

TRANSMISSION OF MONETARY POLICY THROUGH THE WEALTH CHANNEL IN BRAZIL: DOES PUBLIC DEBT MATTER?

Jose Rossi Junior Marina Rossi Daniel Cunha

dcunha@imf.org

9/5/2019

Overview

- 1 Introduction
- 2 Literature review
- 3 The Wealth Channel, public debt and other assets
 - Does the LFTs and REPO operations block the public debt wealth effect?
 - What are the assets that potentialize wealth effect?
- 4 Data
- 5 Wealth effect experiment
 - Empirical strategy
 - Empirical results
 - Robustness testing
- 6 Conclusion

Introduction

- The interplay between wealth and consumption has been on the Brazilian macroeconomic spotlight due to a high level of the interest rate in the last 2 decades
- However, the debate has focused on wealth effect of public debt in misalignment with international research in which the focus is the wealth effect caused by the stock market and housing market.
- Even the Brazilian public debt wealth effect was not properly analyzed due to the lack of data quoting debt by market price
- We studied the propagation of the monetary policy through the wealth effect in an original way by adding several novelties on the topic: i) public debt wealth effect at market price, ii) housing market wealth effect, iii) stock market wealth effect, iv) wealth effect estimation via structural Bayesian Autoregressive Vector (BVAR) with sign restrictions and Cholesky factorization (Robustness testing).

- The literature indicates that monetary policy can affect the aggregate demand through several channels such as credit, exchange rate, interest rate, wealth, and expectations. The transmission of monetary policy through the wealth effect measures the impact of changes in monetary policy on consumption due to endogenous variations of private wealth.
- Assets must be perceived as wealth by households. Bernanke and Gertler (1999), for example, stress that some assets are not perceived as wealth in a households budget constraint perspective. According to the authors, the stock market wealth effect in the U.S. is not that strong because individuals hold this type of assets through pension accounts.
- Only persistent shocks in wealth would have a sizeable effect on consumption. Lettau and Ludvigson (2001) show that consumption responds unequally to changes in consumer wealth, depending on whether such variations are transient or permanent.

Literature review

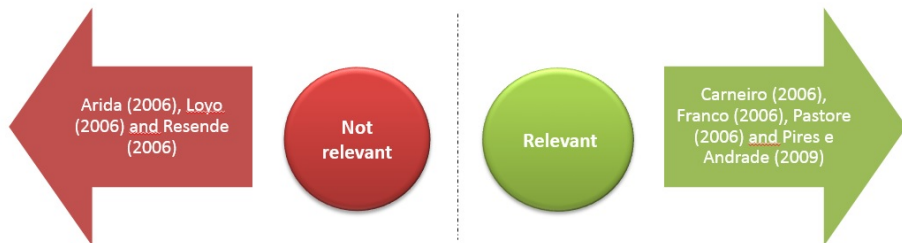
- Pailla (2009): financial (stock market) and non-financial wealth (house market).

TABLE 1: The relation between consumption and wealth according to the empirical literature.

authors	studied variable	US	UK	DE	CA	FR	IT	JAP
<i>Labhard, Sterne and Young (2005)</i>	elasticity (net fin. wealth)	0.12	0.16	0.13	0.19	0.10	0.08	0.16
<i>Case, Quigley and Shiller (2005)</i>	elasticity (housing)	0.62	0.14	0.14	0.14	0.14	-	-
<i>Ludwig and Slok (2004)</i>	elasticity (equity)	0.08	0.08	0.03	0.08	0.03	0.03	0.03
	elasticity (housing)	0.04	0.04	0.02	0.04	0.02	0.02	0.02
<i>Bertaut (2002)</i>	elasticity (financial wealth)	0.23	0.09	-	0.16	0.10	-	0.29
	elasticity (non-fin. wealth)	0.14	0.09	-	0.16	-	-	-
	elasticity (equity)	0.10	0.16	-	0.14	-	-	-

Source: Pailla (2009)

What is the relevance of the public debt wealth effect in Brazil?



