THE DYNAMICS BETWEEN INTEREST RATES, INFLATION AND HOUSEHOLD SAVINGS: AN EMPIRICAL ANALYSIS OF THE PORTUGUESE ECONOMY

Natália Teixeira

ISG -Business & Economics School, Lisbon, Portugal, CEFAGE and CIGEST

Email: natalia.teixeira@isg.pt

Abstract: This study examines the influence of real interest rates, inflation and household disposable income on the Portuguese economy, utilising data from the past two decades and employing the Fisher model. The research assesses the interrelationships between inflation, real interest rates and household savings, with a particular focus on the contrasting dynamics observed during periods of economic crisis, such as the 2008 global financial crisis and the ongoing impact of the SARS-CoV-2 pandemic, and periods of relative stability. The results demonstrate a moderate correlation between real interest rates and savings over the analysed period, with a more pronounced response in crisis scenarios. Furthermore, the presence of negative interest rates associated with expansionary monetary policies does not prevent the growth of precautionary savings during crises. The study emphasises the necessity for supplementary economic policies that integrate factors such as household confidence and expectations, particularly during periods of economic instability.

Keywords: Interest Rates; Inflation; Fisher Model; Household Savings; Economic Crisis.

INTRODUCTION

Interest rates occupy a pivotal position within the economic landscape, functioning as a principal mechanism through which monetary policy is implemented. They exert an influence on consumption, savings and investment decisions, while seeking to achieve a balance between the dual objectives of controlling inflation and promoting sustainable economic growth. Nevertheless, the identification of an 'ideal' interest rate that can simultaneously prevent recessions and stimulate growth represents a persistent challenge in the formulation of economic policies. This debate assumes relevance in times of crisis, such as the 2008 financial crisis and the recent pandemic caused by the SARS-CoV-2 virus, when the impact of interest rates on households' disposable income and savings patterns intensifies.

This study examines these dynamics in the context of the Portuguese economy, utilising data from the last two decades. The analysis is based on the Fisher Model, which describes the relationship between real interest rates, nominal rates and expected inflation, thus enabling a comprehensive assessment of the impact of real interest rates on households' savings capacity. Furthermore, the responses of households in different economic scenarios are examined, differentiating between periods of economic stability and those characterised by crises.

By investigating the interaction between interest rates, inflation and household savings, the study contributes to the economic literature by reinforcing the importance of macroeconomic and behavioural variables in household financial behaviour. Furthermore, it offers insights that can inform the development of more effective economic policies. In addition to financial indicators, these policies should consider factors such as economic confidence and agents' expectations.

THEORETICAL PERSPECTIVES ON INTEREST RATES, INFLATION AND HOUSEHOLD SAVINGS

Economic theories have consistently regarded nominal interest rates as a pivotal and efficacious instrument for curbing inflationary pressures (Alvarez et al., 2001; Eldomiaty et al., 2020; Wahyudin, 2024). The impact of variations in

nominal interest rates on a country's economy is described by Fisher's (1930) approach, which presents the relationship between real and nominal interest rates, adjusted for expected inflation. This model provides an extremely simple mathematical basis for understanding how interest rates influence purchasing power over time, directly impacting households' purchasing power (Herrenbrueck & Wang, 2023; Sun & Phillips, 2004). A substantial body of research attests to the efficacy of the Fisher Model in evaluating the consequences of monetary policies in the context of economic crises (Bernanke, 2020; Gorodnichenko et al., 2023; Luetticke, 2021; Uribe, 2022). Considering the aforementioned considerations, the following hypothesis is proposed for investigation:

H1: There is a negative relationship between inflation and real interest rates.

