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Indicadores macroeconômicos e endividamento pessoal/familiar brasileiro

Macroeconomic indicators and brazilian personal/family indebtedness

Indicadores macroeconómicos y endeudamiento personal/familiar brasileño

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Resumo: O objetivo do estudo foi verificar e quantificar a relação entre as variáveis macroenômicas e o endividamento das famílias brasileiras, numa perceptiva de séries temporais. Tratou-se de uma pesquisa descritiva, quantitativa, com dados secundários em séries temporais mensais de janeiro de 2012 a dezembro de 2022. Foi utilizado estatística descritiva, análise de séries temporais e análise de correlação não paramétrica. Os resultados evidenciaram que as variáveis heterogêneas em termos de médias e desvios padrões de diferentes magnitudes, negativamente assimétricas e platicúrticas, descaracterizando um comportamento normalmente distribuído das séries. As series temporais das variáveis endividamento, % famílias endividadas, volume de concessão de crédito, comprometimento da renda com serviço da dívida e custo do credito apresentaram uma tendência de aumento ao longo do tempo. A correlação evidenciou que o endividamento relacionou-se positivamente com a taxa de cambio, concessão ou facilitação de

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credito, com a renda das famílias, taxa de desocupação, Índice de Confiança no Comércio e inflação. Foi encontrada relação negativa moderada e significativa com a inadimplência e o custo de crédito.

Palavras-chave: Endividamento familiar, séries temporais, variáveis macroeconómicas.

Abstract: The objective of the study was to verify and quantify the relationship between the macroeconomic variables and the indebtedness of Brazilian families, in a perceptive of time series. This was a descriptive, quantitative research, with secondary data in monthly time series from January 2012 to December 2022. Descriptive statistics, time series analysis and non-parametric correlation analysis were used. The results showed that the heterogeneous variables in terms of means and standard deviations of different magnitudes, negatively asymmetric and platykurtic, mischaracterizing a normally distributed behavior of the series. The time series of the variables indebtedness, % indebted families, volume of credit granted, commitment of income to debt service and cost of credit showed an upward trend over time. The correlation showed that indebtedness was positively related to the exchange rate, granting or facilitating credit, family income, unemployment rate, Trade Confidence Index and inflation. A moderate and significant negative relationship was found with default and the cost of credit.

Keywords: Household debt, time series, macroeconomic variables.

Resumen: El objetivo del estudio fue verificar y cuantificar la relación entre las variables macroeconómicas y el endeudamiento de las familias brasileñas, en una serie perceptiva de tiempo. Se trata de una investigación descriptiva, cuantitativa, con datos secundarios en series de tiempo mensuales de enero de 2012 a diciembre de 2022. Se utilizó estadística descriptiva, análisis de series de tiempo y análisis de correlación no paramétrico. Los resultados mostraron que las variables heterogéneas en términos de medias y desviaciones estándar de diferentes magnitudes, negativamente asimétricas y platicúrticas, caracterizan erróneamente un comportamiento normalmente distribuido de la serie. La serie temporal de las variables endeudamiento, %

familias endeudadas, volumen de crédito otorgado, compromiso de ingresos al servicio de la deuda y costo del crédito mostró una tendencia ascendente en el tiempo. La correlación mostró que el endeudamiento se relacionó positivamente con el tipo de cambio, el otorgamiento o facilitación de crédito, el ingreso familiar, la tasa de desempleo, el Índice de Confianza Comercial y la inflación. Se encontró una relación negativa moderada y significativa con la morosidad y el costo del crédito.

Palabras clave: Deuda de los hogares, series de tiempo, variables macroeconómicas

Introduction

One of the contemporary problems that Brazilian society has faced, reported in studies and reports, is the issue of family or personal debt. Several organizations have measured and observed the temporal evolution of this variable, relating its growth in recent years to the deterioration of vacancies in the job market and the increase in general inflation that has eroded people's purchasing power, causing a drop in income. These effects were exacerbated by the Covid-19 pandemic from 2020 to 2022 (SERASA, 2021). Thus, it is suggested that the main explanation for the sharp increase in personal or family debt caused by the pandemic was due to the negative impacts of restrictions on social contact on businesses and the formal and informal labor market, generating restrictions on materials and manufactured products and services, thus increasing demand and raising their prices. Thus, this scenario of falling income, lack of employment and rising inflation is suggested by studies as the main determinants of the rise in personal or family debt levels in Brazil in recent years (Camargos, 2022; Carvalho et al., 2020).

Menasce (2020) notes that household debt is a serious problem in Brazil, the main causes of which are, in addition to unemployment, inflation and falling income, lack of financial education; inadequate use of credit modalities (overdraft or revolving credit); excessive consumerism and materialism; lack of an emergency reserve; poor

financial management; high interest rates on credit and taking out impulsive loans through high-interest credit offers.

According to data from the Consumer Debt and Default Survey (PEIC) of February 2023, the proportion of indebted Brazilian families was 78.3% of all Brazilian families, a record in the historical series, which began in 2011.

