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## Household credit bubble in Brazil? The unbearable lightness of having

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# HOUSEHOLD CREDIT BUBBLE IN BRAZIL? THE UNBEARABLE LIGHTNESS OF HAVING\*

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## **Abstract**

This paper characterizes the solvency scenario for Brazilian household credit with different resources and assesses the impact of credit risk proxies based on a fiscal reaction approach. The results suggest that non-earmarked and total household credit are insolvent.

JEL Classification: D14; E51; H63

Keywords: Fiscal reaction approach; Solvency; Brazilian household credit.

## **1. INTRODUCTION**

Building on Bohn's (2007) fiscal reaction approach, this paper analyzes the solvency of Brazilian household credit (non-earmarked, earmarked and total) and examines the role played by the percentage of credit portfolio with arrears, the delinquency rate and the average term of new operations.

Beginning in the 1990s, Brazil and other Latin American economies have experimented with financial liberalization by moving toward an open, market-based development model instead of a state-based model. Brazil is a very interesting economy to study because of its idiosyncrasies. Although the austerity policy adopted in the 1990s is held in check by the deepest economic and political crisis in Brazil's recent democratic history, the government has stimulated household debt growth, without regard to the level of human capital, profile of default or employment status. Counterintuitively, household credit is reaching high levels even as loan interest rates are high; for the first time, household credit has exceeded firm credit. The trajectories during the last decade of both the debt-to-cumulative income ratio and the income commitment to pay loan rates and amortization seem very worrying.

Referring to income, Brazilian economists used to say that, "There are two nations in the same territory". However, there is also a discriminatory credit policy, evidenced by the formation of two clubs characterized by a regional bias: states located in the Northeast and the North regions are predominantly in the second club. Matos and Correia (2017) study this cross-state heterogeneity and find that the demand for credit plays a more important role than the corresponding supply during the period from 2004 to 2013. This evidence corroborates De Jesus

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\*This letter proposes an extended version of the fiscal reaction function described in Bohn (2007) that models the solvency of Brazilian household credit.

Credit risk proxies play a relevant role by stimulating both total and non-earmarked credit toward household austerity. Non-earmarked and total household credit are unsustainable.

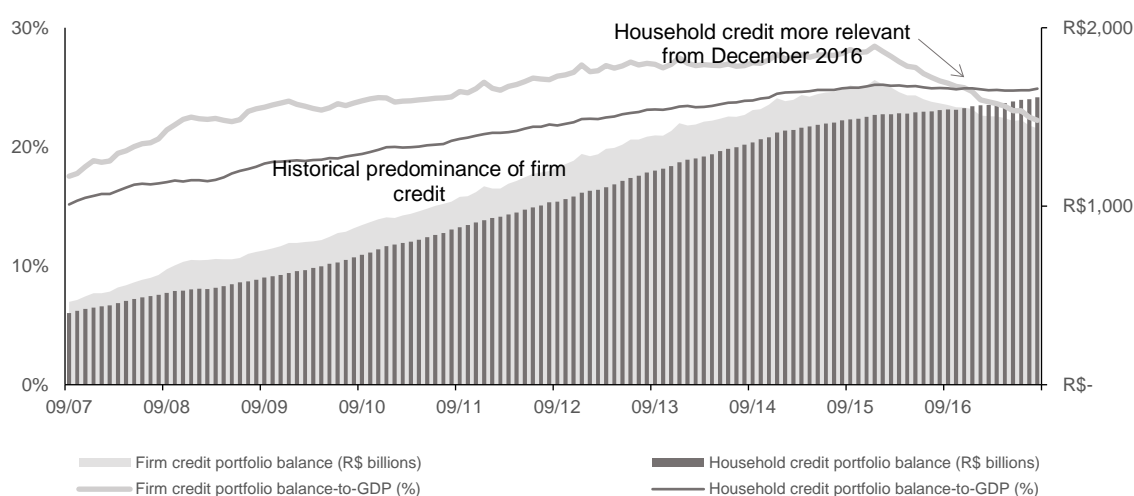
Filho's (2013) previous finding based on a disequilibrium model, which identified shortages in this credit market from 2000 to 2009. We also emphasize the disturbing evidence reported in Matos et al. (2015) about Brazilian household loan delinquency, which is driven by poverty and unemployment.

