
Forecasting Household Saving Rate with Consumer Confidence Indicator and its Components: Panel Data Analysis of 14 European Countries

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Abstract:

Purpose: The aim of this paper is to assess the predictive power of the Consumer Confidence Indicator and its underlying components for household saving rate in the broad cross-country settlement. Two questions are addressed in particular. First, do Consumer Confidence Indicator and its components indeed forecast future household propensity to save on their own? Second, do Consumer Confidence Indicator and its components contain any predictive power for household saving beyond economic fundamentals?

Design/Methodology/Approach: The regression analysis using panel data for 14 European countries is used.

Findings: Our results reveal that Consumer Confidence Indicator and most of its component questions have predictive power for the forecasts of household saving rate in both cases - as distinct predictor and as additional variable to the baseline model.

Practical implications: Generally, our results support the recommendations to combine subjective (confidence indexes) and objective (economic fundamentals) indicators to achieve a broader picture and a more reliable basis for forecasts and policy assessments in the area of household finance. The results may be of special interest in terms of profound changes in consumer confidence related to the global pandemic COVID-19.

Originality: This study extends the knowledge in consumer confidence – household saving relationship and is the first analysis of consumer confidence forecasting ability for household saving settled in the broad European perspective.

Keywords: Consumer confidence, precautionary saving, sentiment index, unemployment expectations, uncertainty, household finance.

JEL classification codes: E27, E21.

Paper type: Research article.

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1. Introduction

Households' savings represent the balance between their current income and their current consumption. Decisions by households on whether to spend or save are a key factor influencing the economic outlook. Household saving determines to an important extent the availability of financial resources to support domestic investments of enterprises and government. Insufficient saving may therefore hinder investment and dampen economic growth (Kandil 2015; Odoardi and Pagliari 2020; Rocher and Stierle 2015). Households' own savings are the resource used most often to deal with financial shocks (Lusardi *et al.*, 2011).

Households' wealth is among the most important determinants of the level of households financial fragility (Kośny and Piotrowska 2019; Potocki and Cierpień-Wolan 2019). Vulnerable households pose a threat to financial stability due to their ties to financial institutions (Ampudia *et al.*, 2016; Anioła and Gołaś 2012). Wealth accumulation and intergenerational transfers have consequences for meeting the needs of future generations. These are only some reasons why household saving behavior plays an important role in ensuring the financial sustainability of individuals, families and national economies. The favourable level of economic indicators such as debt, payment discipline, savings, and financial management translates into the economy and sustainable development (Swiecka *et al.*, 2020).

While there have been a significant amount of empirical studies that aim to explain household saving rate or, more generally, private saving rate by using various macroeconomic and demographic factors (Grigoli *et al.*, 2014; Rocher and Stierle 2015), until recently the literature neglected to incorporate the widely tracked consumer confidence index as a part of saving explanatory variables. Some pioneer work in this subject has been carried out by Kandil (2015) and Kłopočka (2017). Kandil (2015) contributes to a rich stream of literature focusing on the dynamics of US savings and its determinants. She confirms the relevance of the consumer sentiment index as an important factor that affects US household savings, both in the short and long-run. Kłopočka (2017) provides a unique appraisal of the predictive ability of not only composite but also component consumer confidence indexes for household saving and borrowing rates in Poland. Her empirical findings suggest that some consumer confidence indexes contain predictive ability beyond economic fundamentals and that they are useful in forecasting household saving and borrowing behavior.

Vanlaer *et al.* (2020) extend literature on the relationship of household saving and consumer sentiment (as captured by 13 consumer confidence indicators from the Joint Harmonised EU Consumer Survey) with a cross-country study of annual data for 18 EU economies. They confirm that decreases in consumer sentiment are associated with higher saving. A comparison of effects exerted by components of consumer confidence reveal that households are more concerned with the developments of their personal financial situation than with the general economic

situation. Presumably confidence in the current financial situation has a larger impact on the saving rate than does the perception of the future financial situation.