It is believed that investigating the factors that cause people and families to become indebted is essential to understanding this phenomenon. It is assumed that the determinants of people or families' indebtedness are multifactorial, and can be classified into personal, psychological, behavioral, demographic, social and economic aspects. For Carvalho, Souza and Fuentes (2017), indebtedness occurs in all economic classes and goes beyond only financial aspects, which is the determinant most often cited in the literature on the subject. For the authors, indebtedness is dissociated from the simple issue of financial limitations, and is considered a multicausal socioeconomic phenomenon with varied interpretations. The authors cite factors such as the individual's educational level, financial literacy, self-esteem, locus of control, risk-taking behavior, money-use habits, lifestyle, mental disorders, as well as sociodemographic aspects and personal characteristics as themes capable of explaining debt.

The personal finance literature includes studies and research that investigated behavioral determinants of the propensity to indebtedness, evaluating differences in gender, level of financial literacy, levels of materialism, education, as well as psychological and behavioral aspects in consumption decisions and attitudes towards money. Another theoretical strand focused on studying macroeconomic variables that include social, demographic and economic data as determinants and that greatly influence levels of family or personal indebtedness.

The main macroeconomic variables listed in the literature as causing household debt are: Basic interest rate of the economy (Vieira, Roma and Ferreira, 2014; Ruberto et al., 2013; Bortoluzzi et al. 2015; Steter and Barros, 2012); Inflation (Linardi, 2008; Glad and Almeida, 2021; Camargos, 2022; Rayssa and Maia, 2022); Unemployment or vacancy rate (Zerrenner, 2007; Lucena et al., 2014; Kunkel, Vieira and

Potrich, 2015; Vieira, Flores and Campara, 2014; Rayssa and Maia, 2022; Steter and Barros, 2012; Camargos, 2022); Household income (Santos and Silva, 2004; Silva, Vieira and Faia, 2012; Bricker et al., 2012; Lucena et al., 2014; Vieira, Flores and Campara, 2014; Zerrenner, 2007; Santos and Souza, 2014; Kunkel, Vieira and Potrich, 2015); Consumer confidence (Berg and Bergström, 1996); Default rate (Glad and Almeida, 2021; Rossato, Beskow and Pinto, 2019), Exchange rate and Gross Domestic Product (Ruberto et al., 2013; Camargos, 2022); Cost of credit, (Vieira, Roma and Ferreira, 2014) and Supply of credit in the economy (Sbicca, Floriani and Juk, 2012; Vieira, Roma and Ferreira, 2014; Camargos, 2022).

In this sense, the objective of this research was to verify and quantify the relationship between macroeconomic variables and the indebtedness of Brazilian families, from a time series perspective. As specific objectives, the descriptive statistics of the macroeconomic variables listed in the literature that are associated with indebtedness were presented, the time series of each of the variables and their patterns over time were analyzed, and the association between the variables was measured through correlation.

It is assumed that understanding the macroeconomic variables that are associated with the levels of debt of individuals and families can provide information for people, institutions and governments to understand the phenomenon and take actions and decisions to mitigate the problem of growing debt. In addition to contributing to previous studies by bringing a perspective of more recently updated temporal data.

The work is divided as follows: First the introduction, then the theoretical framework with definition of terms and related studies, then the methodology, analysis and discussion of results, conclusion and references used.

Theoretical Reference

Contreras et al. (2006) conceptualize debt as the existence of an obligation that will be obliterated after payment, characterized by

anticipated consumption, where it is enough to contract the debt to be classified as indebted. The authors argue that the concept of debt is not strictly related only to consumer relations. In a broader sense, Bortoluzzi et al. (2015) conceptualize that the term debt itself originates from the verb to indebted and means to contract debts, and can be defined as the use of third-party resources in order to satisfy financial needs, that is, the individual exceeds his/her income and resorts to the use of third-party resources with the promise of future payment.

Vieira, Roma and Ferreira (2014), when studying the factors causing debt, concluded that reductions in the economy's basic interest rate led to an increase in the supply of credit, which generated an increase in consumption and, consequently, an increase in household debt levels. Ruberto et al. (2013), when reviewing the financial stability reports of the Central Bank of Brazil, reported that lower interest rates and longer terms have contributed to an increase in the volume of credit for households. With more credit, individuals find it easier to get into debt and end up increasing their level of debt and the risk of not being able to pay their commitments by the due date, becoming defaulters. Bortoluzzi et al. (2015) and Steter and Barros (2012) understand that the reduction in the interest rate and the increase in the volume of credit, as expansionary economic instruments, in addition to increasing consumers' purchasing power, increased debt. For Dwyer; Mccloud; Hodson, (2011) and Paraíso and Fernandes (2020) the movements intended to facilitate access to credit driven by the stimulus to consumption by incentives, (ease of credit) encourages individuals to become increasingly indebted due to the need to acquire new consumer goods, becoming a social problem, of the so-called “consumer society” of the indebted.

