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Household deposits and consumer sentiment expectations: Evidence from Eurozone

Dimitris Anastasiou [a,b], Zied Ftiti [c], Waël Louhichi [d,*], Dimitris Tsouknidis [b]

[a] *Economic Research Division, Alpha Bank, Athens, Greece*
[b] *Department of Accounting and Finance, Athens University of Economics and Business, Athens, Greece*
[c] *EDC Paris Business School, OCRE Research Lab, Paris, France*
[d] *ESSCA School of Management, Paris, France*

A R T I C L E   I N F O

A B S T R A C T

This paper examines whether new refined measures of consumer sentiment expectations exert a significant effect on household deposit flows across Eurozone's member countries. The new measures of sentiment-based expectations of consumers are constructed following a principal component analysis of selected individual answers as part of Eurostat's consumer sentiment survey across the Eurozone's member countries. Employing a Bayesian panel VAR model to increase the accuracy of our results, we document that a (positive) shock on consumers' sentiment expectations triggers an imminent positive response of household deposits that gradually reverses during the next 2–3 months. This main result extends and complements traditional explanations for depositors' behavior in the extant literature. Our results have important implications for Eurozone's households, policymakers, central bankers, and commercial banks.

1. Introduction

Consumer sentiment has been shown to drive future economic activity (Ludvigson 2004; Benhabib and Spiegel, 2019). At the same time, consumers' (depositors') confidence in the banking system has been shown to affect the level of household bank deposits, while episodes of financial crises exert a profound effect on consumers' savings and likely introduce a large and unmeasured cost to the banking sector (Osili and Paulson, 2014). Such episodes may be triggered by non-macroeconomic fundamental factors such as behavioral attributes like consumer sentiment.[1]

In this paper, we explore whether consumer sentiment expectations affect household bank deposit flows across Eurozone member countries. This research question is of primary importance for policymakers and investors (households) since fluctuations in bank deposit flows affect investment and consumption activity leading to changes in the macroeconomic environment (Anastasiou and Drakos, 2021a). Potential large deposit outflows hasten banking insolvency and could ultimately

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* Corresponding author at: 55, Quai Alphonse Le Gallo, 92100 Boulogne Billancourt, Paris, France.
    E-mail addresses: anastasioud@aueb.gr (D. Anastasiou), zftiti@edcparis.edu (Z. Ftiti), wael.louhichi@essca.fr (W. Louhichi), dtsouknidis@aueb.gr (D. Tsouknidis).
    [1] In fact, massive deposit withdrawals have been recorded due to consumers' fear of a bank default event that leads to a systemic banking crisis (Calomiris and Gorton, 1991).

result in a bank run (Lang and Schmidt, 2016). Such adverse effects have a ripple effect and reduce the efficiency of the financial markets and the banking sector overall.[2]

This study is motivated by the behavioral characteristics of consumers, often measured through their economic sentiment, which has long been recognized as an important driver of economic activity. For instance, consumer sentiment exhibits a robust positive relationship with future economic activity (Benhabib and Spiegel, 2019). Forecasters often monitor developments in consumer sentiment and related measures and use them as leading indicators in forecasting models (Barnes and Olivei, 2017).[3] At the same time, bank deposits account for a significant and measurable part of individuals' savings; for example, the degree of moneyness of savings deposits forms a benchmark definition of what is considered money and has been shown to vary over time (Laumas, 1968, 1969).[4]

Only a few prior studies have investigated the effects of investor sentiment on the stability of the banking sector and the economy. These studies focus on the bank credit channel, showing that changes in investor sentiment led to changes in the magnitude of bank financing to individuals. Specifically, Cubillas et al. (2021) have analyzed the investor sentiment effect on bank credit and whether lending variation impacts bank stability. The authors reveal a positive effect between high investor sentiment and bank lending, which exerts a negative effect on bank stability through excess risk-taking. In the same vein, Agoraki et al. (2022) introduce text-based sentiment measures to assess the effect of investor sentiment on bank credit and financial stability. The authors show that when investor sentiment is low, banks' lending activity declines and this effect is stronger for banks exhibiting higher levels of credit risk. Furthermore, a few studies have investigated the relationship between economic sentiment and bank deposits (e.g., Anastasiou and Drakos, 2021a; Anastasiou and Drakos, 2021b; Anastasiou and Petralias, 2021; Anastasiou et al., 2022; Anastasiou and Katsafados, 2022; Bijsterbosch, and Falagiarda, 2015; Burdekin and Redfern, 2009; Fecht et al., 2019).

This paper contributes to the literature in the following ways. First, we examine whether consumer sentiment expectations exert an important effect on households' bank deposit flows. Second, we introduce new and refined measures of consumer sentiment to capture their expectations. These measures are constructed by employing a principal component analysis of selected individual answers included in the European Commission's consumer sentiment survey across Eurozone member countries.

In essence, we argue that the widely used aggregate measures of consumer sentiment may not fully capture consumers' expectations regarding future economic activity and consequently their bank deposit behavior. In this paper, we attempt to fill this gap in the literature by quantifying the effect of refined measures of consumer sentiment expectations on household deposit flows across Eurozone member countries. This is important because if there is a positive relationship between the two, this would reveal a transmission mechanism of consumer sentiment to the economy, that is, through bank depositors' behavior.

Overall, our results for Eurozone's member countries reveal that our measure of consumer sentiment expectations has a positive relationship with bank deposit flows, which extends and complements traditional explanations for depositors' behavior in the extant literature. Specifically, a (positive) shock on consumers' sentiment expectations triggers an imminent positive response of household deposits that gradually reverses during the next 2–3 months.

The relationship between consumer sentiment and bank deposit flows is expected to vary across different economies. For instance, Cubillas et al. (2021) and Agoraki et al. (2022) show a heterogenous effect between developed and developing (fragile) economies. In our setting, this variation across different economies may also hold across Eurozone countries. For example, a case of special interest is the Greek government-debt crisis over the period 2009 to 2017. When consumer sentiment was low, Greek households withdrew their deposits and transfer them to bank accounts out of the country or keep them in their homes. When uncertainty resolved and consumer sentiment improved, depositors started to return their deposits to the banking system thereby increasing bank deposit flows.[5] Therefore, in this case, we expect a positive relationship between consumer sentiment expectations and bank deposit flows. The same rationale may be generalized for other less developed (fragile) economies across the Eurozone, i.e. the so-called "Periphery" countries. Confirming our expectations, we document a positive and significant relationship between consumer sentiment and household deposits for periphery countries within Eurozone. By contrast, for the "Core" developed economies of the Eurozone, which are less prone to fiscal debt-induced uncertainty and where the protection of creditors' rights is higher, this positive relationship might not be verified. It may be expected that when consumer sentiment is low, investors in Core economies will liquidate their risky investments (i.e. stocks, bonds, mutual funds, etc.) and increase their bank deposits (i.e. flight to safety), thereby imposing a negative relationship between the two.

The rest of the paper is structured as follows. Section 2 discusses prior relevant literature on bank deposit flows and macroeconomic variables. Section 3 describes the data and the variables of the empirical part of the paper, while Section 4 presents the methodology followed. Section 5 presents the results and Section 6 discusses the results and concludes the paper.

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[2] For instance, large-scale deposit withdrawals cause bank insolvencies that can reach up to 50% of a country's gross domestic product (GDP) (see, Maechler and McDill, 2006).

[3] The importance of behavioral and individual choices regarding economic activity has also been documented during the COVID-19 pandemic. For example, Goolsbee and Syverson (2021) showed that overall consumer traffic fell by 60 percentage points during the pandemic, while legally imposed restrictions could only explain seven percentage points of this decline. This suggests that the economic collapse was primarily caused by people voluntarily choosing to stay at home to avoid infection rather than through government-imposed restrictions.

[4] More recent studies have linked the design of contract accounts to the behavioral characteristics of individual depositors. For instance, Beshears et al. (2015) have shown that weak self-control individuals restrict their spending by taking up commitment contracts.

[5] Choi and Furceri (2019) confirm the important role of uncertainty for bilateral cross-border banking flows.

2. Theoretical background and related literature

Modern macroeconomic models of consumption go back to the seminal paper of Keynes (1936) and the early Monetarism school theory ofFisher (1930).[6] Since then, several theoretical and empirical studies have been devoted to explaining household consumption, since it is widely considered a main economic driver. Early empirical studies imposed linear models for household consumption and focused on the relationship between income and consumption (Flavin, 1981; Johnson, 1986; Campbell and Mankiw, 1991; Allard, 1992; among others). Subsequent empirical efforts decomposed the relationship between consumption and income into its short-run and long-run components following the seminal cointegration analysis of Engle (1982), (see, for example, Muellbauer, 1988; Constantinides, 1990; Han and Ogaki, 1997; Rudd and Whelan, 2002; among others) and documented a relatively stable relationship between aggregate consumption and income.