The Wealth Channel, public debt and other assets

The increase of the interest rate causes the reduction of the market value of the security for a regular fixed rate bond. For example, taking into account the case of a perpetual bond B that pays an interest rate r for each unit of time t , the market price of such bonds is equal to the present value of the cash flow of the securities discounted by a short-term interest rate i , so that the pricing formula can be represented by the following formula:

$$P_t = \sum_{t=1}^{\infty} \frac{rB}{(1+i)^t} = \frac{rB}{i} \quad (1)$$

The Equation (1) denotes that an increase in the short-term interest rate causes a reduction of the bond market price. That is,

$$\frac{dP_t}{di} = -\frac{rB}{i^2} < 0 \quad (2)$$

The LFTs, however, has a different effect than the one discussed above. Taking into account a number of LFTs in perpetual perspective that pays a short-term interest rate i for each unit of time t in a daily basis, the market price of these securities is equal to the present value of the cash flow of the securities discounted by a short-term interest rate i , so that the market value of these securities can be synthesized by the following formula:

$$P_t = \sum_{t=0}^{\infty} \frac{iB}{(1+i)^{1+t}} = B \quad (3)$$

The Wealth Channel, public debt and other assets

- Real Estate: According to data from the RFB, real estate is the main component of the wealth stock of Brazilians. As a result, real estate is expected to be perceived as wealth by agents and, consequently, to increase the power of monetary policy.
- Equity (stock market): According to information from the RFB, equity holdings have the third largest participation in the category of financial assets of Brazilian families. Hence, equity holdings are expected to be capable to boost the transmission of the monetary policy through the wealth effect.

- The model spans from 2002:1 to 2017:2 at quarterly frequency.
- The wealth, labor income, consumption, interest rate and commodity index variables have been filtered to capture the cyclical component in these series by applying the Hodrick-Prescott (HP) filter. In addition, all monetary variables were calculated in real terms by using the prices of second quarter of 2017 as reference.

- Inflation: we used the CPI index (IPCA) measured by the IBGE (1993=100).
- Labor Income: to calculate it we multiplied the real income per capita times the number of employed persons. For this variable, we used two series provided by the IBGE: PME and PNAD continua. The former spans from 2002:1 to 2015:4 and aims to measure the labor income in six Brazilian metropolitan areas. The latter spans from 2012:1 to 2017:2 and measures the labor income in twenty Brazilian metropolitan areas. Since both series have a strong correlation (around 0.96), we have created an index to extrapolate the PME labor income data from 2016:1 to 2017:2 by using the PNAD continua quarter variation. Thus, the labor income was used in the form of natural logarithm.
- Consumption: the nominal consumption was collected from the national accounts data provided by IBGE. In the modeling, the consumption was used in the form of natural logarithm.

- Interest rate: we use the SELIC rate at the end of the quarter, which was collected on the BACEN website.
- Commodity index: the commodity research bureau spot index for all commodities collected by Bloomberg was used as reference. In the modeling, the commodity index was used in the form of natural logarithm.
- Internal Federal Domestic Public Debt (DPMFi) at market prices: the DPMFi was calculated by summing the following securities: LTN, NTN-F, NTN-B and LFT. For each index of public debt, the stock was calculated by multiplying the bond quantity by the bond market price (PU). The bond quantities were extracted from the National Treasury, while the PU was collected at ANBIMA. In the modeling, we use the natural logarithm of the DPMFi.

- REPO: the stock of repo operations was collected at BACEN website. In the modeling, the natural logarithm of the stock of repo operations was used.
- Real estate: we use the BACEN real estate price index. Nevertheless, the index was expressed in natural logarithm form.
- Equity (stock Market): we use the IBOVESPA index as a benchmark of the stock market. This index was collected in the BACEN website. In the modeling process, the IBOVESPA was expressed in natural logarithm form.

Empirical strategy

- Transforming the Ludvigson, Steindel e Letau (2002) VAR into a BVAR

Variables: inflation , π ; labor income , y ; consumption , c ; wealth, a and interest rate, i .