The Linardi's (2008) research concluded that debt has a cause and effect relationship with the interest rate and inflation expectations. Glad and Almeida (2021) observed that the inflation indicator was negatively associated with household debt. Less inflation, more economic growth and consumption, and more debt. On the other hand, Camargos (2022) found that the behavior of household debt is accentuated by high inflation, generating a drop in real income; families resort to credit to

maintain their level of consumption, including basic necessities, increasing debt. Studies by Ruberto et al. (2013), Rayssa and Maia (2022) concluded that high inflation and the consequent drop in people's purchasing power are one of the main drivers of household debt.

Regarding the employment rate, Zerrenner (2007) discussed that unemployment is also one of the determining factors of household debt. In this line, the research by Lucena et al. (2014) reported that unemployment had a significant response rate in the question of determinants of debt. The investigations by Vieira, Flores, Campara (2014) and Kunkel, Vieira and Potrich (2015) indicated that individuals with employment are less likely to have a medium propensity to indebtedness. They concluded that unemployment or unemployment is a determining factor of household debt. This result is similar to that found by Para Rayssa and Maia (2022) and Carvalho et al. (2020) in which they report the precariousness of the labor market and the increase in unemployment as one of the main promoters of household debt. Steter and Barros (2012) also concluded that the unemployment rate has a positive correlation with variations in the debt and default rates of Brazilian individuals and families.

Conceptually, income can be defined as the sum of the remunerations of these various production factors (wages, profits, interest and rent). The income of the economy is the sum of the income associated with all goods and services generated in a given year. And, in accounting terms, the value of the total production of the economy (GDP) is equal to this aggregate income. Regarding income, Santos and Silva (2004) observed that the level of income influences the way families consume and the way they resort to credit. According to Silva, Vieira and Faia (2012), an association was observed between personal income and debt, with the lower the level of income, the more vulnerable to debt. According to Santos and Souza (2014), people with lower incomes are more likely to be in debt compared to other economic classes, justified by the fact that they require several facilities that are provided by agencies and financial institutions, since credit products facilitate the use of money and, consequently, can be classified as financial debt. These results corroborate other studies that verified the

relationship between income level and the propensity to be in debt, with the lower the income level, the more vulnerable people are to debt (Livingstone and Lunt, 1992; Bricker et al., 2012; Lucena et al., 2014; Vieira, Flores and Campara, 2014; Zerrenner, 2007; Ruberto et al. 2013). On the other hand, the study by Kunkel, Vieira and Potrich (2015) also concluded that there is a relationship between the level of family income and the propensity to indebtedness, however confirming the fact that those who have higher incomes are less likely to indebted due to consumerism.

Another variable that can influence debt is the National Consumer Confidence Index (ICC), given its relationship with consumption, which can result in debt or default. Consumer confidence expresses the consumer's purchasing power in the country's situation, addressing expectations regarding inflation, unemployment and future income. When consumers are satisfied and optimistic about the future, they tend to spend more; when they are dissatisfied and pessimistic, they spend less. Thus, it is possible to have a perspective of indicators that predict their optimism or pessimism about the future, which tends to indicate a possible increase or decrease in demand (Weiss, 2003). Consumer confidence is often treated as the “driving force” of the economy, so that when consumers are confident about their economic conditions and their vision of the future, the economy tends to be stimulated and present positive results, and the opposite is also true (Sequeira, 2011). Berg and Bergström (1996) conducted a study on the role of confidence indexes in explaining consumption growth and concluded that interest rates and inflation rates are important factors in consumer confidence levels, and that the index explains about 37% of the variation in the consumption growth rate. Higher levels of confidence in the economy are related to greater consumption, greater access and stimulus to credit, and greater indebtedness of individuals and families. Relating the ICC to the increase in the supply of credit in a heated economy, with a significant supply of goods, even those of small value, which can be paid in installments, where families with a large part of their income already committed end up gaining access to credit, even without being able to pay off existing debts, leads the consumer to a situation of indebtedness.

Especially for those with greater budgetary restrictions and who, in most cases, do not have reserves for any unforeseen event, the increase in the number of installment payments may also impact the degree of difficulty in managing finances and thus increase the likelihood of over-indebtedness and default situations (Sbicca, Floriani and Juk 2012; Ruberto et al., 2013; Miotto, 2013).

The default can be a determinant or a consequence of debt. According to Rossato, Beskow and Pinto (2019), debt can make the individual susceptible to accumulating debt, becoming prone to default, which, in turn, increases the propensity for over-indebtedness. The results of the study by Silva (2014) showed that the greater the debt, the higher the individual's default rate. In the study by Glad and Almeida (2021), default showed a positive association with household debt, especially in terms of debt renegotiation. In this sense, IDEC (2022) observed that fairs held for debt renegotiation cause the consumer to acquire even more loans. Debt renewal, often in installments and over a longer term, in addition to not being aligned with the consumer's payment capacity, has the potential to increase consumer debt due to greater exposure to interest rates over time. Thus, many agreements, in addition to not solving the problem, have increased the value of the debt and the indebtedness. This occurs because in these joint efforts, banking institutions take different types of debt that a consumer has and transform them into a single one. This single type of debt has its own credit and can generate much higher interest rates than those of previous debts. According to Levine (2005), problems in the financial system, such as a significant increase in the number of families in default and with credit restrictions, affect economic growth, mainly through its effect on the allocation of savings in the economy. It causes the financial system to perform its functions poorly, and tends to harm economic growth (GDP) and reduce opportunities in the economy.