In this context, we are convinced that it is worthwhile to broaden this discussion by modeling household credit solvency from April 2001 to August 2017 for the first time. Our paper is aligned with Hansen and Sulla (2013), aiming to uncover evidence of whether Brazil's recent economic conditions are consistent with sustainable financial development. We similarly inquire whether we should worry about the Brazilian household credit bubble or whether the recent excessive credit growth and its cycles are related to patterns of bank funding sources, as suggested by Bucher et al. (2013).

## 2. BRAZILIAN CREDIT MARKET

According to the World Bank dataset, the growth rate of Brazil's credit-to-gross domestic product (GDP) ratio from 2004 to 2011 was 11.4%, one of the highest rates worldwide. The average percentage of credit-to-GDP in Brazil during this period was approximately 39%, the third ranked value in a sample of 14 Latin American economies. The first- and second-ranked countries in this sample were Panama and Honduras, with percentages of credit-to-GDP of 77% and 44%, respectively. These numbers suggest that Brazil is an exception among emerging countries. By separating Brazil's credit market into households and firms, we are able to show the predominant role of new operations in the productive sector during the period from September 2007 to November 2016. Figure 1 shows these trajectories.

Figure 1 - Evolution of firm and household credit in Brazil during the last decade



Source: CBB

Firm credit share reached its highest value in December 2008, constituting 56.57% of the total credit balance in Brazil. In December 2015, firm credit-to-GDP rose to 28.45%. Even accounting for historical time series, only recently, in December 2016, did household credit play,

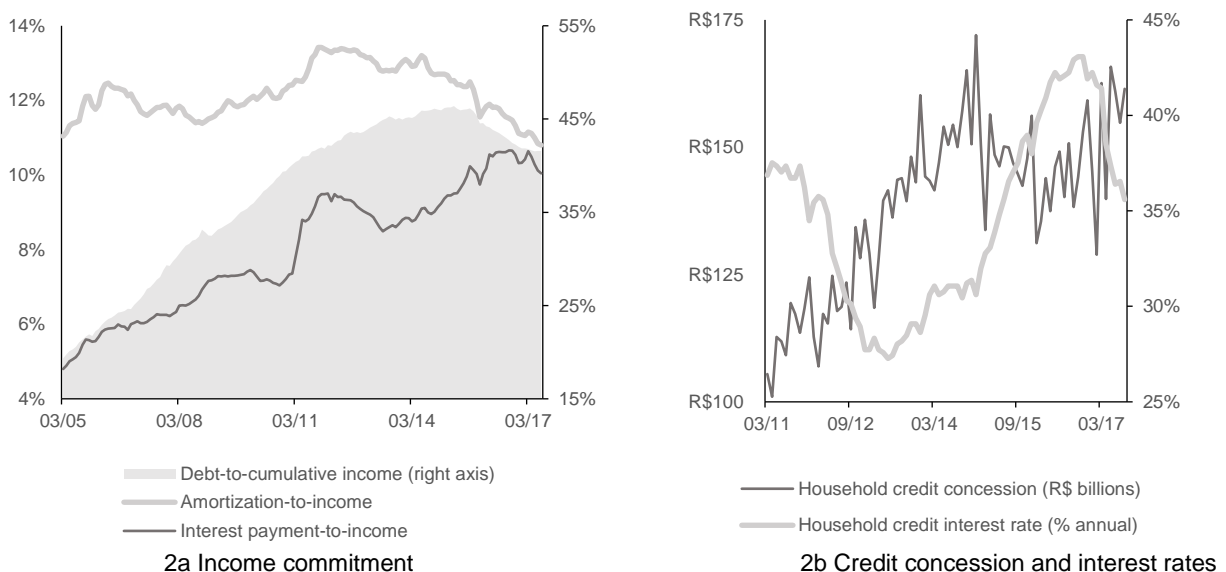
for the first time, the most important role in the Brazilian financial system. According to the database of the Central Bank of Brazil (CBB), in August 2017, household credit reached 52.85% of the total credit balance in the country, which is equivalent to 25% of GDP.