Fig. 1 depicts the evolution of key characteristics of households in the Eurozone as follows: (i) the gross disposable income, (ii) the consumption rate, (iii) the saving rate, and (iv) the deposit flows. As observed, three periods of distress are characterized by low disposable income and consumption, i.e. the global financial crisis during 2007–2009, the European debt crisis during 2010–2013, and the COVID-19-related economic crisis during 2020–2021. However, the saving rate of households is reduced only during the European debt crisis, whereas the saving rate increases mildly during the GFC period and notably during the COVID-19 pandemic period.

Another strand of the literature, starting with Hall (1978) focused on the income uncertainty to model household consumption behavior (see, for example, Blanchard and Mankiw, 1988; Ermini, 1993; Cochrane, 1994), documenting mixed results regarding the stability of the relationship examined over time vs the existence of a cyclical consumption pattern. At the end of the 1990s and during the 2000s, the degree of uncertainty increased considerably, motivating further studies on the issue (see, for example, Chamberlain and Wilson, 2000; Menegatti, 2007; Özak, 2014; Luo and Young, 2016).

The key theories describing the relationship between consumption, savings, and household deposits have evolved considerably due to the high degree of uncertainty faced in more recent decades.[7] More specifically, the critique of Lucas (1976) and the random walk hypothesis developed by Hall (1978) have challenged the consumption theory. These two-seminal works have added a new dichotomy based on anticipated and unanticipated changes in income, in addition to the earlier dichotomy of permanent and transitory income (PHI), Deaton (1985). Lucas (1976) highlights that PIH does not lead to a structural relationship between consumption and income but to a time-varying statistical relationship regarding the generating process of the income series. In line with Lucas (1976), Hall (1978) argues that only unanticipated income influences consumer behavior.

Based on the literature discussed above, we argue that uncertainty significantly affects households' consumption behavior. Specifically, we conjecture that the expectations of households (consumers) capture a crucial component of their sentiment (and perceived uncertainty) that will affect their choices regarding their bank deposits. This is motivated further by compelling empirical evidence that consumers' behavioral characteristics, i.e. fear, sentiment, etc., are closely linked with their saving behavior and eventually their bank deposits (Anastasiou and Drakos, 2021a).

3. Data, variables, and summary statistics

The dataset examined in this study comprises 226 monthly observations, over the period January 2002 to November 2021, across 26 countries in Eurozone.[8] Each country-month combination uniquely determines the data points of this panel data set for a total of 6,214 country-month observations.[9] The dependent variable is the percentage change of deposit transaction flows from domestic households and non-profit institutions (*deposits*), retrieved from the Statistical Data Warehouse of the European Central Bank.[10] We winsorize the deposit flows series at the 1 % level (0.5 % in each tail) to remove the effect of potential outliers.

To construct the main explanatory variable, we have collected the consumer sentiment-related time series for each country as published by the European Commission in the Joint Harmonized EU Programme of Business and Consumer Surveys.[11] The question-level data examined are expected to yield further insights into what drives fluctuations in aggregate consumer confidence by incorporating information on key dimensions of consumer sentiment, such as the past and future financial situation of households, the economic situation of the country as a whole, the expected inflation and unemployment, along with perceived buying conditions for durable products (furniture, electrical/electronic devices). The exact corresponding survey questions are presented in the Appendix.[12]

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[6] The theory of Fisher (1930) is the intertemporal optimization theory.

[7] In this section we do not aim to present a comprehensive overview of consumption theories but only focus on the ones related to household savings and deposits.

[8] Denmark has been excluded due to limited data availability.

[9] Some variables may be available only for fewer years. Therefore, the final sample period examined is March 2003 to November 2021.

[10] Deposit flows data are available in the following website (last access: April 10, 2022): https://sdw.ecb.europa.eu/browse.do?node=9691312.

[11] These data are available in the following website (last access: April 10, 2022): https://ec.europa.eu/info/business-economy-euro/indicators-statistics/economic-databases/business-and-consumer-surveys/download-business-and-consumer-surve data/time-series_en.

[12] The possible answers in the questionnaire follow a five step likert scale as follows: got a lot better, got a little better, stayed the same, got a little worse, got a lot worse, do not know. Full documentation is available in ECB's website (last accessed: April 10, 2022): https://ec.europa.eu/economy_finance/db_indicators/surveys/documents/bcs_user_guide_en.pdf.
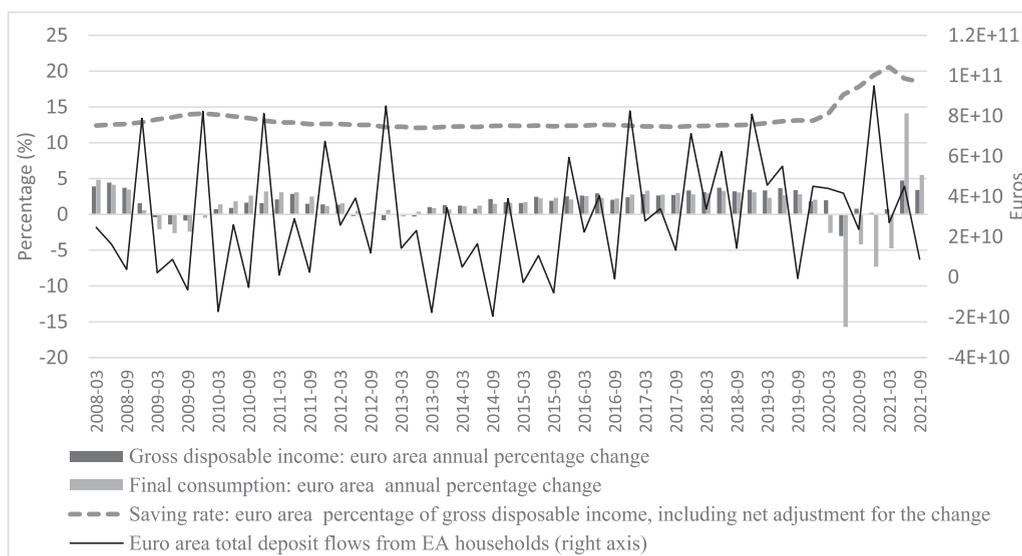
Fig. 1. Gross disposable income, consumption rate, saving rate and households deposit flows for the Euro Area. Notes: Left y-axis is in percentage (%) and the right y-axis is in euros. Sources of data: Eurostat and ECB.

According to the user guide of the "Joint Harmonized EU Programme of Business and Consumer Surveys", answers obtained from the surveys are aggregated in the form of "balances". Balances are constructed as the difference between the percentages of respondents giving positive and negative replies. The Commission calculates Euro Area (EA) aggregates based on the national results and adjusts the balance series for seasonality. The balance series are used to build composite indicators. Specifically, the Commission calculates confidence indicators as arithmetic means of answers (the seasonally adjusted balances) to a selection of questions closely related to the reference variable they track, for instance, the consumers' sentiment for the consumer confidence indicator. We do not transform the time series further, since they are expressed in terms of fluctuations around their long-run mean of 100 and therefore they are stationary by construction. This detailed dataset of Eurozone's consumer sentiment has been widely examined in the literature, see, for instance, Clerides et al. (2022).

Fig. 2 plots the five consumer sentiment expectations components over time. They refer to the consumers' perceptions regarding the next 12 months across E.U. member countries, as published by the European Commission (left y-axis, denominated in index points). In turn, Fig. 3 plots the consumer sentiment expectations index we construct based on the principal component analysis as discussed later in the paper along with the household deposit flows. The index exhibits an increase in consumer expectations before the outburst of the 2007–2008 GFC, followed by a clear downward pattern. After this period, consumers' expectations became significantly pessimistic about the future during the European sovereign debt crisis (i.e. the period after 2012) and then again during the recent COVID-19 pandemic (i.e. the period after 2020).