The Gross Domestic Product (GDP) is defined as an indicator of economic activity that represents the sum of all goods and services produced in a geographic area in a given period, expressing the economic dynamics of the place, indicating the possible growth of the economy, if positive. On the other hand, low growth or a decline in

Gross Domestic Product (GDP) would also result in low growth or a decline in employment and income, which means more difficulty for people to pay off debts or obtain new financing. With economic growth measured by an increase in GDP, there is more credit supply due to greater disposable income. Regarding GDP, the work of Ruberto et al. (2013) concluded that GDP explains household debt, with a significance level of 10%. GDP and debt have a positive relationship with debt, where a 1% increase in these variables causes a 0.09% increase in debt, respectively. Brodt's (2022) research corroborates this by concluding that the behavior of household debt was explained by the behavior of GDP. He also observed that GDP growth led to increases in debt in the years 2018 to 2021.

The exchange rate is the price of foreign currency based on the national currency. In this sense, a currency devaluation would raise the prices of imported inputs from industries and, therefore, production costs would be passed on to products, becoming more expensive for consumers and families, causing inflation. Likewise, capital goods and imported products would also become more expensive, increasing the price of investment. On the other hand, Glad and Almeida (2021) and Ruberto et al. (2013) concluded that an increase in the exchange rate tends to cause Brazilian families to avoid spending and, consequently, reduce their debt levels. They assert that there is a negative relationship, where increases in the exchange rate would determine decreases in debt.

The cost of credit is the interest rate charged when taking out a loan from a financial institution. Regarding the cost of credit, Vieira, Roma and Ferreira (2014) observed a negative relationship between the cost of credit and household debt, and a positive relationship between the basic interest rate and the credit rate. They concluded that increases in household debt were due to the reduction in the cost of credit. They also concluded that when the government changes the SELIC rate, there is a significant change in the cost of credit, influencing household debt levels. Zerrenner's (2006) research highlighted, among other reasons for individual debt, the high interest rate influencing the cost of credit is one of the main factors for the increase in the level of debt.

Methodological approach

This research was characterized as descriptive, since it described characteristics obtained from secondary data on macroeconomic variables related to personal debt. It was also classified as quantitative evaluation, due to the characteristic of the data analysis. According to the technical procedures used, the research can also be classified as expost facto and statistical, since the data were obtained from past facts) and as statistical because it represents and explains, through statistical techniques (graphs, tables, charts and methods) the quantitative observations (Fachin, 2001).

The data were secondary and obtained from several databases, as shown in Table 1. These were observations in time series (132 months), from January 2012 to December 2022. Data reliability was maintained and they were tabulated and organized using a Libre Office Calc spreadsheet and statistical treatments were performed using Stata software. Initially, the descriptive statistics of the variables were measured. Subsequently, each graph of each time series was presented and the Dickey-Fuller test was used to statistically detect the presence of stochastic trend behavior in the time series of each variable, highlighting their behavior patterns over time.

Table 01 - Description of research variables

Variable	Definition	Source
Household debt	Household debt with the National Financial System in relation to accumulated income over the last twelve months	Central Bank of Brazil
% of income committed to debt	Family income commitment to repay debt with the National Financial System - Seasonally adjusted	Central Bank of Brazil
Individual default	Percentage of the National Financial System credit portfolio with at least one installment overdue for more than 90 days	Central Bank of Brazil
Cost of credit as a % per year	Average cost, in one month, that burdens families that have taken out credit in the SFN	Central Bank of Brazil
Exchange rate	Nominal exchange rate: Cost of the Dollar compared to the Real	IPEADATA
ICC - consumer	Measures consumer confidence in their	FECOMERCIO

confidence index	purchasing power and in the country's situation, addressing expectations regarding inflation, unemployment and future income. Perception regarding their financial conditions, their future prospects and also the consumer's perception of the country's economic conditions	SP
Credit concessions to individuals in R$ (millions)	Value of new credit operations contracted in the reference period in the National Financial System. Includes operations contracted in the free credit segment and in the directed credit segment	Central Bank of Brazil
GDP at market prices	Measures the total added value at market prices, in current currency, of goods and services produced by production units	IPEADATA IBGE
Interest rate - SELIC	Base interest rate of the economy. It is the main monetary policy instrument used by the Central Bank (BC) to control inflation. It influences all interest rates in the country, such as interest rates on loans, financing and financial investments	Central Bank of Brazil
Inflation	National Broad Consumer Price Index - IPCA - the government's official inflation index. The IPCA aims to measure the inflation of a set of products and services sold in retail, relating to the personal consumption of families whose income varies between 1 and 40 minimum wages, regardless of the source of income	IBGE
Average income from work	Sum of the monthly income from the main job divided by the total employed population aged 16 or over	IBGE
Unemployment	Unemployment rate is the percentage of people in the workforce who are unemployed	IBGE
% of families in debt	Number of families in debt in relation to the total number of families. Consumer Debt and Default Survey (PEIC)	FECOMERCIO
% of families in default	Number of families with accounts up to 90 days overdue in relation to the total number of families. Consumer Debt and Default Survey (PEIC)	FECOMERCIO

