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Monetary policy and inflation rate in the behavior of consumer sentiment in the us. A fractional integration and cointegration analysis

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ABSTRACT

Consumer sentiment is a relevant tool for experts when it comes to determining the economic situation in a country, making it possible to analyze the spending trend in advance; for this reason, this paper analyzes links between monetary policy and the inflation rate in the behavior of consumer sentiment in the United States. We use methodologies based on fractional integration and fractional cointegration to obtain the stochastic properties of the monthly time series, from December 2019 to August 2022. The results using fractional integration methodologies exhibit a high degree of persistence and the consumer price index (CPI) and consumer sentiment index present a non-mean reversion I(1) behavior. Focusing on the cointegrating part, we conclude from the results that: 1) an increase in the variable "Total Monetary Base" produces an increase in the CPI, 2) the "variation in the total monetary base" in the United States does not affect consumer sentiment, and 3) a positive variation in the consumer sentiment indicator affects the increase in the inflation rate in the United States.

1. Introduction

Consumer sentiment, which is influenced by the impact of exogenous variables on the propensity to consume (Garner, 1981), represents an important factor in economics, and its influence on macroeconomic variables has been widely discussed in the literature (Vuchelen, 2004). Economic analysts interpret consumer sentiment data as an early indicator of future consumer behavior, closely observing it during recessions as potential signs of the end of economic depression (Dees and Brinca, 2013), though Fuhrer (1993) suggests the information unique to sentiment plays a relatively small role in explaining subsequent variations in consumption expenditures.

Among the characteristics covered by consumer sentiment are consumers' inflation expectations, which play a key role in the monetary transmission mechanism, making it necessary to study the perceptions and expectations of reported inflation (Reiche and Meyler, 2022), which are fundamental for the economy since they affect the effectiveness of fiscal and monetary policy (D'Acunto et al. 2023).

The relationship between economic growth, inflation rate, and monetary base has been analyzed by various researchers, with Haslag (1990) concluding the monetary base can be useful in predicting economic behavior, while Curtin (1992) wrote that consumer

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sentiment is the most closely monitored indicator of economic behavior, suggesting both components may be highly related. Though, many experts agree a 10 % growth in the economic base instead of 5 % would cause long-term inflation (Cecchetti, 1995), which does not provide enough information on how central banks should act.

During economic expansions, high consumer confidence encourages greater spending, while low consumer confidence values prompt lower consumption, potentially leading to decreased sales volumes and an economic recession (Çelik and Özerkek, 2009). In this context, Golinelli and Parigi (2004) reassessed the validity of the consumer sentiment index as an accurate predictor of economic activity, and Reihani et al. (2022) examined the effects of economic policies based on the monetary base and interest rates to control inflation using regressive models. Building on these findings, Avdiu and Unger (2022) highlighted evidence that an increase in inflation is likely caused by a growth in the monetary base compared to productivity growth, stating that an increase in the money supply reduces the need to save, slowing down and increasing cash balances.

Along the same lines, Claus and Nguyen (2020) analyzed how the application of a latent factor model to consumer data affected their expectations regarding economic conditions, unemployment and family finances. This reflected that after a shock in monetary policies produced an adjustment in consumer expectations in the direction predicted by standard models, there was an asymmetric response to policy tightening or easing. Breitenlechner et al. (2024) delve into their research along these lines, asking if it is possible that monetary policies are capable of stimulating consumption through inflation expectations, demonstrating how expansionary policy shocks tend to increase the willingness to conditionally spend on a greater expected inflation outside the zero lower bound.

To analyze the influence of monetary policies and inflation on the behavior of consumer sentiment, different methodologies have been used in the literature, Galariotis et al. (2018) used different techniques such as Panel Vector Autoregression and Quantile Vector Autoregression to highlight the importance of monetary policy in determining consumers' economic expectations, evidencing an effect of monetary policies on consumer sentiment in the Eurozone. Durr (1993) employs a multiple-time-series error correction model to analyze shifts in domestic policy sentiment and their impact on changing economic expectations in the US from 1968 to 1988. Their findings shed light on the intricate interplay between shifts in domestic policy sentiment and evolving economic expectations, offering empirical validation for their hypotheses. Furthermore, in a pioneering endeavor, De Grauwe (2011) introduces a behavioral macroeconomic model, elucidating how cognitive limitations lead agents to rely on biased heuristics, giving rise to waves of optimism and pessimism ("animal spirits").