3.1. The expectations component of consumer sentiment

In this section, we describe the construction of the variable capturing the sentiment-related expectations of consumers. The construction of this variable is important since the standard measures of consumer sentiment are either too aggregate, i.e. the consumer sentiment index, or too specific, i.e. the responses of consumers to individual questions imposed through Eurozone's questionnaire. Thus, we construct a more refined measure of consumer sentiment that focuses exclusively on consumers' expectations over the next twelve months. This is achieved by performing a principal component analysis (PCA) across the (responses to) five survey questions that explicitly ask consumers for their views regarding the next twelve months, i.e. questions Q2, Q4, Q6, Q7, and Q9 as presented in Table A3 of the Appendix.[13]

After estimating the principal components, we perform the Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy, which compares the correlations and the partial correlations between variables. If the partial correlations are relatively high compared to the correlations, the KMO measure yields a low value, and a low-dimensional representation of the data is not possible. By construction, the KMO takes values between 0 and 1, with values less than 0.5 indicating that the variables have too little in common to justify a principal component analysis. In our case, the KMO measure takes the value of 0.70 and following the Kaiser (1974) characterization of KMO values, we conclude that the PCA method is appropriate for the construction of our sentiment expectations index.

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[13] We keep the first principal component and refrain from using simultaneously the five next twelve months questions in the same panel VAR model, since the pair-wise correlations are very high across them.
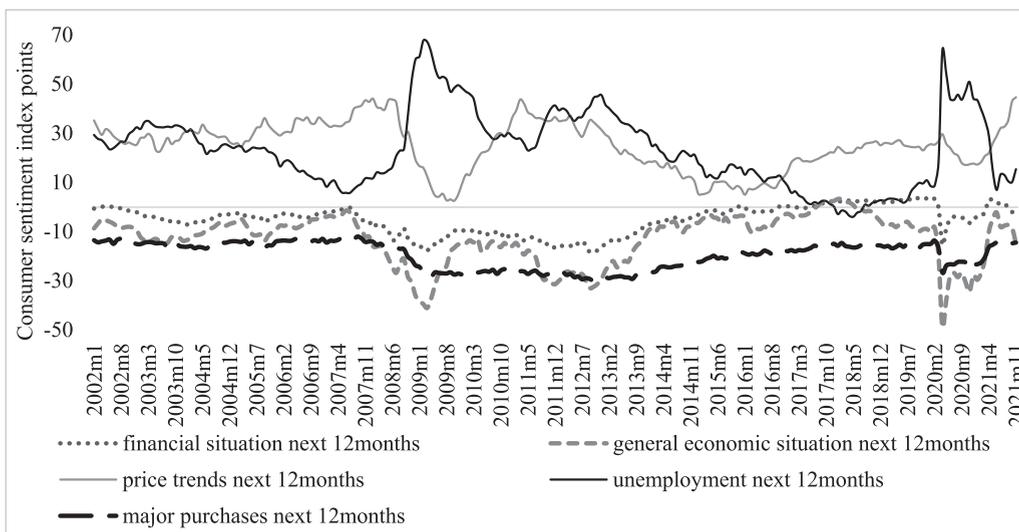
Fig. 2. Average responses to consumer sentiment individual questions across Eurozone countries. Notes: This Figure depicts the average responses of consumers to specific consumer sentiment questions over time, i.e. household financial situation, country-specific general economic situation, country-specific level of prices, country-specific unemployment level, and household-specific conditions for major purchases. Each of these consumer sentiment components captures the expectations of consumers over the next 12 months across the Eurozone's member countries.
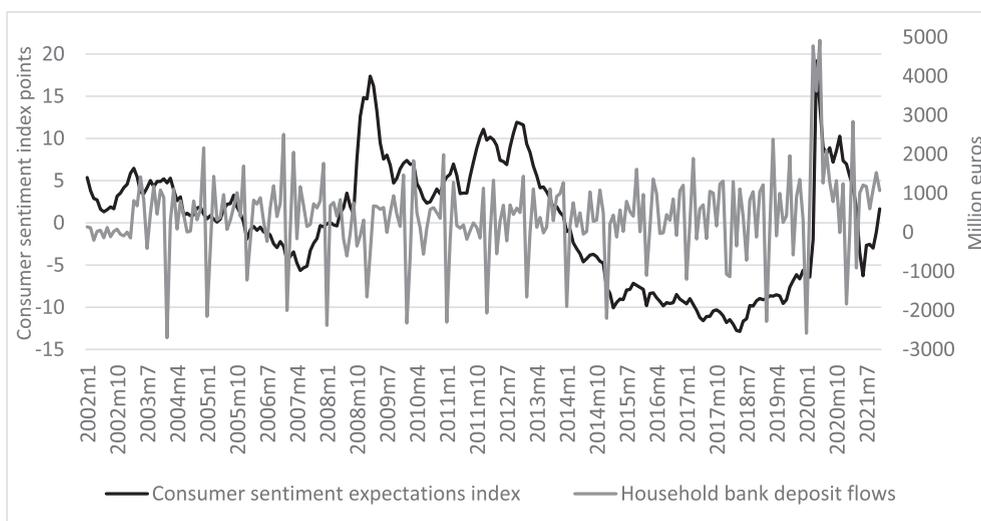

Fig. 3. Average consumer sentiment expectations index (black line) vs household bank deposit flows (gray line) across Eurozone countries. Notes: This Figure shows the constructed consumer (sentiment-based) expectations index following a principal component analysis on selected individual answers as part of Eurostat's consumer sentiment survey across Eurozone's member countries and the household bank deposit flows as published by Eurostat.

Next, we need to determine the number of components adequate to represent a large percentage of the common cumulative variation of the variables of interest. Table 1 presents the key results of the principal component analysis. Interestingly, the cumulative proportion of the variance explained by the first two principal components is almost 80 %, while the rest of the components together add less than 18 % to the total variance explained. This is also confirmed by the scree plot presented in Fig. 4, which depicts the corresponding eigenvalues, showing that the first two components are above the threshold line. Therefore, we calculate an average of the first two principal components as our index of consumer sentiment-based expectations across Eurozone member countries.

3.2. Control variables

Several other variables may also affect depositors' savings behavior. We control for potential unobserved country-specific heterogeneity in our setting by including a broad set of country-specific macroeconomic variables. These include the annual

Table 1

Principal Components Analysis.

Component	Eigenvalue	Difference	Proportion	Cumulative Explained Variance
Component 1	2.83784	1.73	0.57	0.57
Component 2	1.10636	0.50	0.23	0.80
Component 3	0.606153	0.32	0.11	0.91
Component 4	0.288742	0.128	0.06	0.97
Component 5	0.160907	–	0.03	1.00

Notes: This table presents key statistics regarding the individual components of the principal component analysis conducted to construct the consumers (sentiment-based) expectations index. Each row of the column cumulative explained variance shows the percentage of the variance explained by the corresponding number of components.
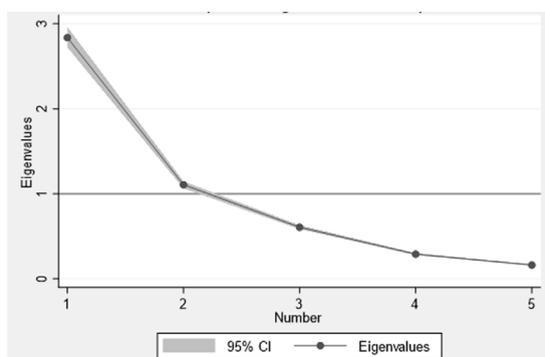

Fig. 4. Scree plot of eigenvalues after PCA. Notes: This scree plot depicts the eigenvalues of the principal components and it is used to determine the number of factors to retain. The eigenvalues are depicted in a downward curve.

growth rate of the industrial production index which has also been used as a possible determinant of depositors' behavior by previous studies (see, Hondroyiannis, 2004; Finger and Hesse, 2009; Anastasiou and Drakos, 2021a; Anastasiou and Drakos, 2021b). Next, the inflation rate, typically computed as the annual percentage change of the harmonized consumer price index (HICP), is included to capture the degree of macroeconomic stability (see, Finger and Hesse, 2009; Anastasiou and Drakos, 2021a; Anastasiou and Drakos, 2021b). Next, in line with Horváth et al., (2014); Trenca et al., (2015); Singh and Sharma, (2016); Anastasiou and Drakos, (2021a; 2021b) we include the average household deposit interest rates per country, unemployment rate per country, and the annual percentage change of the retail trade volume index per country. The retail trade volume index is included to capture the consumption expenditure per country. Finally, we include the Country Level Index of Financial Stress (CLIFS) as introduced by Duprey and Peltonen (2017). CLIFS index includes six, mainly market-based, financial stress measures that capture three important financial market segments: equity markets, bond markets, and foreign exchange markets. Table A1 of the Appendix defines the variables discussed above, while Table A2 reports their summary statistics.

We acknowledge that further variables may also affect household deposits. For example, according to the life-cycle hypothesis (Modigliani, 1966, 1970), the age structure of the population can exert an important effect on the saving behavior of households. In addition, bank-specific variables may also impact depositors' behavior, such as banks' credit risk exposure, their profitability levels, or their capital adequacy ratios. However, variables capturing these factors are not available at a monthly frequency as per our research design framework.