Finally, to verify the association between the variables, Spearman's correlation analysis was performed, which is a non-parametric measure of rank correlation (statistical dependence of the ranking between two or more variables), measuring the strength and direction of the association

between two classified variables. It was judged that the test would be adequate to meet the research objectives.

Results and discussion

From the point of view of descriptive analysis, the focus was on the analysis of the relative variability of the data, since the measures of central tendency and dispersion, due to the particularity of the data being from different measurements and databases, were presented in heterogeneous measures and units. Thus, the greatest relative variability over time (35% to 376.8%) was observed, namely in the variables GDP, Inflation (IPCA), basic interest rate (SELIC) and granting of credit to individuals. Such results denote the characteristics of significant dispersion in these variables, mainly in GDP, as they present greater amplitudes in relation to the average, and are variables of government intervention over the years, results of economic policies, especially fiscal, monetary and credit policies that served to induce economic growth and increase the well-being of the population.

Thus, among the objectives of these policies are: GDP growth, injection of credit and liquidity, reduction in unemployment and inflationary stabilization (Vasconcellos, 2009). They presented the smallest variations over time (3 to 9.3%), namely, average labor income, % of income committed to debts, cost of credit to individuals and % of household debt. It was observed, mainly in the variable average labor income, smaller amplitudes in relation to the average, being variables more stable over time compared to the others. The other variables presented relative variability between 14.5% and 25%.

Table 01- Results of descriptive statistics

VARIÁVEIS	Obs	Média	DP	Min	Max
1. Endividamento % das famílias	132	40.46	3.76	36.8	50.09
2. Comprometimento % de renda com dívidas	132	23.71	1.53	20.1	28.21
3. Inadimplência da carteira de crédito - PF	132	3.89	0.65	2.85	5.51
4 - Taxa de Câmbio nominal	132	227.54	44.25	145.94	315.26
5. Concessões de crédito - PF	132	159591	48694.77	92539	299453
6. Taxa básica de juros - SELIC	132	8.93	3.73	2	14.25
7. PIB a preços de Mercado	132	0.69	2.60	-4.5	5.2
8. Custo do Credito PF	132	25.49	1.94	21.45	29.32
9. % familias Endividadas	132	0.55	0.08	0.39	0.77
10. % familias Inadimplentes	132	0.18	0.03	0.1	0.26
11. Inflação (IPCA)	132	0.49	0.39	-0.68	1.62
12. Taxa de Descocupação (Desemprego)	132	10.48	2.62	6.3	14.9
13. Rendimento Médio Trabalho	132	2720.98	82.48	2541	2967
14. Índice de Confiança do Consumidor	132	116.90	20.73	84.55	170.18

The results show that the variables used present means and standard deviations of different magnitudes, which was expected, since this characteristic is due to the use of the most different types of macroeconomic variables used in the study, from different sources.

Through the Skewness and Kurtosis indicators, it can be seen that the variables, in general, are negatively asymmetric and platykurtic, disregarding the normally distributed behavior of the series, justifying the subsequent use of nonparametric statistics for the analysis of associations. The distribution of the data presented a more open frequency curve, characterized mainly by the significant variability of some variables, especially GDP, Inflation (IPCA), basic interest rate (SELIC) and granting of credit to individuals.

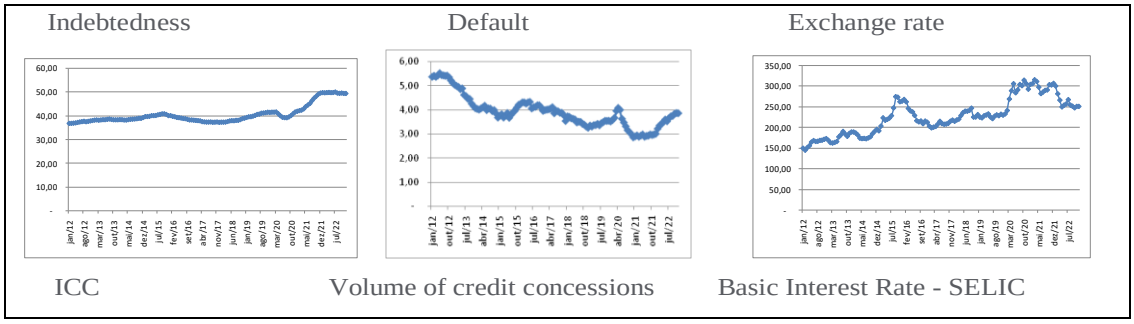
The analysis of the time series aimed to verify its decomposition into trend, cycle and seasonality components, emphasizing the trend of the series as indicating its "long-term" behavior. First, the Dickey-Fuller test (ADF) was processed to test whether there was a significant presence of trend in the time series of the variables, the results of which are shown in Table 02. Subsequently, the trend graph for each variable was presented.