Model:

$$B_0 Z_t = k + B_1 Z_{t-1} + B_2 Z_{t-2} + \dots + B_P Z_{t-P} + u_t$$

Where $Z_t = (\pi, y, c, a, i)$

Wealth channel on						Wealth channel off					
	π	y	c	a	i		π	y	c	a	i
π	1	0	0	0	0	π	1	0	0	0	0
y	β_{21}	1	0	0	0	y	β_{21}	1	0	0	0
c	β_{31}	β_{32}	1	β_{34}	0	c	β_{31}	β_{32}	1	0	0
a	β_{41}	β_{42}	0	1	β_{45}	a	β_{41}	β_{42}	0	1	β_{45}
i	β_{51}	β_{52}	β_{53}	0	1	i	β_{51}	β_{52}	β_{53}	0	1

Empirical strategy

The table 4 shows the description of sign restrictions used in the model. We choose to control a positive interest rate shock, so that it provokes a decline in inflation, labor income and wealth for four quarters. According to the theory, it is expected that an interest rate hike causes a contraction on inflation, labor income, consumption and wealth. As we are not controlling the consumption response to an interest rate shock, we aim to test if the consumption impulse response function is statistically less than zero.

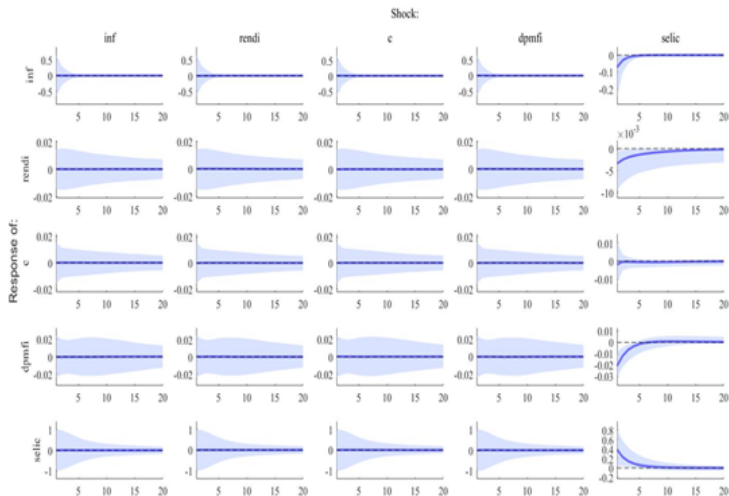
TABLE 4: Summary of sign restrictions.

	shock of				
	inflation	labor income	consumption	wealth	interest rate
inflation					-
labor income					-
consumption					?
wealth					-
interest rate					+

Source: elaborated by the authors.

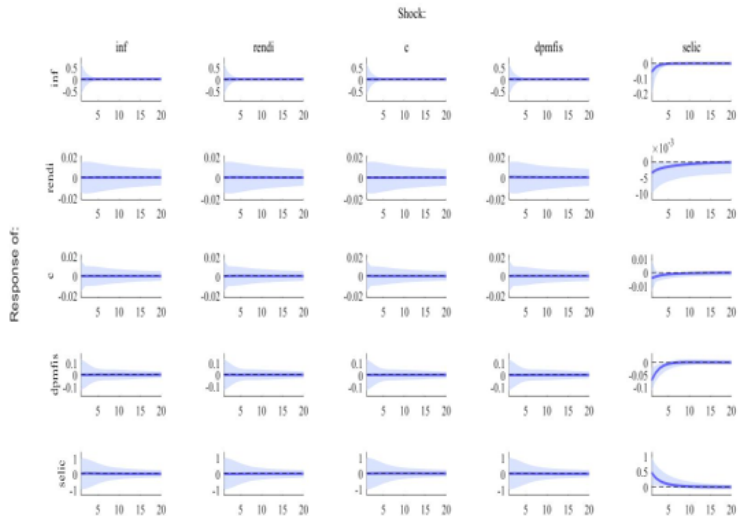
Empirical results

Figure 1: BVAR impulse response functions taking into account the DPMFi as the wealth variable. Sign Restriction