Conversely, Keynesian thinking is important in this analysis, as it emphasises the influence of interest rates on the level of savings in the economy, the impact on companies' investment capacity and their influence on the general level of economic activity (Asimakopulos, 1986; Biggs, 2023; Blinder, 2008). In scenarios of price rigidity, Keynes (1936) posited that moderate inflation is necessary to maintain economic flexibility. More recent studies have demonstrated the efficacy of interest rates in mitigating recessions and stimulating sustainable economic development (Barrie, 2017; Ozili, 2024; Zakhidov, 2024). The following hypothesis can be defined:

H2: High interest rates reduce household disposable income.

In the context of the proposed study, it is also important to consider the role of household savings in the economy. The extant literature indicates that interest rates and inflation have a significant impact on household savings and debt decisions (Flodén et al., 2021; Lieb & Schuffels, 2022). Indeed, during periods of economic downturn, households tend to adjust their savings rates to protect themselves against potential financial instability or concerns about the future performance of the economy (Aladangady et al., 2022; Borio et al., 2020). In a recent study, Yazdanparast and Alhenawi (2022) examined the impact of economic crises on savings behaviour, identifying recurring patterns across diverse economies. They also observed a phenomenon of globalisation in behavioural terms.

Considering the aforementioned considerations, the study proposes the following research hypothesis:

H3: During economic crises, households increase their savings rate as a protection mechanism.

These hypotheses are investigated in the context of the Portuguese economy, based on the data collected and the application of the Fisher Model and the aforementioned theoretical perspectives.

METHODOLOGY

TYPE OF STUDY

The article presents the findings of a quantitative and exploratory study, which analyses historical data pertaining to the behaviour of the Portuguese economy. The study was designed with the following specific objectives: (i) to evaluate the evolution of the real interest rate by applying the Fisher Model; (ii) to verify the impact of the evolution of the inflation rate on real interest rates in Portugal; (iii) to verify the correlation between the real interest rate and the savings rate of Portuguese households. The interrelationship between the variables and the corresponding research hypotheses mentioned in the literature review is illustrated in Figure 1.
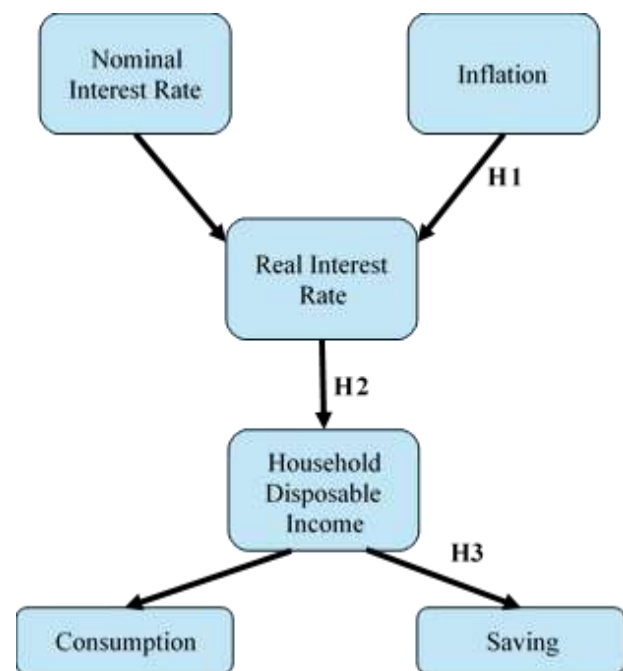
Figure 1: Research Model
Source: Author owns work

DATA SOURCE AND ANALYSIS

The data on inflation rates and household savings were obtained from PORDATA (2024), which provides data covering the period from 2000 to 2022. In the case of nominal interest rates, the 12-month Euribor rate was employed, with the evolutionary values derived from Euribor-rates (2024).

A detailed examination of the presented tables reveals noteworthy economic fluctuations pertaining to interest rates, inflation, and savings indicators in Portugal over the 2000-2022 period. This assessment is further supported by the results of the correlation between the real interest rate and the household savings rate. Table 1 presents data on the evolution of nominal and real interest rates (in accordance with the Fisher equation), inflation and the household savings rate in Portugal.

