increase in inequality, but then it is reversed to a decrease in inequality and dissipates with another increase in inequality at the end of the twelve periods. The relationship between income inequality, employment, and economic activity, the Impulse-Response function (IRF) shows that an impulse in employment and economic activity has a similar effect on income inequality. Specifically, the IRF indicates that a positive shock in employment and economic activity generates a reduction in income inequality in the first periods after the shock. However, after a certain time, income inequality begins to increase again, but this increase is dissipated at lower levels than observed in the initial shock effect.

The magnitude and duration of the shock effects on income inequality are shown in the IRF over time. The initial reduction in income inequality suggests that an increase in employment and economic activity can have a positive effect on income distribution in the economy. However, the subsequent increase in income inequality indicates that this effect may be temporary and may be followed by an increase in income inequality. The dissipation of the increase in income inequality at lower levels than observed in the initial effect suggests that over time, the economy may adjust to mitigate the negative effects of the increase in income inequality. This interpretation can be useful in understanding the effects of economic policies that aim to increase employment and economic activity and to evaluate the impacts of different shocks on the economy.

In summary, the IRF shows that an impulse in employment and economic activity has an initial positive effect on the reduction of income inequality, but this effect may be temporary and may be followed by an increase in income inequality. The dissipation of the increase in income inequality suggests that the economy may adjust over time to mitigate these negative effects.

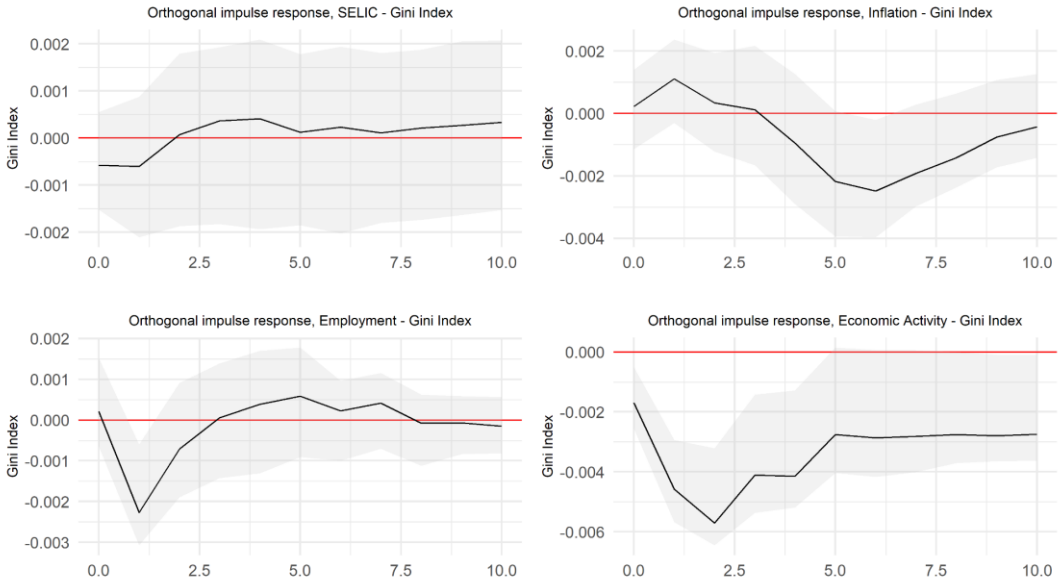

Figure 4: Impulse-response function to Gini Index (order SELIC, economic activity index, employment index, and inflation)

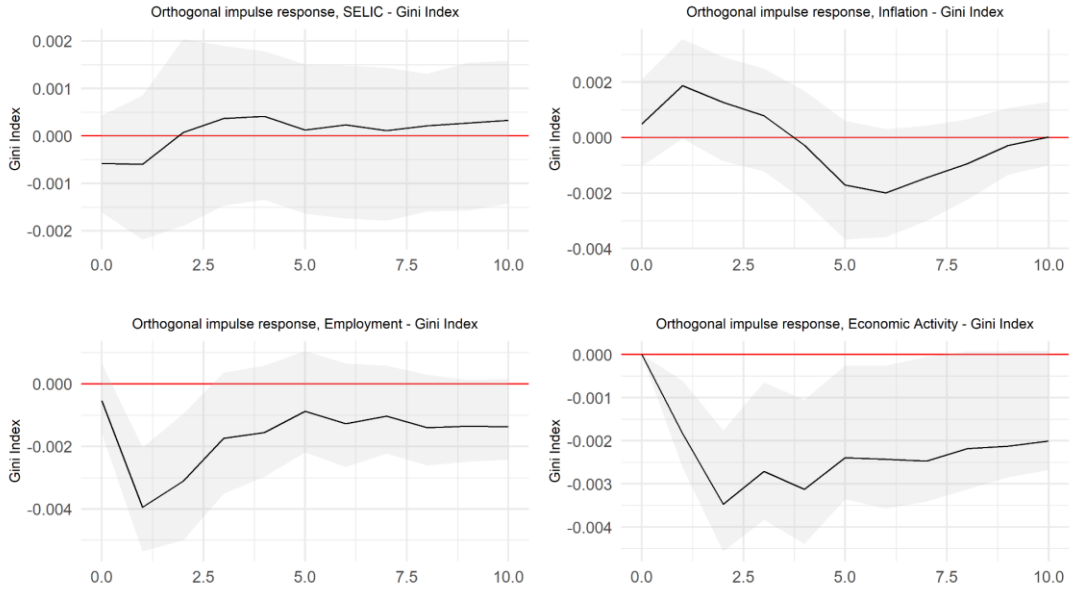

Figure 5: Impulse-response function to Gini Index (order SELIC, inflation, employment index, and economic activity)