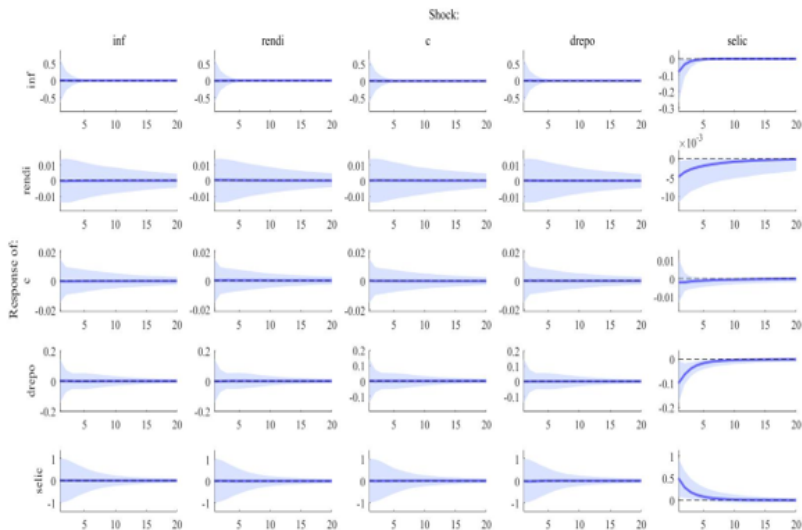
Empirical results

Figure 2: BVAR impulse response functions taking into account the DPMFi excluding the LFTs as the wealth variable. Sign Restriction



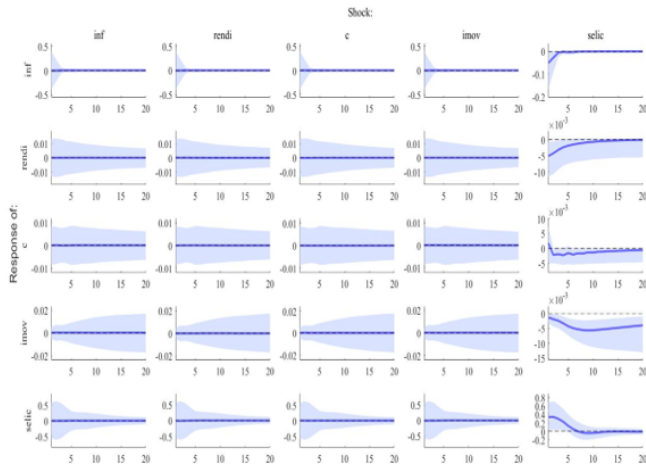
Empirical results

Figure 3: BVAR with sign restrictions impulse response functions taking into account the DPMFi plus REPOs as the wealth variable.



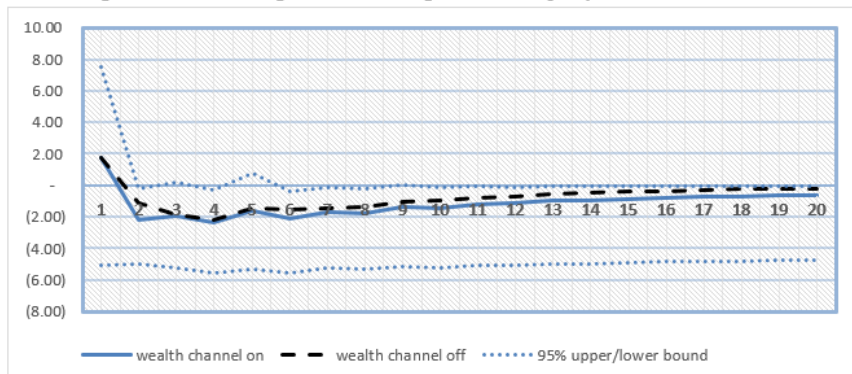
Empirical results

Figure 4: BVAR with sign restrictions impulse response functions taking into account the real estate price index as the wealth variable.