In consideration of the primary conclusions to be drawn from the analysis of Table 1, it can be observed that the nominal interest rate exhibits a fluctuating pattern, reaching a maximum of 4.682% in 2008 and subsequently assuming negative values from 2017 onwards, reaching -0.502% in 2021. This trend is reflective of the impact of the European Central Bank's (ECB) expansionary monetary policies, particularly in the aftermath of the global financial crisis.

The inflation rate demonstrates periods of notable increase, such as in 2001 (4.4%) and 2022 (8.1%), which are in contrast with occasional deflations (2009, 2014 and 2020) resulting from the global financial crisis and the pandemic. The high inflation rate observed in 2022 can be attributed to global economic tensions, including the rising prices of energy and raw materials, which have been influenced by the post-pandemic period and the war in Europe, and have consequently impacted supply chains.

In accordance with the Fisher equation, the real interest rate has predominantly remained negative throughout the period in question, thereby underscoring the impact of elevated inflation on nominal rates. It is notable that in 2009, the value was 3.8 per cent, indicating a deflationary shock associated with the global financial crisis.

In conclusion, the household savings rate exhibited fluctuations between 6.8% (2017) and 12.9% (2003), reflecting shifts in household behaviour in response to economic conditions. Savings increased during periods of crisis (2009 and 2020-2022), indicating a tendency towards traditional precautionary behaviour in the context of economic uncertainty.

In conclusion, the inverse relationship between inflation and savings is evident. During periods of high inflation, such as that experienced in 2022, household savings decrease, indicating a potential erosion of purchasing power and a disincentive to save. Conversely, the monetary policy of low and negative interest rates, combined with controlled inflation until 2022, had a tangible effect on household savings.

Table 2 presents the Pearson correlation coefficients and R^2 to evaluate the strength and explanatory power of the relationship between the real interest rate and the savings rate. During the period under consideration, the Pearson coefficient (0.46061) indicates a moderate positive correlation between the real interest rate and household savings. This indicates that an increase in real interest rates is associated with a tendency for households to augment their savings. Nevertheless, the real interest rate accounts for only 21.2% of the variation in the household savings rate ($R^2=0.212162$). This may be attributed to variables such as income, consumption, confidence and economic expectations, which may exert a more significant influence.

When the study is subdivided into specific economic periods, the results vary. In the periods of the financial crisis and the pandemic caused by the SARS-CoV-2 virus (2008-2012 and 2020-2022), the Pearson coefficient (0.87824) demonstrates a markedly strong correlation, indicating a heightened sensitivity of savings to alterations in the real interest rate during periods of economic turbulence. Concurrently, 77% of the variation in savings is explained by the real interest rate ($R2=0.771305$), indicating that crises tend to precipitate an increase in precautionary saving behaviour among households, even when interest rates are low.

In periods of economic stability or expansion (2000-2007 and 2013-2019), the weak correlation (Pearson coefficient = 0.354594) indicates that during periods of greater economic stability, the savings rate responds less to real interest. The results demonstrate that only 12.5% of the observed variation in savings can be attributed to real interest rates. This finding reinforces the conclusion that other factors exert a significant influence during these periods.

Table 1: Economic indicators on interest rates, inflation and savings for Portugal (%)