5. Conclusion

The investigation of the causes and effects of income inequality is a topic of interest to economists of different theoretical lines and generations. In addition, this determination is essential for economic policies to be directed towards mitigating the adverse effects of inequality in income distribution. This phenomenon of income inequality affects developed economies, but its presence in underdeveloped economies has a greater impact

on the most vulnerable segments of society, since the aspects that surround contemporary quality of life (employment, availability of quality public goods, access to education, access to basic sanitation, internet connection, etc.) are scarce.

This article investigated the impact of monetary policy conducted by the Central Bank of Brazil through the use of its only instrument currently in use: the interest rate. The following macroeconomic variables were used: (i) inflation; (ii) employment index; (iii) economic activity index; (iv) SELIC (Brazil's basic interest rate). In addition, to measure income distribution, a Gini index was calculated from microdata that characterizes the Brazilian workforce individually.

A vector autoregressive approach and Bayesian vector autoregressive approach, as well as regression analysis and causality tests were used to find evidence of the impact of monetary policy on income distribution. Results indicate that a shock to SELIC positively impacts the Gini index, meaning that it increases inequality, within a 95% confidence interval. The same occurs with inflation, but also with a negative impact after a few periods and then a return to the growth of inequality. Additionally, the article also indicates that an increase in economic activity and job generation have a negative impact on the Gini index, reducing income inequality observed in the economy.

For future research, other regression techniques that seek causal effects in time series can be applied, seeking to investigate the prevalence of these results. On the other hand, the analysis was carried out until 2019 due to limitations in the availability of microdata to calculate the Gini index, and thus, as data is made available, new rounds of tests should be carried out to ensure the robustness of the evidence presented.

References

[1] George Argitis and Christos Pitelis. Monetary policy and the distribution of income: evidence for the united states and the united kingdom. Journal of Post Keynesian Economics, 23(4): 617–638, 2001.
[2] Valentina Bonifacio, Mr Luis Brandao-Marques, Mrs Nina T Budina, Mr Balazs Csonto, Chiara Fratto, Philipp Engler, Davide Furceri, Ms Deniz O Igan, Rui Mano, Mr Machiko Narita, et al. Distributional Effects of Monetary Policy. International Monetary Fund, 2021.
[3] Vitor Chagas da Costa. Canais de transmissão da política monetária norte-americana no Brasil. Master dissertation, Universidade de São Paulo, 2018.
[3] Thomas Doan, Robert Litterman, and Christopher Sims. Forecasting and conditional projection using realistic prior distributions. Econometric Reviews, 3(1):1–100, 1984. doi: 10.1080/07474938408800053.
[4] Dietrich Domanski, Michela Scatigna, and Anna Zabai. Wealth inequality and monetary policy. BIS Quarterly Review March, 2016.
[5] A. Gelman, J.B. Carlin, H.S. Stern, D.B. Dunson, A. Vehtari, and D.B. Rubin. Bayesian Data Analysis. Chapman and Hall/CRC, 3rd ed. edition, 2013. doi: 10.1201/b16018.
[6] Domenico Giannone, Michele Lenza, and Giorgio E Primiceri. Prior selection for vector autoregressions. Review of Economics and Statistics, 97(2):436–451, 2015.
[7] Stefan Hohberger, Romanos Priftis, and Lukas Vogel. The distributional effects of conventional monetary policy and quantitative easing: Evidence from an estimated dsge model. Journal of Banking & Finance, 113:105483, 2020.