The predictive ability of consumer confidence indexes for household saving may be a topic of special interest in terms of the global pandemic COVID-19. Although it is too early to comprehensively investigate the effects of a severe and sudden drop in consumer confidence on household consumption/saving decisions it is worth to emphasize the potential role of consumer confidence indexes as forward-looking measures that can be used to assess the macroeconomic impact of the COVID-19 pandemic.³

The aim of this paper is to assess the predictive power of the European Commission's aggregate measure of consumer confidence (namely, the Consumer Confidence Indicator) and its underlying components for household saving, using quarterly balanced panel data for 14 European countries. Two questions are addressed in particular. First, do Consumer Confidence Indicator and its components indeed forecast future household propensity to save on their own? Second, do Consumer Confidence Indicator and its components contain any predictive power for household saving beyond economic fundamentals? The explanatory variables that we treat as "economic fundamentals" are variables usually perceived as potential determinants of household saving. This study is an expansion of previous work by Kłopocka (2017) and to the best of our knowledge this is the first analysis of consumer confidence forecasting ability for household saving settled in the broad European perspective.

The empirical analysis that has been undertaken in the current paper suggests that developments in Consumer Confidence Indicator and some of its components do possess independent predictive content for household saving rate. The rest of the paper is organized as follows: Section 2 provides the review of existing literature; Section 3 describes the data and the methodology of the research; Section 4 demonstrates and discusses empirical findings of the regression analysis; Section 5 concludes with some remarks.

2. Literature Review

This study relates to two broad strands of the literature. The first stresses the influence of uncertainty on consumption and saving. The second one discusses the usefulness of customer confidence indexes for macroeconomic forecasts, in particular for the prediction of changes in consumption.

³*Baker et al. (2020) identify and use some real-time forward-looking uncertainty measures to document and quantify the enormous increase in economic uncertainty in the COVID-19 pandemic in the U.S. case. They also model a forecasted negative effect of COVID-induced uncertainty for U.S. real GDP. One of the measures used is the subjective uncertainty in business expectations surveys.*

The first vast strand of the literature addresses the effect of uncertainty on households saving behavior. This is a long-standing topic in research on household saving (Skinner 1988; Dynan 1993). In the seminal works of Carroll (1997) and Deaton (1991) assets play the role of a buffer stock, and a consumer saves and dissaves in order to smooth consumption in the face of income uncertainty. The precautionary motive ("to build up a reserve against unforeseen contingencies") has assumed an important place in the literature on household saving (Hubbard *et al.*, 1994; Bertaut and Haliassos, 1997; Carroll and Samwick, 1997; Lusardi, 1998; Cagetti, 2003; Lee and Sawada, 2007; Mody *et al.*, 2012; Bande and Riveiro, 2013; Ceritoğlu, 2013; Chamon *et al.*, 2013; Deidda, 2014; Mastrogiamomo and Alessie, 2014; Aizenman *et al.*, 2015; Fulford, 2015; Bouyon, 2016; Kłopocka, 2018; Korzeniowska, 2018; Lugilde *et al.*, 2018; Broadway and Haisken-DeNew, 2019).

A fresh interest in precautionary saving as a potential explanation of the sharp increment in household saving rates during the Great Recession has emerged in recent times. For example, Bouyon (2016) using panel data for 13 European countries of the period 2007-2013 confirms the prominent role played by the precautionary motive during the financial crisis of 2008-2009, which is reflected in the strong impact of unemployment rates and housing prices upon household saving rate. Bande and Riveiro (2013) using Spanish regional data for the period 1980-2007 reveal that part of the increase in saving rates is related to a precautionary motive and that increased uncertainty causes greater savings rates. Nofsinger (2012) demonstrates that household saving and borrowing behavior exacerbates the boom/bust economic cycle. In boom times, the increase in debt load and decrease in saving rate spur economic growth. In bust times, households repay debt and save more, which drags on an already slow economy.