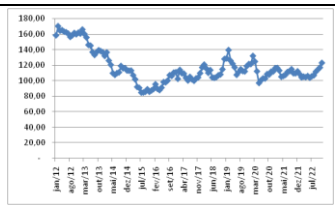
Table 02- Results of stationarity tests

Variável	Teste Dickey-Fuller		
	Z(t)	P- Value	Interpretação
1. Endividamento % das famílias	2.126	0,9988	Não estacionária
2. Comprometimento % de renda com dívidas	-0.275	0,9290	Não estacionária
3. Inadimplência da carteira de crédito - PF	-1.739	0,4113	Não estacionária
4 - Taxa de Câmbio nominal	-1.962	0,3037	Não estacionária
5. Concessões de crédito - PF	0.010	0,9594	Não estacionária
6. Taxa básica de juros - SELIC	-0.098	0,9497	Não estacionária
7. PIB a preços de Mercado	-1.589	0,4891	Não estacionária
8. Custo do Credito PF	-0.701	0,8465	Não estacionária
9. % famílias Endividadas	-1.212	0,6685	Não estacionária
10. % famílias Inadimplentes	-1.819	0,1565	Não estacionária
11. Inflação (IPCA)	-2.219	0,3974	Não estacionária
12. Taxa de Descocupação (Desemprego)	-0.882	0,7938	Não estacionária
13. Rendimento Médio Trabalho	-1.649	0,4574	Não estacionária
14. Índice de Confiança do Consumidor	-2.020	0,2777	Não estacionária

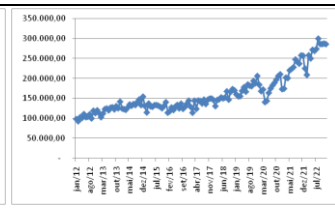
Regarding the analysis of time series, stationarity is a necessary condition. In order to assess whether the variables used present this characteristic, the ADF (Augmented Dickey-Fuller) test was performed, where the null hypothesis H0 is that the series has a unit root (non-stationary), against the alternative of stationarity. The results of the augmented ADF test showed that all series behaved with trends or seasonality, being statistically non-stationary. It is understood that the trend and seasonality will affect the value of the time series at different times. The results of the ADF test (table 2) suggest the presence of a unit root, which can lead to non-stationary behavior of the time series, that is, that its mean and variance change over time.

Figure 01 - Time series graphs of the research variables

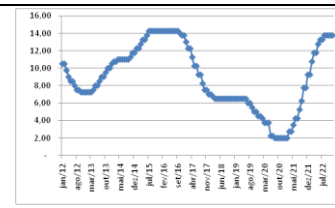




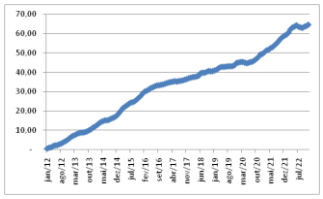
IPCA ACCUMULATED



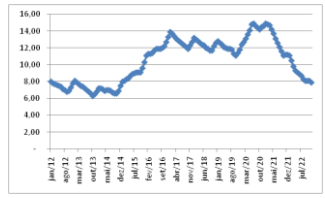
Unemployment rate



Average income

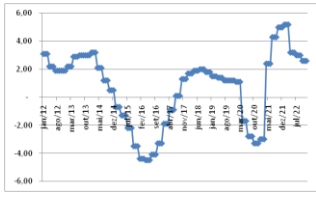


GDP at current prices

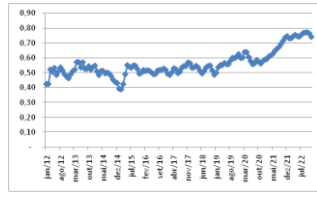


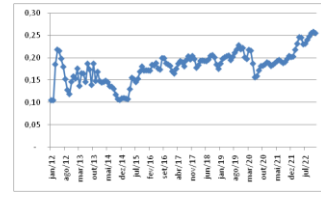
% families in debt

% families in default

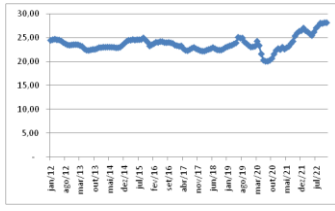


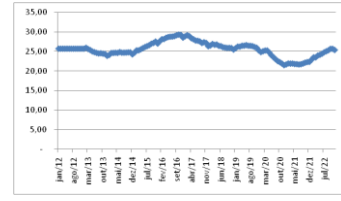
Commitment of income to debt service





Average cost of credit - effective rate % per year





Seasonality (peaks and valleys) were observed in the distributions of the series of variables Exchange Rate, Unemployment, GDP, Average Income and Volume of Credit Granting. These results confirm the analysis of the variability of descriptive statistics and kurtosis indicator, as they are direct results of government intervention in economic policies. It was also observed that the time series of the variables indebtedness, % of indebted families, volume of credit granting, commitment of income to debt service and cost of credit

showed an increasing trend over time.