More recently, other authors such as Caputo and Duch (2020) have used Structural Vector Autoregression (SVAR) and Generalized Method of Moments (GMM) with instrumental variables, methods widely used to estimate monetary policy reactions (see Clarida et al. (1998)). This research tried to demonstrate that consumer sentiment is clearly determined by the management of economic policy.

Building on this understanding of sentiment's impact, Marschner (2021) delves into economic uncertainty and monetary policy effects on investor sentiment in Brazil, utilizing an autoregressive distributed lag model. This investigation not only underscores the importance of sentiment as a guiding indicator for investment decisions but also underscores the necessity of integrating economic and monetary policy considerations into national financial education initiatives.

This research shows the crucial role that expectations play in macroeconomic models, showing that when consumer sentiment is positive, they will expect an expansion of the economy but a decrease in inflation. However, Kamdar (2019) states that monetary policies that aim to stimulate the economy by raising inflation expectations could have counterproductive consequences, especially on what he calls the inattentive consumer.

This research aims to study the possible relationship between consumer sentiment, monetary policies, and inflation, using statistical analyses such as fractional cointegration to observe how consumer sentiment is affected by monetary policies, how consumer sentiment and monetary policy affect inflation, and whether variation in consumer sentiment has any impact on inflation rates. To this end, the researchers obtained data on the total monetary base, the consumer price index, and consumer sentiment from the Federal Reserve Bank of St. Louis, utilizing monthly frequency data from December 2019 to August 2022.

The rest of the paper is structured as follows: Section 2 explains the data used; Section 3 is devoted to the methodology; Section 4 shows empirical results and Section 5 includes conclusions of the manuscript.

2. Data

Data used for the research is economic data from the Federal Reserve (FRED), retrieved by the Federal Reserve Bank of St. Louis, which contains a large amount of information in the form of economic time series from different sources, both public and private, nationally and internationally.

All the data used in this study has a monthly periodicity in the period from December 2019 to August 2022. The Consumer Price Index (CPI) is calculated from a set of certain goods and services whose prices change infrequently. Frequency of data are monthly, percent change at annual rate, seasonally adjusted. Total monetary base data are in millions of dollars, monthly, not seasonally adjusted. Consumer sentiment data are from Surveys of Consumers, University of Michigan: Consumer Sentiment © [UMCSENT], it is a standardized index with a maximum value of 100, the information is obtained from a series of 500 interviews conducted by telephone with a sample of the population in the United States through fifty basic questions. Citizens will answer questions about their perception of the economic situation and their future spending intention.

3. Methodology

a. Unit roots

Unit roots can be tested in many ways. For this research we use the ADF test based on Dickey and Fuller (1979). There are many other tests available to calculate unit roots that have a greater power such as Phillips and Perron (1988) in which a non-parametric estimate of the spectral density of u_t at the zero frequency is used. Also, considering deterministic trends, we use the methodology based on Kwiatkowski et al. (1992) and Elliot, Rothenberg, and Stock (1996), producing all essentially the same results.

b. ARFIMA (p, d, q) model

Following authors such as Diebold and Rudebusch (1991), Hassler and Wolters (1994), Lee and Schmidt (1996) and others, it is now a well stylized fact that all unit root methods have very low power if the true data generating process displays long memory or if it is fractionally integrated. Thus, to make the time series stationary I(0), we differentiate the time series with a fractional number I(d).

Another feature of the I(d) models is to determine and capture the persistence of the observations. This is when observations are far apart in time but highly correlated.

The fractional integrated method that we use in this research paper is the ARFIMA (p, d, q) model where the mathematical notation is:

$$(1-L)^d x_t = u_t,\ t = 1,\ 2, \tag{1}$$

In Eq. (1), x_t refers to the time series that has an integrated process of order $(x_t \approx I(d))$, d refers to any real value, L is the lag-operator $(Lx_t = x_{t-1})$ and $u_t$refers to I(0) which is the covariance stationary process where the spectral density function is positive and finite at the zero frequency and displays a type of time dependence in the weak form. Therefore, we can state that if u_t is $ARMA\ (p,\ q)$, x_t is $ARMA(p,\ d,\ q)$.