Carroll *et al.* (2012) argue that the long stability of the U.S. personal saving rate from the 1960s through the early 1980s, subsequent steady decline from the 1980s to 2007, and recent substantial increase in 2008-2011 can all be interpreted using a parsimonious buffer stock model of optimal consumption in the presence of labor income uncertainty and credit constraints. Their model's key insight is that, in the presence of income uncertainty, optimizing households have a target wealth ratio that depends on the usual theoretical considerations (risk aversion, time preference, expected income growth, etc.) as well as the degree of labor income uncertainty and the availability of credit. Their model's estimated coefficients imply that a substantial contribution to the decline in consumption during the Great Recession was due to the increase in precautionary saving. The perceived labor income risk is measured by the households' unemployment expectations using the Thomson Reuters/University of Michigan's Surveys of Consumers. The households' unemployment expectations are assumed to be a better proxy of labor income risk than the unemployment rate.

Broadway and Haisken-DeNew (2019) using household-level panel data, distinguish between 'real' income uncertainty the household is actually exposed to, and

‘perceived’ income uncertainty. They find that the latter substantially increases precautionary savings above and beyond the effect of ‘real’ income uncertainty. Vinokurov *et al.* (2018) prove that the information factor (the uncertainty in economic news from media) plays an important role in the process of households’ decision-making about the distribution of disposable income between consumption and savings.

Models of precautionary savings have mainly focused on one specific type of uncertainty, namely labor income uncertainty. However, there are also other types of risk (like financial, political, terrorist, pension wealth, health risk) that influence the level of uncertainty and become a subject of exploration (Guiso *et al.*, 2013; Crump *et al.*, 2015; Aaberge *et al.*, 2017; Goel *et al.*, 2017; Kochaniak and Ulman, 2020).

In general, the precautionary saving theory predicts that higher levels of uncertainty lead to higher precautionary saving. However, when market volatility is extreme or financial, macroeconomic, and political forms of instability turn into crises, agents lose confidence in financial instruments and the institutions that issue or back them such that saving declines (Grigoli *et al.*, 2014).

A recent review of the empirical literature on the precautionary saving by Lugilde *et al.* (2019) concludes that although the hypothesis that increased uncertainty generates a positive extra saving has been tested by a large number of authors, the empirical results are not conclusive. There is neither consensus on the intensity of the precautionary motive for saving, nor on the most appropriate measure of uncertainty. The need for further research is also confirmed at the theoretical basis. Baiardi *et al.* (2020) reveal that there is room for further development in precautionary saving theory along several lines.

Taking as a basis the large impact on household well-being of the subprime crisis and, more generally, of all the disruptive events that, in the current opinion, are included in the category of ‘black swan’ circumstances, they convince that a deeper investigation of the effects of rare events on precautionary saving could prove to be very useful. This path may be of special interest in terms of the global pandemic COVID-19 that has contributed to an unprecedented uncertainty. Undoubtedly the social distancing and lockdown measures imposed by governments during the emergency significantly restricted households’ ability to spend. However, the precautionary motives, related to medical and economic concerns, may turn out to be important drivers of household saving increase in a pandemic economy as well (Ercolani 2020).⁴

⁴Ercolani (2020) provides some back-of-the-envelope calculations to show that in the US the dynamics of the unemployment rate alone can induce a large increase in (precautionary) saving for the year 2020, which can raise the prospect of a new saving glut.

The second vast strand of literature discusses the importance of consumer sentiment⁵ in stimulating economic activity. According to George Katona, the founding father of surveys of consumer attitudes, consumers' willingness to buy depends primarily on attitudes and expectations about personal finances and the economy as a whole. Willingness to buy (captured by the Index of Consumer Confidence) and ability to buy (represented primarily by the income, the possessions of consumer like the available financial assets and by access to credit) interact and each factor may change independently to the other (Katona, 1968). This is supported by Golinelli and Parigi (2004) findings that the main driving forces of consumer confidence cannot be simply summarised on the basis of the most common and used macroeconomic variables.

Malgarini and Margani (2007) prove that sentiment does not seem to be well explained by economic fundamentals alone because it also captures the effects of the political cycle and exceptional circumstances. Similarly, De Boef and Kellstedt (2004) demonstrate a direct effect of politics, as well as an indirect effect of media coverage of the economy, on consumer sentiment, after controlling for economic conditions. Some part of fluctuations in sentiment may reflect discrepancies between people's perceptions of economic fundamentals and actual changes in conditions. Starr (2012) reveals that "news shocks" (that is instances when news portrayals of economic conditions move unexpectedly relative to incoming economic data) are important in explaining short-term fluctuations in consumer sentiment. Some researchers suggest that consumer confidence may capture the effects of uncertainty. Still this is a disputed issue whether changes in confidence represent autonomous fluctuations in optimism or rather reflect (information on) economic fundamentals.