[8] Sylvio Kappes. Monetary policy and personal income distribution: a survey of the empirical literature. In The Future of Central Banking, pages 38–61. Edward Elgar Publishing, 2022.
[9] Mario Jorge C. Mendonça, Luis Medrano, and Adolfo Sachsida. Efeitos da política monetária na economia brasileira: resultados de um procedimento de identificação agnóstica. Pesquisa e Planejamento Econômico, 40(3):367–394, 2010. ISSN 2237-2091. URL https://ppe.ipea.gov.br/index.php/ppe/article/view/1259.
[10] Ricardo Ramalhete Moreira, Chukiat Chaiboonsri, and Prasert Chaitip. Performing a bayesian var to analyze how monetary policy's credibility is affected and affects over time: The brazilian experience. Procedia Economics and Finance, 24:444–450, 2015. ISSN 2212-5671. doi: https://doi.org/10.1016/S2212-5671(15)00701-7. URL https://www.sciencedirect.com/science/article/pii/S2212567115007017. International Conference on Applied Economics (ICOAE) 2015, 2-4 July 2015, Kazan, Russia.
[11] Christopher J Niggle. Monetary policy and changes in income distribution. Journal of Economic Issues, 23(3):809–822, 1989.
[12] Rory O'Farrell, Łukasz Rawdanowicz, and Kei-Ichiro Inaba. Monetary policy and inequality. OECD Economics Department Working Papers, 2016.
[13] Päivi Puonti. Data-driven structural bvar analysis of unconventional monetary policy. Journal of Macroeconomics, 61:103131, 2019. ISSN 0164-0704. doi: https://doi.org/10.1016/j.jmacro.2019.103131. URL https://www.sciencedirect.com/science/article/pii/S016407041830346X.
[14] Louis-Philippe Rochon, Mario Seccareccia, et al. A primer on monetary policy and income distribution: A heterodox perspective. Ensayos Económicos, 1(76):5–25, 2021.
[15] Christopher A. Sims. Macroeconomics and reality. Econometrica, 48(1):1–48, 1980. ISSN 00129682, 14680262. URL http://www.jstor.org/stable/1912017.
[16] Harald Uhlig. What are the effects of monetary policy on output? Results from an agnostic identification procedure. Journal of Monetary Economics, 52(1):341–419, 2005.
[17] Aye, G. C., Clance, M. W., & Gupta, R. 2019. 'The effectiveness of monetary and fiscal policy shocks on US inequality: the role of uncertainty'. Quality & Quantity 53(1): 283-295.
[18] Bunn, P., Pugh, A., and Yeates, C. 2018. 'The distributional impact of monetary policy easing in the UK between 2008 and 2014'. Bank of England Staff Working Paper, No. 720. Bank of England.
[19] Casiraghi, M., Gaiotti, E., Rodano, L., and Secchi, A. 2018. 'A "Reverse Robin Hood"? The distributional implications of non-standard monetary policy for Italian households'. Journal of International Money and Finance 85: 215-235.
[20] Coibion, O., Gorodnichenko, Y., Kueng, L., and Silvia, J. 2017. 'Innocent Bystanders? Monetary policy and inequality'. Journal of Monetary Economics 88: 70-89.
[21] Davtyan, K. 2016. 'Income Inequality and Monetary Policy: An Analysis on the Long Run Relation'. AQR–Working Papers, n. 16/04.
[22] Furceri, D., Loungani, P., and Zdzienicka, A. 2018. 'The effects of monetary policy shocks on inequality'. Journal of International Money and Finance 85: 168-186.
[23] Galbraith, J. K., Giovannoni, O. G., and Russo, A. J. 2007. 'The Fed's Real Reaction Function: Monetary Policy, Inflation, Unemployment, Inequality-and Presidential Politics'. Levy economics institute working paper n. 511.
[24] Granger, Clive WJ. Investigating causal relations by econometric models and cross-spectral methods. Econometrica: journal of the Econometric Society, p. 424-438, 1969.
[25] Guerello, C. 2018. 'Conventional and unconventional monetary policy vs. households income distribution: An empirical analysis for the Euro Area'. Journal of International Money and Finance 85: 187-214.

[26] Hafemann, L., Rudel, P., and Schmidt, J. 2018. ‘Moving Closer or Drifting Apart: Distributional Effects of Monetary Policy’. The Manchester School 86: 110-136.
[27] Inui, M., Sudou, N., and Yamada, T. 2017. ‘The effects of monetary policy shocks on inequality in Japan’. BIS working paper n. 642.
[28] Lenza, M., and Slacalek, J. 2018. ‘How does monetary policy affect income and wealth inequality? Evidence from the euro area’. European Central Bank Working Paper Series No 2190.
[29] Montecino, J. A., and Epstein, G. 2015. ‘Did Quantitative Easing increase income inequality?’. Institute for New Economic Thinking Working Paper Series 28.
[30] Mumtaz, H., and Theophilopoulou, A. 2017. ‘The impact of monetary policy on inequality in the UK. An empirical analysis’. European Economic Review 98: 410-423.
[31] Saiki, A., and Frost, J. 2014. ‘Does unconventional monetary policy affect inequality? Evidence from Japan’. Applied Economics 46 (36): 4445-4454.
[32] Saiki, A., and Frost, J. 2018. ‘Japan's Unconventional Monetary Policy and Income Distribution: Revisited’. Tokyo Center for Economic Research (TCER) Paper No. E-126.
[33] Samarina, A., and Nguyen, A. D. 2019. ‘Does monetary policy affect income inequality in the euro area?’. DNB working paper n. 626.
[34] Taghizadeh-Hesary, F., Yoshino, N., and Shimizu, S. 2019. ‘The impact of monetary and tax policy on income inequality in Japan’. The World Economy 43(10): 2600-2621.
[35] Villarreal, F. G. 2014. ‘Monetary policy and inequality in Mexico’. MPRA Paper No. 84588.