4. Econometric methodology

Our main specification model relies on a Vector Autoregressive (VAR) model where all variables in the system are treated as endogenous. In this way, we mitigate concerns regarding the effect of endogeneity in the relationship examined in this paper, i.e. endogeneity in the form of reverse causality and/or simultaneity. For instance, increased household savings may lead to higher economic growth via higher investment or capital accumulation, but at the same time, economic growth increases savings through the above-mentioned channels.

We further mitigate any concerns regarding the existence of possible endogenous relationships across the variables of interest by using a Bayesian estimation framework. VAR models are often estimated on relatively short-period samples which can lead to imprecise estimates. Therefore, shrinking parameter estimates towards benchmark values through Bayesian techniques helps to reduce the variance of unrestricted least squares estimators. Specifically, the Bayesian framework incorporates extraneous economic information about the VAR model parameters that would be difficult to incorporate in a

standard VAR estimation. Other recent studies also rely on a Bayesian VAR (BVAR) model when examining relatively short time series of data (e.g. Auer 2019).

For the reasons above, we rely on Bayesian techniques to increase the estimation accuracy of the VAR framework (on this, see Kilian and Lutkepohl, 2017). Specifically, we follow Canova and Ciccarelli (2013) and estimate a Bayesian Panel VAR pooled estimator model to increase the accuracy of our estimations.[14]

At the same time, the panel (cross-country) dimension of the model allows for the existence of potential unobserved individual heterogeneity across countries and over time in the sample examined. The panel VAR approach extends the traditional VAR model into a panel data approach, as in Love and Zicchino (2006) and Abrigo and Love (2016).[15]

Therefore, we estimate an eight-variable Bayesian Panel VAR model with twelve lags as follows:

$$Y_{i,t} = \gamma + B_1 Y_{i,t-1} + \alpha_i + \psi_{i,t} + \varepsilon_{i,t} \tag{1}$$

Where γ stands for a vector of constants, B_1 is a matrix of the estimated coefficients, α_i captures the unobserved country-specific effects, $\psi_{i,t}$ introduces year fixed effects, and $\varepsilon_{i,t} \sim$ i.i.d. $(0, \Sigma)$ is a vector of the idiosyncratic error terms. The model follows the assumptions that: $E[\varepsilon_{i,t}] = 0$ and $Cov(\varepsilon_{i,t}, \varepsilon_{j,t}) = 0$ for $i \neq j$, as in Love and Zicchino (2006); Canova and Ciccarelli, (2013) and Abrigo and Love (2016).

The vector $Y_{i,t}$ of monthly endogenous variables is defined as: $Y_{i,t} = [IndProd Unemp RetailTrade Infl Dep IntRate CLIFS ConsExpec HDF]$, includes *IndProd* stands for the annual percentage change of the industrial production of each country examined, *Unemp* denotes the unemployment rate, *RetailTrade* stands for the annual percentage change of retail trade volume index, *Infl* denotes the annual percentage change of the consumer price index, *DepIntRate* stands for the percentage change of the household deposit interest rates, *CLIFS* denotes the country level index of financial stress of Duprey and Peltonen (2017), *ConsExpec* stands for the constructed sentiment-based consumer expectations index, *HDF* denotes the household bank deposit flows. All variables fluctuate per country member of Eurozone. We order the variables in reducing exogeneity ranking, i.e. macroeconomic variables are ordered first followed by consumer-related variables.[16]

The Bayesian approach treats parameters as random variables and estimates them by imposing prior beliefs on their distribution. Since Bayesian models rely on the specification of priors, we use a Normal-Wishart prior which assumes that neither the VAR coefficients nor the variance–covariance matrix are known (pooled estimator), rather than using the Minnesota prior which assumes that the variance–covariance matrix is known (on this see also, Auer, 2019). We believe this specification is more appropriate as it imposes fewer constraints on the model. The structural shocks are identified using a Cholesky decomposition of the covariance matrix of the VAR reduced-form residuals. Impulse responses are derived based on 10,000 draws, from which the first 5,000 draws are discarded as a burn-in sample.[17]

A necessary condition for obtaining unbiased estimates in a VAR estimation framework is the absence of unit roots in the variables under examination. As observed in Table 2 we reject the null hypothesis of the existence of a unit root for all variables examined, based on the Augmented Dickey-Fuller (1979) and the Im-Pesaran-Shin (2003) panel data unit root tests.

5. Empirical findings

Fig. 5 illustrates the median (black solid lines) impulse response functions (IRFs) of household deposits to a positive one standard deviation shock on the constructed (sentiment-based) expectations index of consumers. The grey dashed lines denote the 90 % pointwise credible sets from the baseline model, and the horizontal axis shows the number of months since the shock.

As observed, panel (a) of Fig. 5 shows that during the whole sample period examined, March 2003 to November 2021, a positive shock on consumers' sentiment-based expectations triggers a statistically significant and immediate positive response of households' bank deposits across Eurozone country members. Albeit the positive response is short-lived and dies away after 2–3 months from the shock. This finding confirms our conjecture that the behavior of bank deposits of individual households exhibits a positive relationship with the expectations of consumers, as captured through their economic sentiment.

Next, we perform a sub-period analysis for three sub-periods and show the results in Panels (b), (c), and (d) of Fig. 5. Specifically, we depict the IRFs of households' deposits to a positive one standard deviation shock on the (sentiment-based) expectations of consumers for the periods: *Pre-crises*, March 2003 to July 2007 (Panel b), *Crises*, August 2008 to December 2013 (Panel c), which includes the global financial crisis (GFC) and the European debt crisis, and *After crises*, January 2014 to December 2019 (Panel d), respectively. As observed the positive responses of households' bank deposits to a positive shock on the (sentiment-based) expectations of consumers are evident in the *Crises* and *After crises* periods, as opposed to the *Pre-crises* period where the positive impulse response is weaker and mostly statistically insignificant. These

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[14] Prior related literature has also estimated VAR and Panel VAR models in a Bayesian way (see among many others Ellington et al. 2017, Chen and Tillman 2021).

[15] In a robustness test, we also estimate the panel VAR model in a standard (non-Bayesian) framework as in Love and Zicchino (2006) and Abrigo and Love (2016). The results are qualitatively the same and available from the authors upon request.

[16] The results are robust to alternative orderings of the variables keeping the reducing exogeneity ranking rule.

[17] We estimate the Bayesian panel VAR model with the MATLAB-based Bayesian Estimation, Analysis and Regression (BEAR) Toolbox developed by the European Central Bank (see Dieppe et al. 2021).

Table 2
Panel data unit-root tests.

Variable	ADF test statistic	IPS test statistic
Household deposit flows	25.99***	−53.03***
Consumer expectations	7.77***	−10.80***
IndProd	37.26***	−66.24***
Unemployment	14.75***	−47.24***
Retail trade	22.12***	−65.52***
Inflation	8.69***	−7.93***
Deposit Interest rate	24.51***	−52.32***
Clifs	6.41***	−25.01***