From Eq. (1), the polynomial $(1-L)^d$ is expressed in terms of binomial expansion where for all real d, x_t depends not only on a finite number of past observations but also on the whole of its history. So a higher value of d implies a higher level of association between the observations of the series.

Depending on the value of the parameter d, we can differentiate between various cases.

Table 1 summarizes the different results of d:

Although there are several procedures for estimating the degree of long-memory and fractional integration (Geweke and Porter-Hudak, 1983; Phillips, 1999, 2007; Sowell, 1992; Robinson, 1994, 1995a,b; etc.), we follow Sowell's (1992) maximum likelihood approach because Sowell's procedure is based on the exact maximum likelihood estimation and not on semiparametric approaches. Additionally, Sowell proved that this estimation procedure outperforms the semi-parametric ones in terms of the bias and the mean square errors.

To select the most appropriate ARFIMA (p, d, q) model, we use the Akaike information criterion (AIC) (Akaike, 1973) and the Bayesian information criterion (BIC) (Akaike, 1979).

c. FCVAR model

Following Johansen and Nielsen (2012), we use their multivariate Fractional Cointegrated VAR (FCVAR) model to check the relationship of the variables in the long term. The FCVAR model is notated in the next equation:

$$\Delta^d X_t = \ \alpha\beta' L_b \Delta^{d-b} X_t + \sum_{i=1}^{k} \Gamma_i \Delta^b L_b^i Y_t + \varepsilon_t \tag{2}$$

Where ε_t is a term with mean zero and variance-covariance matrix Ω that is p-dimensional independent and identically distributed; α and β are $p \times r$ matrices where $0 \leq r \leq p$. The relationship in the long-term equilibria in terms of cointegration in the system is due to the matrix β. Controlling the short-term behavior of the variables is due to parameter Γ_i. Finally, the deviations from the equilibria and their speed in the adjustment is due to parameter α.

4. Empirical results

Using the time series mentioned above and conducting the standard unit root tests (ADF, PP and KPSS) we conclude that CPI and consumer sentiment are non-stationary I(1). On the other hand, the results of the variation in the total monetary base and consumer sentiment suggest a I(0) stationary behavior.

Following the results obtained from the unit root tests and due to the lower power of the unit root methods under fractional

Table 1
Interpretation of the results of d for the ARFIMA model.

$d = 0$	x_t process is short memory
$d > 0$	x_t process is long memory
$d < 0.5$	x_t is covariance stationary
$d \geq 0.5$	x_t is nonstationary
$d < 1$	x_t is mean reverting
$d \geq 1$	x_t is not mean reverting

alternatives, we also employed ARFIMA (p, d, q) models to study the persistence of the total monetary base, CPI, consumer sentiment index and its variation.

Table 2 displays the fractional parameter d and the AR and MA terms obtained using Sowell's (1992) maximum likelihood estimator of various ARFIMA (p, d, q) specifications with all combinations for each time series.

When analyzing the results of the original time series from Table 2, we see that the estimates of d in all cases is fractional. Focusing on each variable, we observe that the inflation rate in the United States and consumer sentiment index present a high degree of persistence.

According to the parameter, d is 1.02 for CPI and the confidence interval we observe a non-mean reverting behavior for this variable. For the case of Consumer Sentiment Index, although the parameter d is 0.86 and apparently shows a mean reverting behavior, the confidence interval indicates that we cannot reject the I(1) hypothesis for this variable. The rest of variables present an I(0) behavior, with the parameter d being less than 1.

Next, we use FCVAR model to study the possible existence of persistence in the long-run co-movement of the series. Table 3 summarizes the results of the FCVAR model.

According to the results that we get using the FCVAR model, we are going to focus on two terms - the integrating and cointegrating part ($d \neq b$) and the beta term to analyze the behavior of the time series.