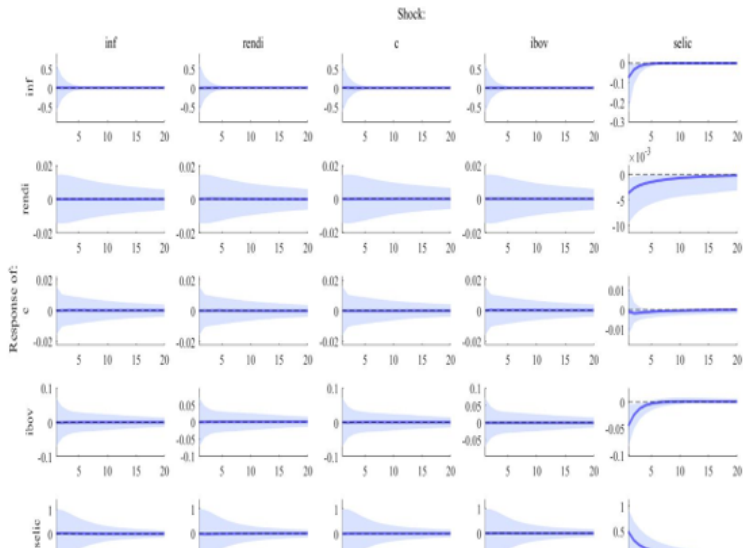
Empirical results

Figure 5: BVAR with sign restriction using the real state proxy as the wealth variable.



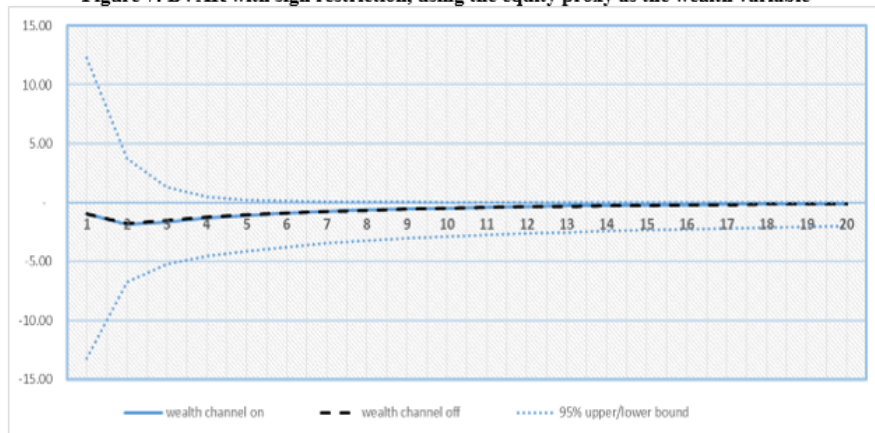
Empirical results

Figure 6: BVAR with sign restrictions impulse response functions taking into account the Ibovespa index as the wealth variable



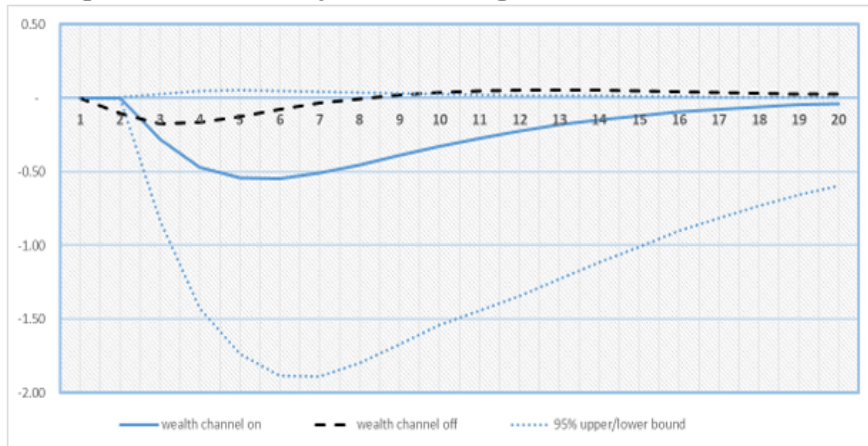
Empirical results

Figure 7: BVAR with sign restriction, using the equity proxy as the wealth variable



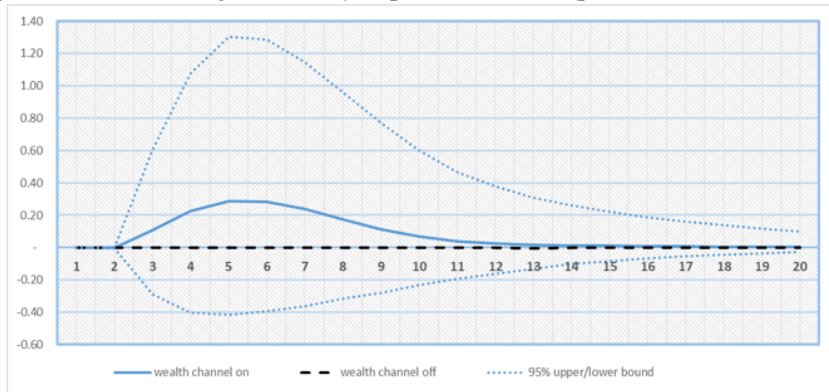
Robustness testing

Figure 8: VAR with Cholesky factorization, using the DPMFi as the wealth variable.