Notes: This Table presents the results for the following panel data unit root tests: (i) the Augmented Dickey-Fuller (1979) test (ADF) and (ii) the Im et al., (2003) test (IPS). The null hypothesis of these tests is that the time series of interest contains a unit root. *** denotes statistical significance at the 1% level.
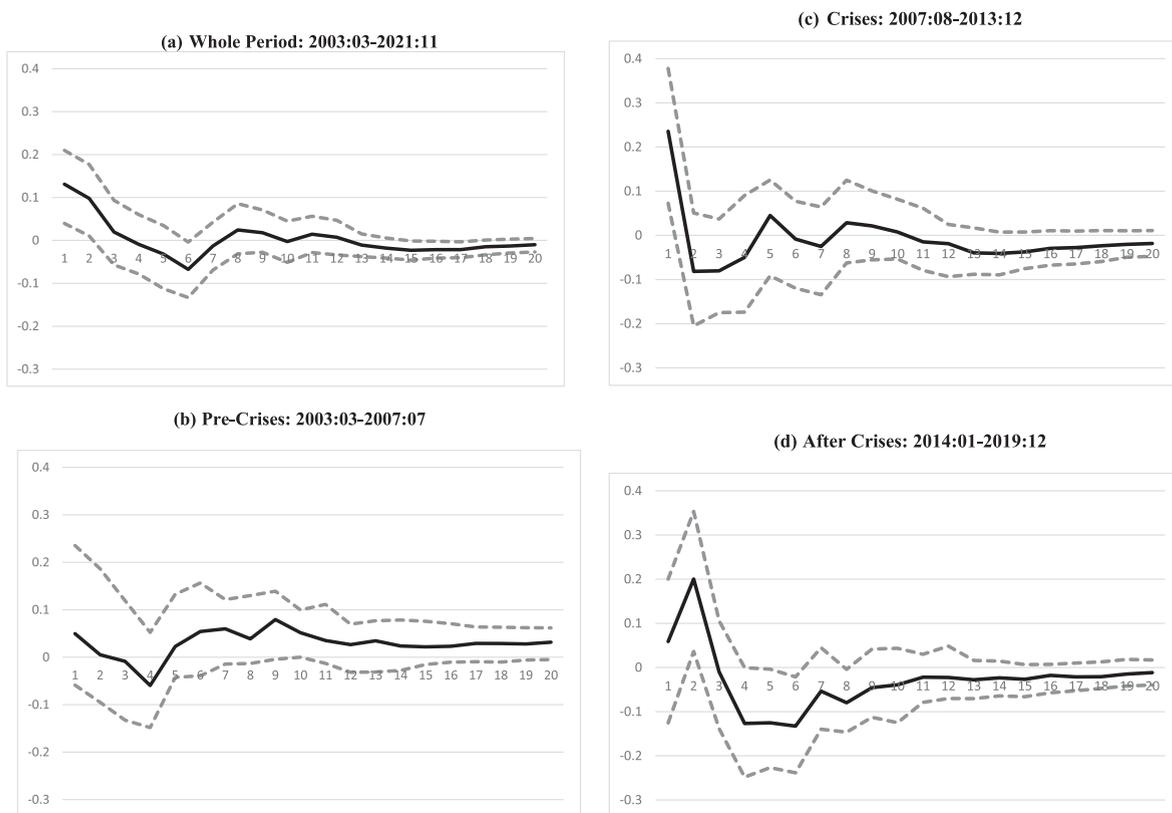

Fig. 5. Impulse Response Function of Households' savings to a shock in consumer sentiment expectations. Notes: This figure shows the impulse response functions of household bank deposits to a positive shock of consumer (sentiment-based) expectations for the whole period examined (panel a), the pre-crises period (panel b), the crises period (panel c), and the after crises period (panel d). The "Crises" period includes both the global financial crisis (GFC) and the European debt crisis. The black solid line shows the median impulse response to a positive shock equal to one standard deviation in the baseline Bayesian panel VAR specification. The gray dashed lines represent 90% credible sets from the baseline model, respectively. The horizontal axis shows the number of months since the shock.

results reveal an increased positive response of households' bank deposits to consumers' sentiment during the period that includes the GFC and European debt crises episodes.

In turn, Fig. 6 presents the forecast error variance decomposition (FEVD) for the estimated Bayesian panel VAR model. FEVD shows the percentage of explained variance of households' bank deposits attributed to shocks to the consumers' (sentiment-based) expectations. Similarly, to the IRFs presented in Fig. 5, the forecast horizon is expanded from one to twenty months ahead of the shock. Interestingly, shocks in consumers' expectations explain a higher percentage of households' bank deposit fluctuations the after the *Crises* period, followed by the *Pre-crises* period.

(c) Crises: 2007:08–2013:12

(a) Whole Period: 2003:03–2021:11

(b) Pre-Crises: 2003:03–2007:07
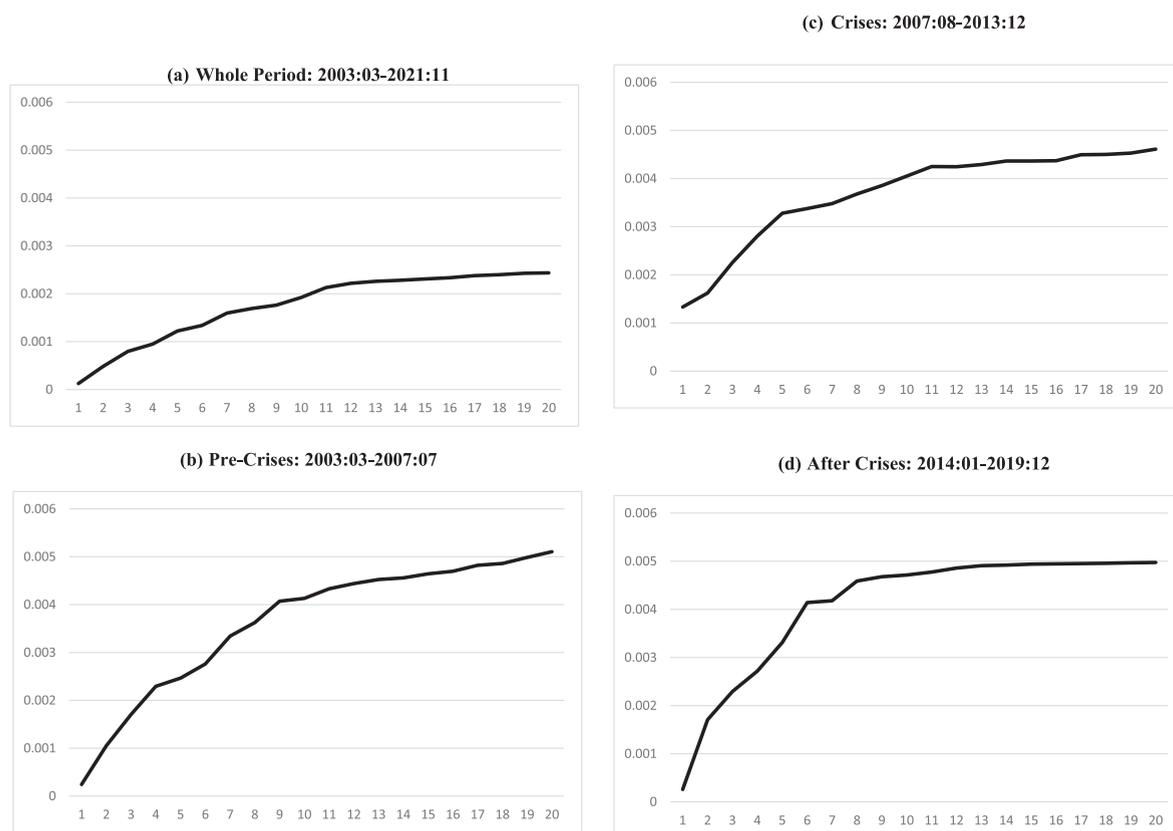
(d) After Crises: 2014:01–2019:12

Fig. 6. Forecast Error Variance Decomposition (FEVD) of Households' savings to a shock in consumer sentiment expectations. Notes: This figure shows the forecast error variance decompositions (FEVD) of the household bank deposits to a positive shock of consumer (sentiment-based) expectations. The black solid lines show the median percentage of the variance of household bank deposits that can be explained by a positive shock on consumer (sentiment-based) expectations. The estimates are based on the FEVD of the eight-variate model in Equation (1). The horizontal axis shows the number of months since the shock. See also notes in Fig. 5.

5.1. Historical decomposition: The case of Greece

The IRFs presented earlier are informative about the timing and size of responses of household bank deposits to one-time consumer sentiment expectations shocks. However, they are not informative about the effect of these shocks on household bank deposits at specific points in time. Therefore, we conduct a historical decomposition (HD) of the effect of each shock on household bank deposits. Since historical decompositions (HD) are available for each of the eight variables and each of the countries of the Eurozone included in our Bayesian panel VAR model we focus only on the case of Greece, as a country of special interest regarding the relationship of consumer (sentiment-based) expectations and household bank deposits. This is motivated by the fact that Greece has undergone pronounced fiscal financial stress and heightened economic and political uncertainty since 2009.

Panel (a) of Fig. 7 plots the evolution of the constructed consumer sentiment expectations index vs the household bank deposit flows in Greece over time. It is evident that the country experienced severe deposit outflows during periods of heightened fiscal financial stress in 2010 and 2011 when the first bailout program took place, and political uncertainty in 2015 when a critical referendum regarding another rescue package took place. These two episodes of large household bank deposit outflows may also be interpreted as periods of high risk for a bank run, resulting in severe measures taken by the Government, such as the so-called capital controls imposed in June 2015 following the announcement of a critical referendum. Eventually, such episodes increase the cost of capital for a country and force economic agents to postpone investments resulting in lower economic growth.

The rest of the panels of Fig. 8 show the contributions of shocks of other variables of interest to Greece's household bank deposits over time. Notably, in Panel (b) of Fig. 7, we observe that unemployment shocks contribute more to household bank deposit flows over time when compared to industrial production or retail trade shocks.