From Panel I and Panel II, where we analyze the long-term relationship between variation in the total monetary base in the inflation rate and the long-term relationship between variation in the total monetary base in the consumer sentiment, respectively, we observe that the order of integration of the individual series is lower than 1 in these two cases ($d < 1$), getting the same magnitude in the reduction in the degree of integration in the cointegrating regression. These results imply I(0) cointegrating errors.

From Panel III, where we analyze the long-term relationship between variation in the consumer sentiment index in the inflation rate, we observe that the order of integration of the individual series is 1.172 ($d > 1$), again getting the same magnitude in the reduction in the degree of integration in the cointegrating regression ($b = 1.172$).

So, with the results of our cointegration analysis we do not rule out the hypothesis that the effects of the shock disappear in the short-term.

On the other hand, we observe from the Panels that: 1) an increase in the variable "Total Monetary Base" produces an increase in the CPI (cointegrating equation beta equal to 0.817), 2) the "variation in the total monetary base" in the United States does not affect consumer sentiment, and 3) a positive variation in the consumer sentiment indicator affects the increase in the inflation rate in the United States (cointegrating equation beta equal to 0.362).

5. Concluding comments

In the recent literature there are various investigations about the capacity of the consumer confidence index as a forecasting tool for inflation, as well as the possible influence that the monetary base could have (Stokman, 2022; Rudd, 2022). These investigations focus on the possibility of making predictions of the value of inflation based on consumer sentiment and the monetary base, and thus take the necessary economic policies to avoid future recessions.

Authors such as Jeffrey (1993) showed in their research that consumer sentiment played a mainly passive role, reflecting the current situation instead of being a causative agent of economic changes such as inflation. However, according to our results, other researchers such as Curtin (2007) later showed that consumer opinion surveys provide robust and solid forecasts on the trends of macroeconomic variables.

These investigations coincide with the results obtained by Crowder (1998) in his study, where he identified a solid relationship between economic growth and inflation, highlighting that the increase in the monetary base plays a crucial role in this phenomenon, analyzing in detail how this relationship affects various economic sectors, such as the labor market, investment, and consumption, providing a more complete understanding of the underlying mechanisms that drive inflation in a growing economy.

This research is focused on the relationship between consumer confidence, the monetary base and inflation, determining to what extent they depend on each other and can be used as predictors of economic behavior. The results show how an increase in the monetary base produces a significant increase in the consumer price index, while this does not directly affect consumer confidence. Instead, an increase in consumer confidence is reflected in an increase in inflation. Considering that there are different variables that influence consumer sentiment, further research could be done to determine which ones have the greatest effect on the increase in inflation.

Table 2
Results of long memory tests.

Data analyzed Original Time Series	Sample size (days)	Model Selected	d	Std. Error	Interval	I(d)
Var. Total Monetary Base	33	ARFIMA (2, d, 0)	0.33	0.312	[–0.19, 0.84]	I(0)
CPI	33	ARFIMA (0, d, 1)	1.02	0.034	[0.97, 1.08]	I(1)
Consumer Sentiment Index	33	ARFIMA (2, d, 2)	0.86	0.297	[0.37, 1.35]	I(1)
Var. Consumer Sentiment Index	33	ARFIMA (2, d, 0)	0.33	0.304	[–0.17, 0.83]	I(0)

Table 3
Results of the FCVAR model.