Over the whole decade, household credit has grown at an average monthly rate of 1.17%, while firm credit has grown at a monthly rate of 0.95%. Most strikingly, while firm credit has displayed a strong downward trend, with an average rate of -0.86% per month, household credit has continued to grow, even after November 2016, a politically turbulent period in Brazil. Household credit grew even during the subprime crisis in 2007 and 2008.

Regardless of the benefits of firm or household credit, we need better understand the role of Brazilian households in the financial market; Figure 2 is useful for this purpose. According to Figure 2a, household amortization-to-income ranges from 10.5% to 13.5% during the period from March 2005 to July 2017, displaying a downward trend from mid-2014, a path that should not raise concerns. However, we can witness a robust growth of the income commitment that accounts for loan interest rates. The difference between amortization-to-income and interest payment-to-income, which was already higher than 6% at the beginning of the sample period, is lower than 0.8% at the end of the sample period. It is still the driving force for the growth of debt-to-cumulative income, rising from almost 20% in March 2005 to more than 46% in April 2015. In the last two years, this ratio has dropped and is currently 41.6%.

Figure 2b shows that while household credit concession has grown until June 2013 in an environment characterized by a strong reduction in loan rates, during the last four years, household credit has risen, with more volatility and a growth in loan rate. This concession has risen from R\$ 136 billion in June 2013 to R\$ 159 in December 2016, due to excessive demand, while loan rates have increased from 27.4% to 41.9%.

Figure 2 - Brazilian household credit



Source: CBB

### 3. EMPIRICAL EXERCISE

Our exercise adds to the findings on Brazilian household credit by proposing an extended version of fiscal reaction, most recently described in Bohn (2007). Bohn (2007) aims to model household credit solvency by comparing non-earmarked, earmarked and total resources. This is one of the most commonly used approaches to model the sustainability of government debts, based on budgetary intertemporal constraint and the impossibility of infinite debt rollover.

In principle, the applied research studying credit and economic variables in developing economies has to address the trade-off between  $T$  and  $N$ . For the Brazilian economy, our first main limitation concerns the time series, since most of the credit variables are only available from March 2011.

We are able to propose an adaptation of the model originally designed for government debt, which incorporates: *i*) household reaction in terms of amortization-to-GDP minus concession-to-GDP in time  $t$  due to changes of debt-to-GDP in time  $t - 1$  and *ii*) the impact of proxies of credit risk measured by the percentage of credit portfolio in arrears, delinquency and average term of new operations. This framework is given by:

$$\frac{Amo^i}{GDP_t} - \frac{Con^i}{GDP_t} = \alpha + \varphi_I \frac{Int^i}{GDP_{t-1}} + \varphi_A \frac{\widetilde{Amo^i}}{GDP_t} + \varphi_C \frac{\widetilde{Con^i}}{GDP_t} + \varphi_P Arr_{t-1}^i + \varphi_D Del_{t-1}^i + \varphi_T Ter_{t-1}^i + \varepsilon_t^i \quad (1)$$

In this model,  $\frac{Amo^i}{GDP_t}$  is the amortization-to-GDP in time  $t$  for resource  $i$ , which can be earmarked, non-earmarked or total. This notation is useful for estimating an equation for each household credit segment, whose difference is the resource. For the other terms,  $\frac{Con^i}{GDP_t}$  is concession-to-GDP,  $\frac{Int^i}{GDP_t}$  is debt-to-GDP, while  $\frac{\widetilde{Amo^i}}{GDP_t}$  and  $\frac{\widetilde{Con^i}}{GDP_t}$  denote the respective cycles extracted from Hodrick-Prescot filter ( $\delta = 14400$ ). This characterization corresponds to the default approach suggested in Bohn (2007). We also estimate this version, but we report and make our main considerations based on the extended version, which incorporates the effects of the percentage of credit portfolio with arrears,  $Arr_{t-1}^i$ , delinquency rate,  $Del_{t-1}^i$ , and the average term of new operations,  $Ter_{t-1}^i$ .

Our main results are reported in Table 1.