Next, in Panel (c) of Fig. 7 we observe that inflation shocks contributed positively to household bank deposits over the period 2008 to 2011 and negatively over the period 2013 to 2016. The most pronounced contributions to household deposit outflows (negative contributions) are observed from shocks to the clifs index over the period 2014–2016, which coincides
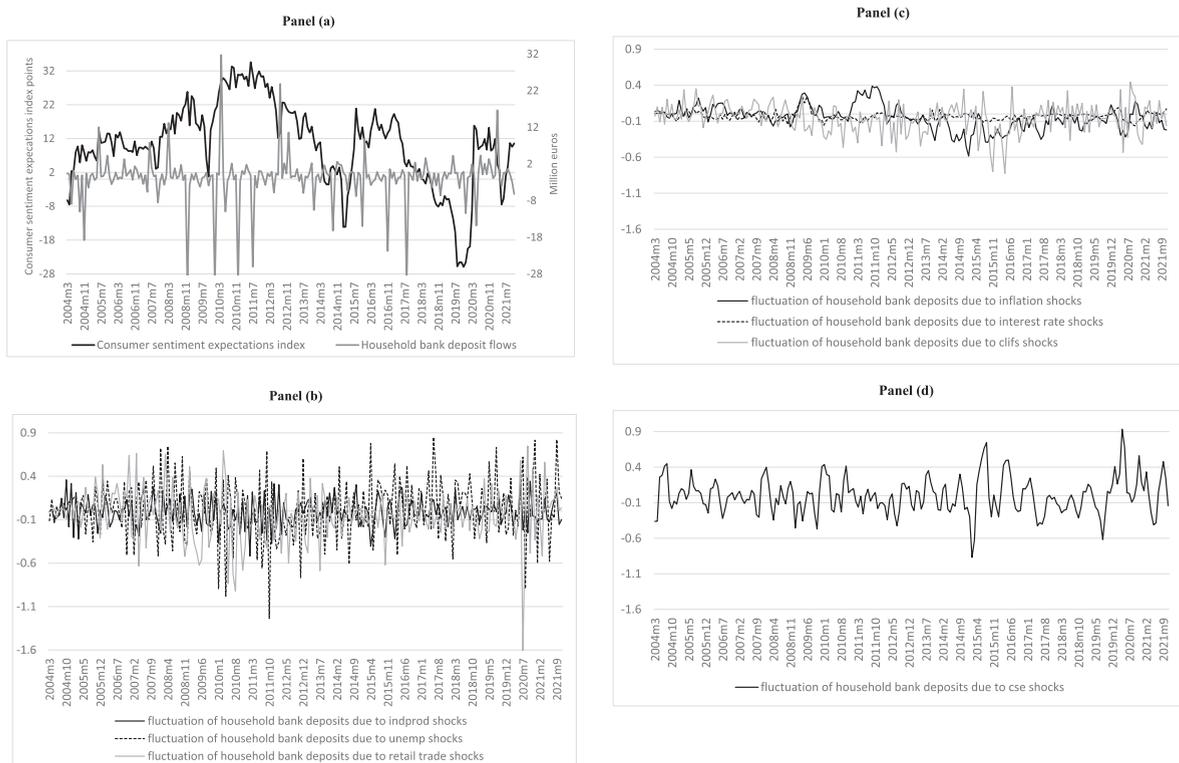
Panel (a)

Panel (c)

Panel (b)

Panel (d)

Fig. 7. Evolution and historical decomposition of Greek household bank deposit flows. Notes: This Figure depicts the constructed consumer (sentiment-based) expectations index (*cse*) following a principal component analysis on selected individual answers as part of Eurostat's consumer sentiment survey across Eurozone's member countries and the household bank deposit flows as published by Eurostat. Panels (b) to (d) depict the fluctuations of household bank deposits for Greece due to shocks in the variables included in Eq. (1). See also notes of Table A1 in the Appendix.

with the period of heightened political uncertainty for Greece. However, all shocks depicted in Panel (c) contribute less in terms of magnitude when compared to Panel (b). Finally, Panel (d) of Fig. 7 depicts the contributions of shocks to consumer (sentiment-based) expectations which are important in terms of magnitude when compared to the rest of the shocks, i.e. Panels (b) and (c). The largest negative contribution of consumer sentiment expectations on household bank deposits is recorded during the first half of the calendar year 2015, which coincides with heightened political uncertainty in Greece, whereas the largest positive one is recorded after the partial recovery of the first wave of the COVID-19 pandemic in Summer 2020.

5.2. Further analysis: Tax heavens and Core vs Periphery countries

We extend our analysis to incorporate interesting features across the Eurozone's member countries that may affect the relationship between household bank deposits and shocks of consumer (sentiment-based) expectations. First, a feature that is relevant for our analysis is whether the positive relationship between consumer (sentiment-based) expectations and household bank deposits is more pronounced for countries characterized as "financial centers" (see, Dharmapala and Hines, 2009; Lane and Milesi-Ferretti, 2010; Anastasiou and Drakos, 2021a,b). These countries typically attract large bank deposits mainly due to their favorable tax schemes and corporate legislation. Therefore, economic agents may be attracted by these features and exhibit higher expectations about the future state of the economy resulting in higher bank deposit inflows.

We re-estimate the Bayesian panel VAR model for countries that are considered financial centers (Cyprus, Ireland, Malta, Luxembourg, and the Netherlands), while the rest of the countries are considered non-financial centers and report the results in Panels (a) and (b) of Fig. 8, respectively. As observed, the results confirm our conjecture that the imminent positive response of household bank deposits due to a shock in consumers' (sentiment-based) expectations is more evident in financial centers, i.e. Panel (a) of Fig. 8, rather than in the rest of the countries examined, i.e. Panel (b) of Fig. 8.

Another important feature relevant to our research question is whether our results differ between "Core" and "Periphery" countries members of the Eurozone, where "Core" countries are the ones exhibiting the largest GDP in the euro area, i.e. Germany, France, Italy, Spain; while "Periphery" countries include the rest. It might be the case that households in "Periphery" countries might be more sensitive to consumer sentiment expectation shocks due to the smaller size of the national econ-
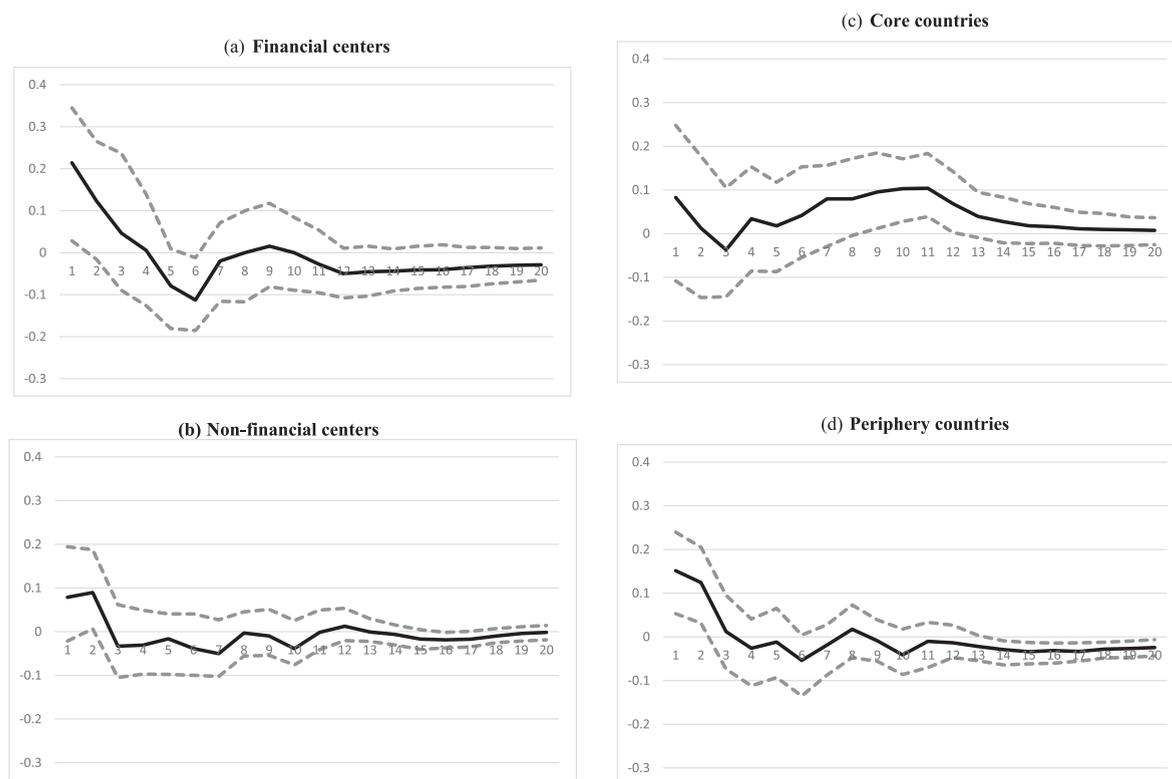
(c) **Core countries**