	$d \neq b$	Cointegrating equation beta		
		Var1	Var 2	Var 3
Panel I:	$d = 0.731\ (0.000)$	1.000	0.817	–
Variation Total Monetary Base (Var1) vs CPI (Var2)	$b = 0.731\ (0.000)$			
	$\Delta^d\left(\begin{bmatrix} Var.\ Total\ Monetary\ Base \\ CPI \end{bmatrix} - \begin{bmatrix} 0.034 \\ 0.022 \end{bmatrix}\right) = L_d\begin{bmatrix} -- 1.071 \\ -- 0.025 \end{bmatrix}\nu_t + \sum_{i=1}^{2}\widehat{\Gamma}_i\Delta^d L_d^i(X_t - \mu) + \varepsilon_t$			
Panel II: Variation Total Monetary Base (Var1) vs Consumer Sentiment (Var 3)	$d = 0.010\ (0.185)$	1.000	–	–0.003
	$b = 0.010\ (0.000)$			
	$\Delta^d\left(\begin{bmatrix} Var.\ Total\ Monetary\ Base \\ Consumer\ Sentiment \end{bmatrix} - \begin{bmatrix} 0.075 \\ 94.551 \end{bmatrix}\right) = L_d\begin{bmatrix} ,218,971,.62,7 \\ 3,212,448,7.1,17 \end{bmatrix}\nu_t + \sum_{i=1}^{2}\widehat{\Gamma}_i\Delta^d L_d^i(X_t - \mu) + \varepsilon_t$			
Panel III: Variation Consumer Sentiment (Var 3) vs CPI (Var2)	$d = 1.172\ (0.237)$	–	0.362	1.000
	$b = 1.172\ (0.168)$			
	$\Delta^d\left(\begin{bmatrix} Variation\ Consumer\ Sentiment \\ CPI \end{bmatrix} - \begin{bmatrix} -- 0.017 \\ 0.020 \end{bmatrix}\right) = L_d\begin{bmatrix} -- 1.808 \\ -- 0.015 \end{bmatrix}\nu_t + \sum_{i=1}^{2}\widehat{\Gamma}_i\Delta^d L_d^i(X_t - \mu) + \varepsilon_t$			

CRediT authorship contribution statement

Manuel Monge: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. **Ana Lazcano:** Conceptualization, Investigation, Validation, Visualization, Writing – original draft, Writing – review & editing. **Juan Infante:** Investigation, Validation, Visualization, Writing – original draft, Writing – review & editing.

Declaration of competing interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

Akaike, H., 1973. Maximum likelihood identification of Gaussian autoregressive moving average models. Biometrika 60 (2), 255–265.
Akaike, H., 1979. A Bayesian extension of the minimum AIC procedure of autoregressive model fitting. Biometrika 66 (2), 237–242.
Avdiu, K., Unger, S., 2022. Predicting Inflation—A Holistic Approach. J. Risk and Financial Manag. 15 (4), 151.
Breitenlechner, M., Geiger, M., Scharler, J., 2024. Monetary policy announcements, consumers' inflation expectations, and readiness to spend. Macroecon Dyn 28 (2), 277–298.
Caputo, R., & Duch, R. (2020). US economic policy and consumer sentiment. Mimeo. https://www.raymondduch.com/files/US-Economic-Policy-and-Consumer-Sentiment_March-2020.pdf.
Cecchetti, S.G., 1995. Inflation indicators and inflation policy. NBER Macroecon Annu 10, 189–219.
Çelik, S., Özerkek, Y., 2009. Panel cointegration analysis of consumer confidence and personal consumption in the European Union. J. Business Econ. Manag. 10 (2), 161–168.
Clarida, R., Galı, J., Gertler, M., 1998. Monetary policy rules in practice: some international evidence. Eur. Econ. Rev. 42 (6), 1033–1067.
Claus, E., Nguyen, V.H., 2020. Monetary policy shocks from the consumer perspective. J. Monet. Econ. 114, 159–173.
Crowder, W.J., 1998. The long-run link between money growth and inflation. Econ. Inq. 36, 229–243.
Curtin, R.T., 1992. The index of consumer sentiment at forty. American Enterprise 3 (3), 18–24.
Curtin, R., 2007. Consumer sentiment surveys: worldwide review and assessment. J. Business Cycle Measurem. Analysis 2007/1.
D'Acunto, F., Malmendier, U., Weber, M., 2023. What do the data tell us about inflation expectations? Handbook of Economic Expectations. Academic Press, pp. 133–161.
De Grauwe, P., 2011. Animal spirits and monetary policy. Econ. Theory 47, 423–457.
Dees, S., Brinca, P.S., 2013. Consumer confidence as a predictor of consumption spending: evidence for the United States and the Euro area. Int. Econ. 134, 1–14.
Dickey, D.A., Fuller, W.A., 1979. Distribution of the estimators for autoregressive time series with a unit root. J. Am. Stat. Assoc. 74 (366a), 427–431.
Diebold, F.X., Rudebusch, G.D., 1991. Forecasting output with the composite leading index: a real-time analysis. J. Am. Stat. Assoc 86 (415), 603–610.
Durr, R.H., 1993. What moves policy sentiment? Am. Polit. Sci. Rev. 87 (1), 158–170.
Elliot, G., Rothenberg, T., Stock, J., 1996. Public investment in infrastructure in a simple growth model. J. Econ. Dynamics and Control 18.
Fuhrer, J.C., 1993. What role does consumer sentiment play in the US macroeconomy? New England Econ. Rev. 32–44 (Jan).
Galariotis, E., Makrichoriti, P., Spyrou, S., 2018. The impact of conventional and unconventional monetary policy on expectations and sentiment. J. Bank Financ 86, 1–20.
Garner, C.A., 1981. Economic determinants of consumer sentiment. J. Bus Res 9 (2), 205–220.
Geweke, J., Porter-Hudak, S., 1983. The estimation and application of long memory time series models. J. Time Ser. Anal. 4 (4), 221–238.
Golinelli, R., Parigi, G., 2004. Consumer Sentiment and Economic Activity: a Cross Country Comparison. J. Business Cycle Measurem0 Analysis 2004/2.
Haslag, J.H., 1990. Monetary aggregates and the rate of inflation. Econ. Rev.-Federal Reserve Bank of Dallas 1.
Hassler, U., Wolters, J., 1994. On the power of unit root tests against fractional alternatives. Econ Lett 45 (1), 1–5.
Jeffrey, C.F., 1993. What role does consumer sentiment play in the U.S. macroeconomy? New England Econ. Rev., Federal Reserve Bank of Boston 32–44 issue Jan, pages.
Johansen, S., Nielsen, M.Ø., 2012. Likelihood inference for a fractionally cointegrated vector autoregressive model. Econometrica 80 (6), 2667–2732.
Kamdar, R., 2019. The inattentive consumer: sentiment and expectations. In: 2019 meeting papers, 647. Society for Economic Dynamics.