Years	Nominal Interest Rate*	Inflation Rate**	Real Interest Rate (Fisher)	Households' Saving Rate**
2000	3,523	2,8	0,723	12,4
2001	4,677	4,4	0,277	12,7
2002	3,259	3,7	-0,441	12,8
2003	2,833	3,2	-0,367	12,9
2004	2,129	2,5	-0,371	11,2
2005	2,174	2,1	0,074	10,2
2006	2,550	3,0	-0,450	8,7
2007	3,770	2,4	1,370	7,6
2008	4,682	2,7	1,982	7.3
2009	2,893	-0,9	3,793	11,9
2010	0,793	1,4	-0,607	9,7
2011	1,057	3,6	-0,543	8,8
2012	1,425	2,8	-1,375	10,2
2013	0,229	0,4	-0,171	9,7
2014	0,478	-0,2	0,678	6.9
2015	0,243	0,5	-0,257	7,1
2016	0,002	0,6	-0,598	7,1
2017	-0,140	1,6	-1,74	6,8
2018	-0,217	1,2	-1,417	7,0
2019	-0,121	0,3	-0,421	7,3
2020	-0,248	-0,1	-0,348	11,8
2021	-0,502	0,9	-1,402	10,5
2022	-0,499	8,1	-8,599	Pro 6,2

Source: Pordata.pt (2024); Euribor-rates.eu (2024)

Table 2: Results of the Pearson coefficient and R2 between the Real Interest Rate and Household Savings Rate (2000 – 2022)

	Pearson Coefficient	R Square (R2)
Household savings rate (2000-2022)	0,46061	0,212162
Global financial and pandemic crises (2008-2012 e 2020-2022)	0,87824	0,771305
Pre-financial crisis and economic recovery (2000-2007 e 2013-2019)	0,354594	0,125737

Source: Pordata.pt (2024); Euribor-rates.eu (2024)

DISCUSSION OF RESULTS

The results of the study allow us to draw relevant conclusions. Periods of economic crisis exert a significant influence on the behaviour of Portuguese households, with the data indicating a stronger correlation between the real interest rate and savings. This reflects the psychological and economic impact of adverse events, which prompt households to save more, regardless of the low financial returns that may result. Conversely, the implementation of negative interest rate policies had a constrained effect on savings during periods of stability yet proved ineffective in counteracting the surge in precautionary savings during crises. In conclusion, the inflation rate plays a pivotal role in determining savings, particularly in recent years (2022), by reducing real returns and affecting households' capacity to save.

The data presented serves to illustrate the intricate nature of the relationship between the real interest rate and household savings in Portugal. While the overall correlation is moderate, the impact of the real interest rate is significantly more pronounced during periods of crisis. These findings emphasise the necessity of incorporating macroeconomic and behavioural variables into the evaluation of monetary policies and their consequences for household savings.

The empirical analysis lends support to the hypotheses that have been defined, reflecting the impacts of real interest rates and inflation on Portuguese household savings between the years 2000 and 2022.

Regarding H1: There is a negative relationship between inflation and real interest rates, the relationship between inflation and real interest rates was found to be negative, thereby validating the premise of the Fisher Model and the associated literature. In periods of high inflation, such as 2001 (4.4%) and 2022 (8.1%), real interest rates exhibited a markedly negative trajectory. This behaviour is consistent with the theoretical predictions that high inflation reduces the real returns on financial investments, thereby discouraging savings. The result serves to reinforce the effectiveness of the Fisher Model as an analytical tool for understanding the impact of inflation on real rates, as discussed by Alvarez et al. (2001) or Herrenbrueck and Wang (2023).

About H2: High interest rates reduce household disposable income, this hypothesis is indeed substantiated by empirical evidence. The negative real interest rates observed during the period under analysis (especially after 2017) reflect the impact of expansionary monetary policies, which were implemented with the objective of stimulating consumption and investment. However, the data indicates that in times of crisis, the reduction in nominal and real rates did not prevent increases in household savings behaviour due to precautionary motives and uncertainty, as observed in 2009 and the period of the pandemic (2020-2022). The moderate correlation between the real interest rate and savings (Pearson's coefficient = 0.46061) throughout the period reflects the importance of other factors, such as economic confidence, income and long-term expectations, which significantly influence the decision to save (Asimakopulos, 1986; Biggs, 2023; Blinder, 2008).