(a) **Financial centers**

(b) **Non-financial centers**

(d) **Periphery countries**

Fig. 8. Impulse Response Function of Households' savings to a shock in consumer sentiment expectations for (i) financial vs non-financial centers and (ii) Core vs Periphery countries. Notes: This figure shows the impulse response functions of household bank deposits to a positive shock of consumer (sentiment-based) expectations for (i) Countries considered financial centers (Cyprus, Ireland, Malta, Luxembourg, Netherlands) vs the rest of the countries, i.e. non-financial centers (panels a and b) and (ii) Core Eurozone countries (Germany, France, Italy, Spain) vs the rest of the countries, i.e. Periphery countries (panels c and d). See also notes in Fig. 5.

omy. To this end, we re-estimate the Bayesian panel VAR model for Core and Periphery countries and report the results in Panels (c) and (d) of Fig. 8, respectively. As observed, the results confirm our conjecture that "Periphery" countries of the euro area exhibit a larger and more pronounced imminent positive response of households' deposits due to a shock in consumer sentiment expectations, when compared to "Core" countries.

Overall, the results of this paper may be attributed to a set of possible mechanisms. For instance, Fagereng et al. (2020) document high heterogeneity but also persistence of returns to wealth across individuals. The authors argue that this persistence arises primarily from differences in risk exposure and assets scale, but also reflects heterogeneity in sophistication, financial information and entrepreneurial talent. Furthermore, consumers' sentiment has been shown to be affected largely by energy (gas) prices, especially if the individuals lived through the recessionary oil crises in the 1970s which is consistent with models of learning from personal experience (Binder and Makridis, 2022).

6. Conclusions and policy implications

This study contributes to the literature by quantifying the effects of consumer (sentiment-based) expectations on household bank deposits across the Eurozone's country members. We use a well-developed and robust Bayesian panel VAR framework that increases the accuracy of our inferences. In the process, we have constructed a new index of household consumer sentiment expectations using the harmonized consumer survey data provided by the European Commission.

The results provide novel empirical evidence, suggesting a positive effect of consumers' sentiment-related expectations on households' deposit behavior across the Eurozone's member countries. This effect was more pronounced after 2007 and the realization of the global financial crisis and the ensuing European debt crisis. Furthermore, the documented positive relationship is more pronounced for the countries considered financial centers than the rest of the countries examined, and for the countries considered in the Periphery than the Core countries of the Eurozone. Overall, these findings have important economic implications for monetary and macroprudential policy.

Disclaimer: The views and opinions expressed in this paper are those of the authors and do not reflect the views of their respective institutions.

Declaration of Competing Interest

Acknowledgments

Appendix

See the Tables A1-A3.

Table A1
Variables, symbols, descriptions, and sources of data.

Variable	Symbol	Description	Source
Deposit Flows	*HDF*	The household bank deposit flows per Eurozone's member country.	European Central Bank
Consumer Expectations	*ConsExpec*	The principal component across five key questions of Eurostat's consumer survey asked consumers explicitly about their expectations over the next twelve months.	Authors' calculation
Industrial Production	*IndProd*	Annual percentage change (%) of industrial production index.	Eurostat
Unemployment	*Unemp*	The unemployment rate, in percentage change (%).	Eurostat
Retail trade	*RetailTrade*	Annual percentage change (%) of retail trade volume index.	Eurostat
Inflation	*Infl*	Annual percentage change (%) of the harmonized consumer price index.	Eurostat
Deposit Interest rate	*DepIntRate*	Household deposit interest rates, in percentage change (%).	European Central Bank
Clifs	*CLIFS*	Country Level Index of Financial Stress (Clifs) of Duprey and Peltonen (2017).	Duprey and Peltonen (2017)

Notes: This table shows the definitions and sources of data of the variables entering Eq. (1).

Table A2
Summary statistics, sample period 2002–2021.

Variable	Obs.	Mean	Std. Dev.	Min	Max
Deposit Flows	5,404	−1.01	6.22	−30.88	31.74
Consumer Expectations	6,144	0.00	10.89	−32.07	38.22
IndProd	6,188	0.13	3.56	−42.50	73.70
Unemployment	6,188	−0.01	0.29	−2.40	2.10
Retail trade	6,188	0.18	3.02	−97.60	33.80
Inflation	5,902	2.17	2.28	−4.35	17.70
Deposit Interest rate	5,381	0.00	0.07	−1.20	0.90
Clifs	6,084	0.13	0.11	0.00	0.91

Notes: See Table A1 in the Appendix for variable definitions. All variables are expressed in percentage changes, apart from *inflation* and *clifs*.

Table A3
Consumer Survey questionnaire of the "The Joint Harmonised EU Programme of Business and Consumer Surveys".

Q1	How has the financial situation of your household changed over the last 12 months?
Q2	How do you expect the financial position of your household to change over the next 12 months?
Q3	How do you think the general economic situation in the country has changed over the past 12 months?
Q4	How do you expect the general economic situation in this country to develop over the next 12 months?
Q5	How do you think that consumer prices have developed over the last 12 months?
Q6	By comparison with the past 12 months, how do you expect that consumer prices will develop in the next 12 months?
Q7	How do you expect the number of people unemployed in this country to change over the next 12 months?
Q8	In view of the general economic situation, do you think that now it is the right moment for people to make major purchases such as furniture, electrical/electronic devices, etc.?
Q9	Compared to the past 12 months, do you expect to spend more or less money on major purchases (furniture, electrical/electronic devices, etc.) over the next 12 months?
Q10	In view of the general economic situation, do you think that now is?
Q11	Over the next 12 months, how likely is it that you save any money?
Q12	Which of these statements best describes the current financial situation of your household?

Notes: The possible answers of consumers vary across the survey questions, but the great majority follow a five-step Likert scale as possible answers: got a lot better, got a little better, stayed the same, got a little worse, got a lot worse, do not know. Full documentation is available on ECB's website (last accessed: April 10, 2022): https://ec.europa.eu/economy_finance/db_indicators/surveys/documents/bcs_user_guide_en.pdf.

References

Abrigo, M.R., Love, I., 2016. Estimation of panel vector autoregression in Stata. The Stata Journal 16 (3), 778–804.

Agoraki, M.E.K., Aslanidis, N., Kouretas, G.P., 2022. U.S. banks' lending, financial stability, and text-based sentiment analysis. J. Econ. Behav. Organ. 197, 73–90.

Allard, P., 1992. La modélisation de la consommation des ménages en France. Rev. Econ. Politiq. 102, 727–765.

Anastasiou, D., Drakos, K., 2021a. Depositors' behavior and crisis sentiment: evidence from the E.U. countries. J. Econ. Behav. Organ. 184, 117–136.

Anastasiou, D., Drakos, K., 2021b. Nowcasting the Greek (semi-) deposit run: hidden uncertainty about the future currency in a Google search? Int. J. Finance Econ. 26 (1), 1133–1150.

Anastasiou, D., Katsafados, A., 2022. Bank Deposits and Textual Sentiment: When an ECB President's speech is not just a speech. The Manc, School. forthcoming.

Anastasiou, D., Kallandranis, C., Drakos, K., 2022. Borrower discouragement prevalence for Eurozone SMEs: investigating the impact of economic sentiment. J. Econ. Behav. Organ. 194, 161–171.

Anastasiou, D., Petralias, A., 2021. On the construction of a leading indicator based on news headlines for predicting Greek deposit outflows. Int. J. Bus. Manag. Finance Res. 4 (1), 1–11.

Auer, S., 2019. Monetary Policy Shocks and Foreign Investment Income: Evidence from a Large Bayesian VAR. Journal of Financial Stability 93, 142–166.

Barnes, M.L., Olivei, G.P., 2017. Consumer attitudes and their forecasting power for consumer spending. J. Money Credit Bank. 49 (5), 1031–1058.

Benhabib, J., Spiegel, M.M., 2019. Sentiments and economic activity: evidence from U.S. states. Econ. J. 129 (618), 715–733.

Beshears, J., Choi, J., Harris, C., Laibson, D., Madrian, B., Sakong, J., 2015. Self-control and commitment: can decreasing the liquidity of a savings account increase deposits? National Bureau of Economic Research Working Paper Series No. 21474.

Bijsterbosch, M., Falagiarda, M., 2015. The macroeconomic impact of financial fragmentation in the euro area: which role for credit supply? J. Int. Money Finance 54, 93–115.