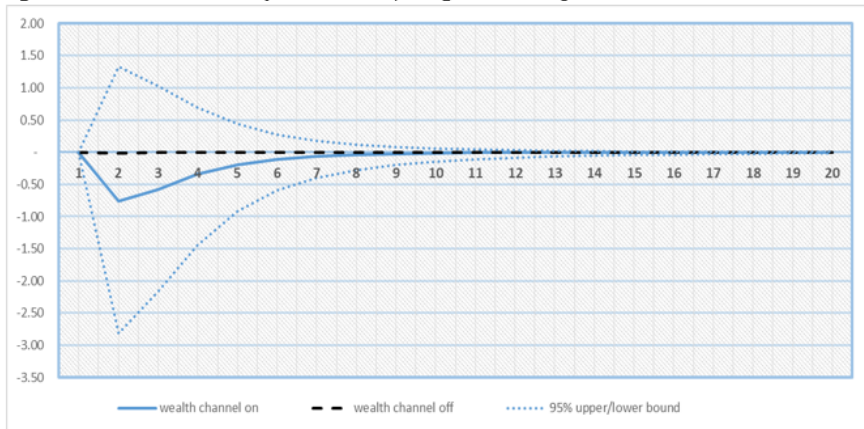
Robustness testing

Figure 9: VAR with Cholesky factorization, using the DPMFi excluding the LFTs as the wealth variable.



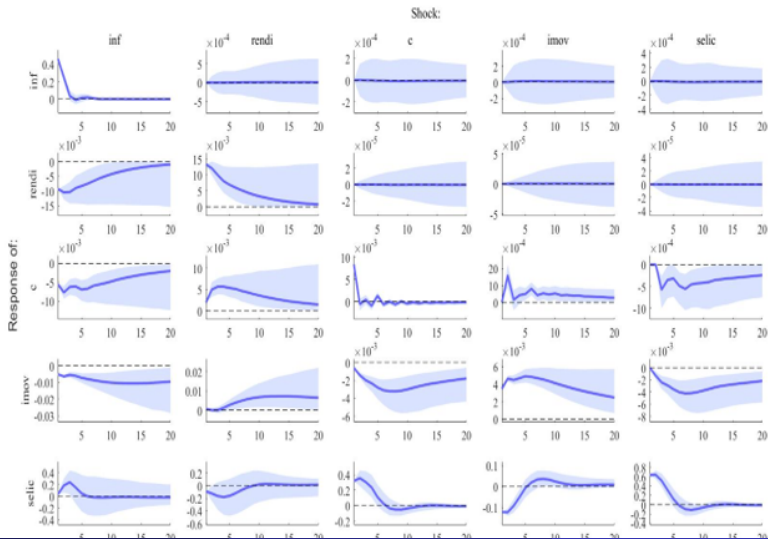
Robustness testing

Figure 10: VAR with Cholesky factorization, using the DPMFi plus REPOs as the wealth variable.