Most studies have focused on the time-series relationship between aggregate consumption (and its subaggregates) and the aggregate indices of sentiment and, in particular, on the question of whether consumer confidence forecasts consumption. The results on the predictability of consumer attitudes toward consumer spending are somewhat mixed. The effect of consumer sentiment on consumption has been analyzed by, among others Carroll *et al.* (1994), Kwan and Cotsomitis (2004), Ludvigson (2004), Easaw *et al.* (2005), Kwan and Cotsomitis (2006), Malgarini and Margani (2007), Celik and Ozerkek (2009), Bruno (2014), Kilic and Cankaya (2016), Gausden and Hasan (2016), Lahiri *et al.* (2016), Juhro and Iyke (2020).

Most of these studies, but not all, have focused on the USA. Their results can be construed as supporting the hypothesis that consumer confidence contains information relevant to predicting spending, independent from other indicators, and improves the accuracy of consumption forecasts. Dees and Brinca (2013) show that the contribution of confidence in explaining consumption expenditures increases when household survey indicators feature large changes; thus, confidence indicators can have some increasing predictive power during periods associated with high

⁵In what follows, the word "sentiment" and "confidence" are used interchangeably.

consumer confidence volatility. Taylor and McNabb (2007) demonstrate that consumer (and business) confidence indicators are procyclical and generally play a significant role in predicting downturns. Nowzohour and Stracca (2020) analyse consumer confidence co-movement with economic and financial variables in an international context and they find that most of the correlations are contemporaneous or forward-looking. This evidence is consistent with the view that consumer sentiment is indeed a driver of activity. Conversely, Fuhrer (1993), Fan and Wong (1998), Howrey (2001), Goh (2003), Cotsomitis and Kwan (2006), Al-Eyd *et al.* (2009), Dreger and Kholodilin (2013), and Karasoy *et al.* (2017) suggest that confidence effects on consumption are weak when other key determinants of consumption are considered. Gausden and Hasan (2016) reveal that a significant within-sample relationship fails to deliver a marked improvement in forecast accuracy when the survey data exhibit only limited variability over the post-sample period.

Rather little attention has been directed to the individual component questions that the aggregate consumer confidence indexes are based on. Bram and Ludvigson (1998) undertake a formal statistical comparison of the predictive power exhibited by the University of Michigan's Consumer Sentiment Index and the Conference Board's Consumer Confidence Index and their component questions for several categories of consumer spending growth. Their results show that some survey questions have more predictive power than others. Questions that ask about consumers' perceptions of job availability typically have the most explanatory power for future movements in consumption, whereas questions that ask about buying conditions or financial conditions today relative to the past appear to have much less explanatory power.

Wilcox (2007) demonstrates that the individual component questions that comprise the University of Michigan's Consumer Sentiment Index often much more significantly improve consumption forecasts than does the aggregated index that is constructed from those questions. He reveals that forecasts, not just of durables or vehicles in particular, but also of nondurables and services are improved by including individual component questions about consumer sentiment. Kellstedt *et al.* (2015) find that, at least with respect to consumer spending on durable goods, the multi-indicator Index of Consumer Sentiment predicts less well than do its components. Willingness to consume appears to be a complex construct, that is better captured by the inclusion of multiple indicators than by the inclusion of the Index created from those indicators.

Gausden and Hasan (2016) reveal that refined versions of Consumer Confidence Indicator (modified by excluding or including some questions) succeed in generating more accurate forecasts than Consumer Confidence Indicator itself. Jonsson and Lindén (2009) focus on how to better capitalise on the current set of questions included in the European Commission harmonised consumer survey in terms of their predictive power of private consumption. They conclude that the composite

Consumer Confidence Indicator in general does not efficiently use the information available to track private consumption. The optimal set of questions included in the composite measure of confidence varies considerably across countries. Dreger and Kholodilin (2013) suggest that data of the harmonized survey on consumer confidence may be exploited for private consumption forecast in a more appropriate way if the composite indicator would be built upon pre-selection methods and data-driven aggregation methods would be applied to determine the weights of the individual ingredients.