Binder, C., Makridis, C., 2022. Stuck in the seventies: Gas prices and consumer sentiment. Review of Economics and Statistics 104 (2), 293–305.

Blanchard, O., Mankiw, N.G., 1988. Consumption: Beyond Certainty Equivalence. Amer. Econo. Rev. 78 (2), 173–177.

Burdekin, R.C., Redfern, L., 2009. Stock market sentiment and the draining of China's savings deposits. Econ. Lett. 102 (1), 27–29.

Calomiris, C.W., Gorton, G., 1991. The origins of banking panics: models, facts, and bank regulation. University of Chicago Press, In Financial markets and financial crises.

Campbell, J.Y., Mankiw, N.G., 1991. The response of consumption to income: a cross- country investigation. Europ. Econ. Rev. 35 (4), 723–756.

Canova, F., Ciccarelli, M., 2013. Panel Vector autoregressive Models: a Survey. European Central Bank.

Chamberlain, G., Wilson, C.A., 2000. Optimal Intertemporal Consumption under Uncertainty. Rev. Econ. Dynam. 3, 365–395.

Chen, H., Tillmann, P., 2021. Monetary policy uncertainty in China. J. Int. Money Finance 110, 102309.

Choi, S., Furceri, D., 2019. Uncertainty and cross-border banking flows. J. Int. Money Finance 93, 260–274.

Clerides, S., Krokida, S.I., Lambertides, N., Tsouknidis, D., 2022. What matters for consumer sentiment in the euro area? World crude oil price or retail gasoline price? Energy Economics 105, 105743.

Cochrane, J.H., 1994. Permanent and Transitory components on GNP and Stock prices. The Quart. J. of Econo. 109 (1), 241–265.

Constantinides, G., 1990. Habit formation: A resolution of the equity premium puzzle. J. Politic. Econo. 98, 519–543.

Cubillas, E., Ferrer, E., Suárez, N., 2021. Does investor sentiment affect bank stability? International evidence from lending behavior. J. Int. Money Finance 113, 102351.

Deaton, A., 1985. Panel Data from Time Series of Cross Sections. J. of. Econometr. 30, 109–126.

Dharmapala, D., Hines Jr, J.R., 2009. Which countries become tax havens? J. Public Econ. 93 (9–10), 1058–1068.

Dickey, D.A., Fuller, W.A., 1979. Distribution of the estimators for autoregressive time series with a unit root. J. Am. Stat. Assoc. 74, 427–431.

Dieppe, A., Legrand, R., & van Roye, B. (2021). The Bayesian Estimation, Analysis and Regression (BEAR) Toolbox v.5.0. European Central Bank.

Duprey, T., Klaus, B., Peltonen, T., 2017. Dating systemic financial stress episodes in the E.U. countries. J. Financial Stab. 32, 30–56.

Ellington, M., Florackis, C., Milas, C., 2017. Liquidity shocks and real GDP growth: evidence from a Bayesian time-varying parameter VAR. J. Int. Money Finance 72, 93–117.

Engle, R.F., 1982. Autoregressive conditional heteroskedasticity with estimates of the variance of U.K. inflation. Econometrica. 50, 987–1008.

Ermini, L., 1993. Shock Persistence and Stochastic Trends in Australian Aggregate Output and Consumption. Econo. Reco. 69 (1), 34–43.

Fagereng, A., Guiso, L., Malacrino, D., Pistaferri, L., 2020. Heterogeneity and persistence in returns to wealth. Econometrica 88 (1), 115–170.

Fecht, F., Thum, S., Weber, P., 2019. Fear, deposit insurance schemes, and deposit reallocation in the German banking system. J. Bank. Financ. 105, 151–165.

Finger, M.H., Hesse, H., 2009. Lebanon-determinants of commercial bank deposits in a regional financial center. IMF, No, pp. 9–195.

Fisher, I., 1930. The Theory of Interest, as determined by Impatience to Spend Income and Opportunity to Invest it. (New York: Macmillan, 1930).

Flavin, M.A., 1981. The Adjustment of Consumption to Changing Expectations About Future Income. J. Politic. Econo. 89, 974–1009.

Goolsbee, A., Syverson, C., 2021. Fear, lockdown, and diversion: comparing drivers of pandemic economic decline. J. Public Econ. 193, 104311.

Hall, R.E., 1978. Stochastic implications of the life cycle -permanent income hypothesis: theory and evidence. J. Polic. Econo. 86 (6), 971–987.

Han, H.–L., Ogaki, M., 1997. Consumption, income and cointegration. Int. Rev. Econ. Finance 6, 107–117.

Hondroyiannis, G., 2004. Estimating private savings behaviour in Greece. J. Econ. Stud. 31 (5), 457–476.

Horváth, R., Seidler, J., Weill, L., 2014. Bank capital and liquidity creation: Granger-causality evidence. J. Financial Serv. Res. 45 (3), 341–361.

Im, K.S., Pesaran, M.H., Shin, Y., 2003. Testing for unit roots in heterogeneous panels. J. Econom. 115 (1), 53–74.

Johnson, D., 1986. Consumption, permenent income anf financial wealth in Canada: Empirical evidence of an intertemporal approach to the current account. Canad. J. Econo. 19, 189–206.

Kaiser, H.F., 1974. An index of factor simplicity. Psychometrika 39, 31–36.

Keynes J.M., 1936. The General Theory of Employment, Interest and Money, Macmillan Cambridge University Press, London. Kuznets, S., 1942, Use of National Income in Peace and War, National Bureau of Economic Research (NBER). New York.

Kilian, L., Lutkepohl, H., 2017. Structural Vector Autoregressive Analysis. Cambridge University Press, United Kingdom.

Lane, P., Milesi-Ferretti, G.M., 2010. Cross-border investment in small international financial centers. IMF Working Paper 10/38.

Lang, M., Schmidt, P.G., 2016. The early warnings of banking crises: interaction of broad liquidity and demand deposits. J. Int. Money Finance 61, 1–29.

Laumas, G.S., 1968. The degree of moneyness of savings deposits. Am. Econ. Rev. 58 (3), 501–503.

Laumas, G.S., 1969. Savings deposits in the definition of money. J. Polit. Econ. 77 (6), 892–896.

Love, I., Zicchino, L., 2006. Financial development and dynamic investment behavior: Evidence from panel VAR. The Quart. Rev. Econ. Finan. 46 (2), 190–210.

Lucas, R., 1976. Econometric Policy Evaluation: A Critique. in: K. Brunner and A. Meltzer (eds.), The Phillips Curve and Labor Markets, Carnegie-Rochester Conference Series on Public Policy 1, 19–46.

Ludvigson, S.C., 2004. Consumer confidence and consumer spending. Journal of Economic Perspectives 18 (2), 29–50.

Luo, Y., Young, E., 2016. Induced uncertainty, market price of risk, and the dynamics of consumption and wealth. J. Econo. Theor. 163 (C), 1–41.

Maechler, A.M., McDill, K.M., 2006. Dynamic depositor discipline in U.S. banks. J. Bank. Financ. 30 (7), 1871–1898.

Menegatti, M., 2007. Consumption and uncertainty: a panel analysis in Italian regions. Appl. Econo. Let. 14 (1), 39–42.

Modigliani, F., 1966. The life cycle hypothesis of savings, the demand for wealth and the supply of capital. Soc. Res. 33, 160–217.

Modigliani, F., 1970. The life-cycle hypothesis of savings and inter-country differences in the saving ratio. In: Eltis, W., Scott, M., Wolfe, J. (Eds.), induction, Growth and Trade, Essays in Honor of Sir Roy Harrod. Clarendon, Oxford.

Muellbauer, J., 1988. Habits, rationality and myopa in the life-cycle consumption function. Annal. Econo. De Statist. 9, 47–70.

Osili, U.O., Paulson, A., 2014. Crises and confidence: Systemic banking crises and depositor behavior. J. Finan. Econ. 111 (3), 646–660.

Özak, Ö., 2014. Optimal consumption under uncertainty, liquidity constraints, and bounded rationality. Journal of Economic Dynamics and Control 39, 237–254.

Rudd, J., Whelan, K., 2002. A note on the cointegration of consumption, income and wealth. Federal Reserve Board Finance and Economics Discussion Paper, No, p. 53.

Singh, A., Sharma, A.K., 2016. An empirical analysis of macroeconomic and bank-specific factors affecting liquidity of Indian banks. Future Bus. J. 2 (1), 40–53.

Trenca, I., Petria, N., Corovei, E.A., 2015. Impact of macroeconomic variables upon the banking system liquidity. Procedia Econ. Finance 32, 1170–1177.