Pestana and Gageiro (2000) state that by convention it is suggested that a correlation coefficient (R) less than 0.19 indicates a very low association, between 0.2 and 0.39 low, between 0.4 and 0.69 moderate, between 0.7 and 0.89 high and finally, between 0.9 and 1 a very high association.

In the correlation analysis, it was found that a greater commitment of family income to interest was moderately and positively related to a higher level of debt (r: 0.46, $p < 0.001$). Santos and Silva (2004) observe that the level of income influences the way families consume and the way they resort to credit. According to Pereira (2022), what is happening to large companies, with difficulty with credit, ends up being repeated with families, who are being victims of economic circumstances. Expensive credit, resistant inflation, a labor market still with a large deficit of jobs and flat wages make up this scenario of income commitment to debt. According to the institution, the number of Brazilians who consider themselves highly indebted has grown at a rapid pace.

Table 02 - Spearman's nonparametric correlation matrix

VARIÁVEIS	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*
1. Endividamento % das famílias	1										
2. Comprometimento % de renda com dívidas	0.4574***	1									
3. Inadimplência da carteira de crédito - PF	-0.5777***	0.0735	1								
4 - Taxa de Câmbio nominal	0.7464***	0.0812	-0.7336***	1							
5. Concessões de crédito - PF	0.6980***	0.0893	-0.8505***	0.7490***	1						
6. Taxa básica de juros - SELIC	-0.0333	0.5007***	0.5080***	-0.2574***	-0.3552***	1					
7. PIB a preços de Mercado	0.0531	0.1978**	-0.0518	-0.1789**	0.1588*	-0.1466*	1				
8. Custo do Crédito PF	-0.4672***	0.0732	0.3887***	-0.2786***	0.5932***	0.4134***	-0.5017***	1			
9. % famílias Endividadas	0.6514***	0.1439*	-0.5553***	0.6442***	0.7350***	-0.3589***	0.3072***	-0.4152***	1		
10. % famílias Inadimplentes	0.3688***	0.2380	-0.4045***	0.4631***	0.6253***	-0.2187***	0.2048**	0.0387	0.6876***	1	
11. Inflação (IPCA)	0.2574***	0.2114**	-0.1084	0.1556*	-0.0027	0.1284	0.0883	-0.3217***	-0.0733	-0.2206***	1
12. Taxa de Descupação (Desemprego)	0.6573***	-0.3335***	0.5860***	0.6103***	0.4482***	-0.4635***	-0.4553***	0.1515*	0.3026***	0.3506***	-0.1879**
13. Rendimento Médio Trabalho	0.0672	-0.5583***	-0.3750***	0.1715**	0.2504***	-0.4958***	-0.3358***	-0.1538*	0.0607	-0.0509	-0.2411**
14. Índice de Confiança do Consumidor	-0.2762***	-0.0564	0.2610***	-0.5318***	-0.2583**	-0.3388***	0.4968***	-0.2780**	-0.1022	-0.1055	-0.0305

*** sig a 0,01; ** sig a 0,05; * sig a 0,10

It was observed that the exchange rate was highly and positively related to household debt (r: 0.75, 0.0001), contradicting the arguments of Glad and Almeida (2021) and Ruberto et al. (2013). For the research data, it is assumed that the exchange rate causes an increase in the inputs of products and services, creating inflation and increasing the cost of living and causing the search for extra sources of financing, explained by the high and positive relationship between the exchange rate and the

granting of credit (r: 0.75, 0.0001). A positive and low relationship was also observed between the exchange rate and inflation (r: 0.16; 0.10). In this sense, it was evident that the granting or facilitation of credit was highly and positively related to household debt (r: 0.70, 0.0001). These results corroborate the works of Vieira, Roma and Ferreira (2014), Ruberto et al. (2013), Bortoluzzi et al. (2015) and Steter and Barros (2012), Dwyer, Mccloud and Hodson, (2011) and Paraíso and Fernandes (2020) in which they assert increases in the supply of credit with increases in indebtedness. On this topic, FEBRABAN (2023) understands that there should be campaigns that go beyond teaching people how to better plan their household budget, warning them to avoid easy credit and making them aware of the illusions created by the consumerism industry so that they do not fall into the market's "traps", guiding and helping to reorganize the financial lives of the so-called passive over-indebted (those who get into debt due to events beyond their control, such as death, unemployment, illness, etc.) and active over-indebted people (those who abuse credit for consumerism).