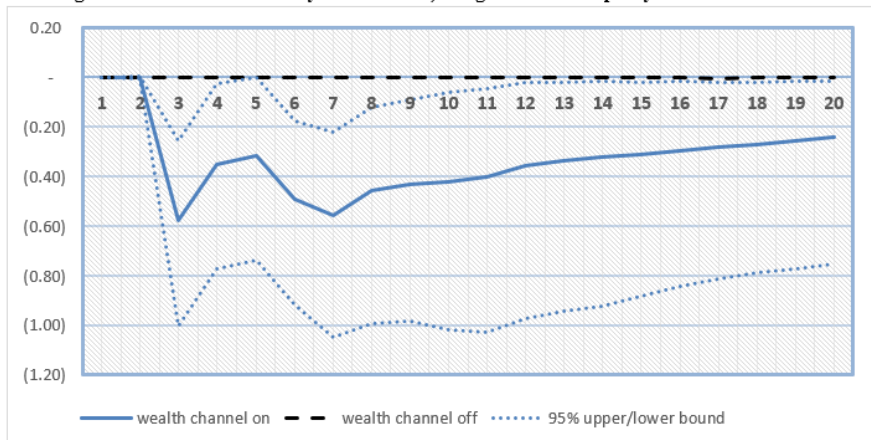
Robustness testing

Figure 11: VAR with Cholesky impulse response functions taking into account the real estate price index as the wealth variable.



Robustness testing

Figure 12: VAR with Cholesky factorization, using the real state proxy as the wealth variable.



Robustness testing

Figure 13: VAR with Cholesky factorization, using the equity prices as the wealth variable.

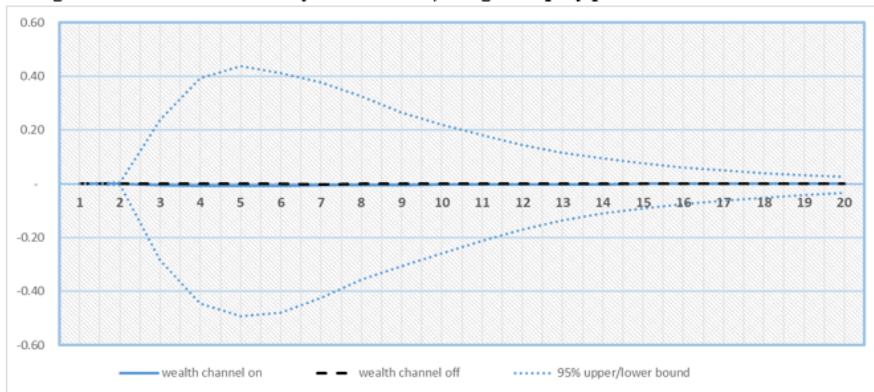
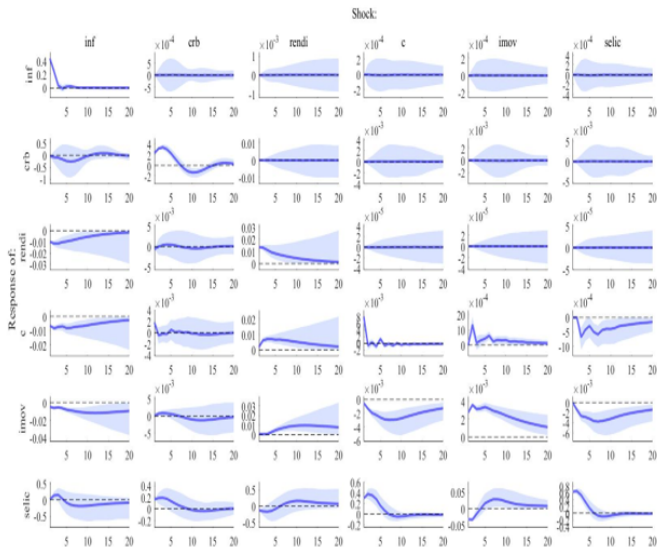


Figure 14: Real estate commodity robustness test.



Conclusion

- Does the public debt wealth effect matter? The results indicate that the stock of public debt does not play a role in the transmission mechanism of monetary policy through the wealth effect. Under different specifications, although a shock in the interest rate exerted an impact on the stock of wealth composed by government bonds it did not propagate to consumption. Differently from what is argued by some authors, the existence of debt indexed to the short-term policy rate does not reduce the power of the monetary policy.
- Does the real estate wealth effect matter? The paper shows that the debate about the role of the wealth effect in the transmission of monetary policy is misled, focusing only on the impact of the government bonds. We find that the wealth effect works in Brazil only through the evolution of real estate prices. The paper shows that a shock to the interest rate leads to a fall in real estate prices and in the consumption. Our work also indicates that this effect is not only significant, but it persists for a long period.

Thanks