At last, H3: During economic crises, households increase their savings rate as a protection mechanism is supported by the evidence. The hypothesis that during economic crises, households increase their savings rate as a protective mechanism has also been verified. During the periods of economic crisis that occurred between 2008 and 2012 and again between 2020 and 2022, a highly significant correlation was observed between the real interest rate and household savings. The Pearson coefficient for this correlation was 0.87824, indicating a strong relationship between the two variables. Furthermore, the real interest rate accounted for 77% of the variation in household savings, as indicated by the R2 value of 0.771305. This result lends support to the hypothesis that households increase their savings rate as a protective mechanism against economic uncertainties, regardless of the immediate financial return on their investments. This data lends support to recent studies that have emphasised the globalised nature of the increase in savings during economic crises. For example, Gorodnichenko et al. (2023) and Uribe (2022) have discussed this phenomenon.

However, the empirical analysis reveals contradictory results in periods of economic stability (2000-2007 and 2013-2019), with a weaker correlation between real interest rates and savings (Pearson coefficient = 0.354594). This suggests that other factors, such as economic growth and market confidence, played a more significant role in the savings decision. Only 12.5% of the variation in savings was explained by real interest rates.

CONCLUSIONS

The present study permits an evaluation of the influence of inflation and negative real interest rates on the Portuguese economy. The reduction of real interest rates is a significant consequence of high inflation, which lends support to Fisher's theory. This phenomenon acts as a disincentive to savings during periods of economic stability. However, it is unable to prevent savings from increasing during crises as a precautionary mechanism.

Conversely, the findings serve to reinforce the significance of the economic context in the dynamic between real interest rates and savings. In periods of economic crisis, households tend to resort to savings as a protective strategy, whereas in periods of stability, other structural and behavioural factors assume greater significance.

Ultimately, the efficacy of monetary policies predicated on interest rates is constrained in crisis scenarios. Despite low nominal and real rates, savings increased during periods of uncertainty, underscoring the pivotal role of confidence and expectations in household behaviour. This finding underscores the necessity for economic policies that complement monetary policies, particularly in times of crisis, to stimulate consumption and investment. Strategies designed to bolster household confidence and enhance disposable incomes may prove more efficacious in balancing economic growth and averting recessions.

LIMITATIONS AND SUGGESTIONS FOR FUTURE RESEARCH

It is important to consider the limitations of this study and to suggest avenues for future research. Further research could incorporate additional variables, such as consumer confidence, debt levels and fiscal policies, to enhance comprehension of economic dynamics. Conversely, a comparative analysis with other European economies could provide further insights into the particularities of the Portuguese case. Ultimately, it would be beneficial to conduct a more comprehensive investigation into the influence of the pandemic and recent global economic challenges, such as the war in Ukraine, on household savings, to gain a deeper understanding of the impact of external shocks on this phenomenon.

REFERENCES

[1]   Aladangady, A., Cho, D., Feiveson, L., & Pinto, E. (2022). Excess savings during the COVID-19 pandemic. https://doi.org/10.17016/2380-7172.3223

[2]   Alvarez, F., Lucas Jr, R. E., & Weber, W. E. (2001). Interest rates and inflation. American Economic Review, 91(2), 219-225. https://doi.org/10.1257/aer.91.2.219

[3]   Asimakopulos, A. (1986). Finance, liquidity, saving, and investment. Journal of Post Keynesian Economics, 9(1), 79-90. https://doi.org/10.1080/01603477.1986.11489601

[4]   Barrier, E. B. (2017). The concept of sustainable economic development. In The economics of sustainability (pp. 87-96). Routledge.

[5]   Bernanke, B. S. (2020). The new tools of monetary policy. American Economic Review, 110(4), 943-983. https://doi.org/10.1257/aer.110.4.943

[6]   Bigg, R. J. (2023). Savings and Investment Analysis. In Alvin Hansen: Seeking a Suitable Stabilization-An Academic Biography (pp. 219-251). Cham: Springer International Publishing. https://doi.org/10.1007/978-3-031-42216-4_10

[7]   Blinder, A. S. (2008). Keynesian economics. The concise encyclopedia of economics, 2(008).