It was found that inflation was related low and positively to indebtedness (r: 0.25, 0.0001) corroborating the results of the studies by Linardi (2008), Camargos (2022), Ruberto et al. (2013); Rayssa and Maia (2022) suggesting for the results inflation and the consequent fall in people's purchasing power as one of the main promoters of family indebtedness.

The unemployment rate showed a moderate, positive and significant relationship with indebtedness (r=0.65; 0.001) and a low and positive relationship with the number of indebted families (r=0.30; 0.0001). The results validate the works of Zerrenner, (2007), Lucena et al. (2014), Vieira, Flores, Campara (2014), Kunkel, Vieira and Potrich (2015), Rayssa and Maia (2022) and Carvalho et al. (2020) and Steter and Barros (2012) who were unanimous in concluding that unemployment is also a determining factor in family indebtedness. These results are linked to the fall in average income and unemployment (r=0.35; 0.0001). Although average labor income did not show a positive association with debt, it was found that the more income fell, the greater the commitment of income to debt (r = -0.55; 0.0001), an

association considered moderate. This validates the results of the SERASA (2021) survey, which concluded that unemployment was the main cause of debt. Pereira (2022) explains that these results are due to years of low economic growth, combined with rising unemployment rates and high inflation, legacies of the pandemic, which further compromised family income. Finally, rising interest rates further aggravate this situation, making debts almost unpayable for the poorest families, who are more vulnerable in terms of debt, validating Silva, Vieira and Faia (2012), Santos and Souza (2014).

Regarding confidence in the economy, the results showed that the less confidence there is in the economy, the greater the household debt (r= -0.28; 0.0001). Despite the low relationship, this result was consistent with Berg and Bergström (1996), Sbicca, Floriani and Juk (2012), Ruberto et al. (2013) and Miotto (2013). The result suggests that the lack of confidence in the improvement of employment, income or the fall in inflation makes households expect a worsening of the economy and seek debt as an alternative source of income, which can also be explained by the significant relationship between unemployment and inflation with debt.

A moderate and significant negative association was found between default and indebtedness (r: -0.58; p<sig. 0.001). On the other hand, a low and significant positive relationship was found between the percentage of defaulting families and indebtedness (r=0.37, 0.0001), validating the studies by Glad and Almeida (2021), IDEC (2022) that assert the relationship between default and indebtedness and vice versa.

Regarding the cost of credit, a moderate negative relationship with indebtedness was found (r= -0.47; 0.0001), suggesting that increases in the cost of credit inhibit indebtedness although they increase default (r=0.39; 0.0001), validating the arguments of Vieira, Roma and Ferreira (2014) and refuting Zerrenner (2006), even though a positive association was found between the economy's basic interest rate and the cost of credit.

There was a moderate and significant positive association between the percentage of household debt in relation to income and the number of indebted households (r=0.65; 0.001) and also a low and significant

association with the number of defaulting households (r=0.37; 0.001). These results were already expected because they are strongly linked variables. In this sense, as Chiara and Gerbelli (2023) explain, the deterioration of the financial situation of households is already a concern for the country's financial system, which leads banks to become more rigid in granting new credit and forces Brazilians to resort to so-called emergency lines, such as special checks and revolving credit on credit cards, which have higher interest rates, generating more debt and default.

Schymura (2022) reiterates that among the low-income population and those classified as having more volatile income, loans were more concentrated in unsecured products and have higher default rates. It was concluded that the high indebtedness and high default rates of Brazilian families, especially the poorest, are based on the most expensive types of credit. For Santos and Souza (2014), economic classes C and D were more prone to debt, as informal employment and income instability represent a danger for this class, since individuals with lower incomes live in a vicious cycle of taking on new debts to pay off old ones. According to the SERASA (2021) investigation, one of the effects of the pandemic was the impact on the financial condition of Brazilians and the profile of those in debt, who often had to make choices between their debts. Unemployment and low or lack of income can be defined as the main reason for debt, and the use of credit cards, used mainly for the purchase of basic supplies, is the main debt of this public.

In the correlation results, the variables GDP, basic interest rate (SELIC) and average labor income were not significant in the association with indebtedness, therefore, they were not analyzed.

Conclusion

The objective of the study was to verify and quantify the relationship between macroeconomic variables and the indebtedness of Brazilian families, from a time series perspective. The results showed that the variables presented heterogeneous measures and units, means and standard deviations of different magnitudes, negatively asymmetric

and platykurtic, disregarding a normally distributed behavior of the series. The time series of the variables indebtedness, percentage (%) of indebted families, volume of credit concession, commitment of income to debt service and cost of credit showed an increasing trend over time.

It was concluded that indebtedness was strongly and positively related to the exchange rate, granting or facilitating credit. It was moderately and positively related to household income, unemployment rate, Trade Confidence Index and was slightly and positively related to inflation. A moderate and significant negative relationship was found with default and the cost of credit.

As suggestions for future research, insert new variables into the model as well as the use of other more robust methods that can capture the joint effect of the variables on Brazilian personal/family debt.

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