Table 1 - Household credit solvency

Estimation		Brazilian Household Credit		
Variable	Parameter	No-earmarked credit	Earmarked credit	Total credit
Constant	a	0.01335 ** [0.0002]	-0.00299 ** [0.0010]	0.00595 [0.2217]
Debt-to-GDP in $t-1$	$j_I$	<b>-0.00117 **</b> <b>[0.0000]</b>	<b>0.00038 **</b> <b>[0.0000]</b>	<b>-0.00092 **</b> <b>[0.0004]</b>
Amortization-to-GDP cycles in $t$	$j_A$	1.09723 ** [0.0000]	0.96321 ** [0.0000]	1.09055 ** [0.0000]
Concession-to-GDP cycles in $t$	$j_C$	-1.11610 ** [0.0000]	-1.11974 ** [0.0000]	-1.10972 ** [0.0000]
Percentage of credit portfolio with arrears in $t-1$	$j_P$	-8.88 e-5 [0.2674]	0.00035 ** [0.0000]	0.00108 ** [0.0000]
Delinquency rate in $t-1$	$j_D$	0.00024 ** [0.0001]	0.00031 [0.2091]	-0.00036 [0.2571]
Average term of credit concession in $t-1$	$j_T$	0.00012 ** [0.0001]	-1.71 e-5 ** [0.0001]	0.00010 ** [0.0000]
<b>Complementary results</b>				
Adjusted R <sup>2</sup>		0.98283	0.95441	0.96368
Wald test (p-value) H <sub>0</sub> : $j_P=j_D=j_T=0$		24.4282 ** [0.0000]	54.1468 ** [0.0000]	116.6941 ** [0.0000]
Wald test (p-value) H <sub>0</sub> :		716.4285 **	262.7021 **	332.6972 **

P-values reported in brackets  
Difference between amortization-to-GDP and credit-to-GDP (both in  $t$ ) as a dependent variable, according to equation (1).  
\* p-value < 0.05 \*\* p-value < 0.01

The results suggest, as expected for this framework, that the difference between amortization and new concession reacts positively to contemporaneous amortization cycles and negatively to concession cycles. The most important results are associated with the parameter  $\varphi_I$  that measures the sensitivity of household reaction to the previous variation in the debt-to-GDP. In this case, the null hypothesis of the solvency of the segment of credit is not rejected when this parameter is statistically non-zero and positive, indicating a household austerity reaction in time  $t$ , after an increase in the household debt in time  $t - 1$ .

This parameter is significant in all credit modalities, but the sustainability of household credit is rejected at 1% with both non-earmarked and total resources. This evidence is corroborated based on the stationarity test results of Phillips and Perron (1988), whose null hypothesis of unit root presence in the household austerity proxy is rejected only for earmarked credit.

When one pays attention to the composition of total credit, in terms of the new operations, non-earmarked credit ranges between 84% and 92% of the total household credit concessions. However, its influence in terms of total portfolio balance is lower and has a steady downward trend, decreasing from 70% of the total credit concessions in April 2011 to 51% in August 2017. Since non-earmarked credit has a larger share in total credit than earmarked credit and has a greater elasticity (in absolute value),  $-0.00117$  compared to  $0.00038$ , which is three times larger, total household credit too seems to be explosive. The individual and joint significance of the variables used in the original fiscal reaction model highlight the longer-term effect of the new operations stemming from stimulating both total credit and non-earmarked credit in the direction of household austerity. The delinquency rate seems to have a positive effect on austerity in terms of non-earmarked credit, while the portfolio with arrears is important for total credit austerity.

Finally, we note that the explanatory power of the model is greater than 0.95 in all cases.

#### 4. CONCLUSIONS

Earmarked household credit in Brazil is mainly used for rural credit and real estate financing, while non-earmarked credit is characterized by non-payroll loans, credit cards, overdraft, vehicles and other types of credit that are generally associated with the consumption of non-durable goods, semi-durable goods and services, which although relevant, are negligible and in many cases unnecessary. This type of credit, whose interest is on average six times higher than the interest charged on earmarked loans and has a higher delinquency rate and five times higher credit cost index (measured by CBB), should not be stimulated by the government as a means of increasing social welfare unless accompanied by an improvement in social, economic, labor market and human capital indicators. Otherwise, this might be the next bubble to be blown.

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