[8]   Borio, C., Drehmann, M., & Xia, F. D. (2020). Forecasting recessions: The importance of the financial cycle. Journal of Macroeconomics, 66, 103258. https://doi.org/10.1016/j.jmacro.2020.103258

[9]   Eldomiaty, T., Saeed, Y., Hammam, R., & AboulSoud, S. (2020). The associations between stock prices, inflation rates, interest rates are still persistent: Empirical evidence from stock duration model. Journal of Economics, Finance and Administrative Science, 25(49), 149-161. https://doi.org/10.1108/JEFAS-10-2018-0105

[10]   Euribor Rates (2024). Euribor a 12 meses: https://www.euribor-rates.eu/pt/ (accessed 10th December 2024).

[11]   Fisher I. 1930. The Theory of Interest. A.M. Kelly: New York.

[12]   Flodén, M., Kilström, M., Sigurdsson, J., & Vestman, R. (2021). Household debt and monetary policy: Revealing the cash-flow channel. The Economic Journal, 131(636), 1742-1771. https://doi.org/10.1093/ej/ueaa135

[13]   Gorodnichenko, Y., Pham, T., & Talavera, O. (2023). The voice of monetary policy. American Economic Review, 113(2), 548-584. https://doi.org/10.1257/aer.20220129

[14]   Gafurdjan, Z. (2024). INFLATION AND ITS EFFECTS ON CONSUMER BEHAVIOR AND ECONOMIC POLICIES. QO 'QON UNIVERSITETI XABARNOMASI, 10, 3-6. https://doi.org/10.54613/ku.v10i10.895

[15]   Herrenbrueck, L., & Wang, Z. (2023). Interest rates, moneyness, and the fisher equation. Simon Fraser University, Department of Economics.

[16]   Keynes, J. M. (1936). The General Theory of Employment, Interest, and Money, London: Macmillan.

[17]   Lieb, L., & Schuffels, J. (2022). Inflation expectations and consumer spending: the role of household balance sheets. Empirical Economics, 63(5), 2479-2512. https://doi.org/10.1007/s00181-022-02222-8

[18]   Luetticke, R. (2021). Transmission of monetary policy with heterogeneity in household portfolios. American Economic Journal: Macroeconomics, 13(2), 1-25. https://doi.org/10.1257/mac.20190064

[19]   Ozili, P. K. (2024). Economic policy for sustainable development: role of monetary policy, fiscal policy and regulatory policy. Circular Economy and Sustainability, 1-32. https://doi.org/10.1007/s43615-024-00406-1

[20]   PORDATA (2024). Estatísticas Europa, Lisbon: PORDATA. https://prod2.pordata.pt/ (accessed 10th Decenber 2024).

[21]   Sun, Y., & Phillips, P. C. (2004). Understanding the Fisher equation. Journal of Applied Econometrics, 19(7), 869-886. https://doi.org/10.1002/jae.760

[22]   Uribe, M. (2022). The Neo-Fisher effect: Econometric evidence from empirical and optimizing models. American Economic Journal: Macroeconomics, 14(3), 133-162. https://doi.org/10.1257/mac.20200060

[23]   Wahyudin, A. (2024). The Role of Monetary Policy in Addressing Economic and Financial Challenges: Effective Strategies for Managing Inflation and Growth. Journal Of Multi Currency, 1(1), 1-13.

[24]   Yazdanparast, A., & Alhenawi, Y. (2022). Impact of COVID-19 pandemic on household financial decisions: A consumer vulnerability perspective. Journal of Consumer Behaviour, 21(4), 806-827. https://doi.org/10.1002/cb.2038

[25]   Zakhidov, G. (2024). Economic indicators: tools for analyzing market trends and predicting future performance. International Multidisciplinary Journal of Universal Scientific Prospectives, 2(3), 23-29.