Kwiatkowski, D., Phillips, P.C., Schmidt, P., Shin, Y., 1992. Testing the null hypothesis of stationarity against the alternative of a unit root: how sure are we that economic time series have a unit root? J. Econom 54 (1–3), 159–178.
Lee, D., Schmidt, P., 1996. On the power of the KPSS test of stationarity against fractionally-integrated alternatives. J. Econom 73 (1), 285–302.
Marschner, P.F., Ceretta, P.S., 2021. Investor sentiment, economic uncertainty, and monetary policy in Brazil. Revista Contabilidade & Finanças 32, 528–540.
Phillips, P.C.B., 1999. Discrete Fourier transforms of Fractional Processes. Department of Economics, University of Auckland.
Phillips, P.C.B., 2007. Unit root log periodogram regression. J. Econom 138 (1), 104–124.
Phillips, P.C., Perron, P., 1988. Testing for a unit root in time series regression. Biometrika 75 (2), 335–346.
Reiche, L., & Meyler, A. (2022). Making sense of consumer inflation expectations: the role of uncertainty.
Reihani Moheb Seraj, N., Falahi, M.A., Ahmadi Shadmehri, M.T., 2022. Financial development and effectiveness of anti-inflationary monetary policies in Iran. J. Iranian Econ. Issues 8 (2), 120–140.
Robinson, P.M., 1994. Efficient tests of nonstationary hypotheses. J. Am. Stat. Assoc. 89, 1420–1437.
Robinson, P.M., 1995a. Gaussian semi-parametric estimation of long range dependence. Ann. Stat. 23, 1630–1661.
Robinson, P.M., 1995b. Log periodogram regression of time series with long range dependence. Ann. Stat. 23 (3), 1048–1072.
Rudd, J.B., 2022. Why do we think that inflation expectations matter for inflation?(And should we?). Rev. Keynesian Econ. 10 (1), 25–45.
Sowell, F., 1992. Maximum likelihood estimation of stationary univariate fractionally integrated time series models. J. Econom 53 (1–3), 165–188.
Stokman, A.C. (2022) Accelerating Inflation Expectations Households: sources and Macroeconomic Spending Consequences for the Euro Area. Available at SSRN 4113650.
Vuchelen, J., 2004. Consumer sentiment and macroeconomic forecasts. J. Econ. Psychol. 25 (4), 493–506.