This manuscript is among the first attempts to fill the gap on the role of consumer confidence indicators in explaining household saving behavior. The value added of this paper is that it borrows from this two growing strands of literature and suggests to incorporate Consumer Confidence Indicator (and its components) to the models forecasting household saving rate in the broad cross-country settlement.

3. Data and Methodology

National accounts are a coherent and consistent set of macroeconomic indicators, which are widely used for economic analysis and forecasting. The economic behavior of households and other institutional sectors (non-financial corporations, financial corporations and government) is a subject of sector accounts. In the European accounts, the households sector comprises all households, household firms and also non-profit institutions serving households (NPISHs), such as charities and trade unions. We employ quarterly sector accounts data based on ESA2010 published by Eurostat to measure households propensity to save.

Households' saving is defined as the difference between their gross disposable income (mainly wages received, revenue of the self-employed and net property income) and their consumption (expenditure on goods and services). In other words, gross saving is the part of the gross disposable income which is not spent as final consumption expenditure. The gross household saving rate (*SR*) is calculated by dividing gross saving by gross disposable income, the latter being adjusted for the change in the net equity of households in pension funds reserves. This is considered traditional measure of household propensity to save.

Concerning the confidence indicators, we use the survey data generated within the framework of the Joint Harmonised EU Programme of Business and Consumer Surveys. High frequency, timeliness and continuous harmonisation are among their main qualities. The survey results are often used by European Commission, the ECB, central banks, research institutes and financial institutions for both qualitative and quantitative analysis. The consumer survey questions are organised around four topics: the households' financial situation, the general economic situation, savings and intentions with regard to major purchases. The Consumer Confidence Indicator (*COF*) is the arithmetic average of the balances (in percentage points) of the answers to the questions on the financial situation of households, the general economic

situation, unemployment expectations (with inverted sign) and savings, all over the next 12 months.⁶ Balances are seasonally adjusted. The questions are as follows:

- Q2 How do you expect the financial position of your household to change over the next 12 months?

It will...

- + + get a lot better
- + get a little better
- = stay the same
- get a little worse
- - get a lot worse
- N don't know.

- Q4 How do you expect the general economic situation in this country to develop over the next 12 months?

It will...

- + + get a lot better
- + get a little better
- = stay the same
- get a little worse
- - get a lot worse
- N don't know.

- Q7 How do you expect the number of people unemployed in this country to change over the next 12 months?

The number will...

- + + increase sharply
- + increase slightly
- = remain the same
- fall slightly
- - fall sharply
- N don't know.

- Q11 Over the next 12 months, how likely is it that you save any money?

- + + very likely
- + fairly likely
- not likely
- - not at all likely
- N don't know.

The formula of Consumer Confidence Indicator is as follows:

$$COF = \frac{Q2+Q4-Q7+Q11}{4} . \quad (1)$$

⁶The construction of the Consumer Confidence Indicator described and used in the article is relevant to the period of analysis (European Commission 2016). It is to be noted, however, that the set of component questions was reformulated by the European Commission in January 2019. More information on present consumer survey methodology is available in European Commission (2020).

On the basis of the distribution of the various options for each question, aggregate balances are calculated for each question. Balances are the difference between positive and negative answering options, measured as percentage points of total answers. If PP , P , E , M , MM denote the percentages of respondents having chosen respectively the option "very positive", "positive", "neutral", "negative", "very negative", and N is the percentage of respondents without any opinion (so that $PP+P+E+M+MM+N=100$), the balance is calculated as:

$$B = (PP + \frac{1}{2}P) - (\frac{1}{2}M + MM). \quad (2)$$

It is clear from the expression above that balance values range from -100 , when all respondents choose the most negative option, to $+100$, when all respondents choose the most positive option.

The explanatory variables that we treat as "economic fundamentals" are variables that are usually perceived as potential determinants of changes in household saving. According to the economic theory income and interest rate are main factors of consumption and saving. As admitted by Carroll et al. (1994) the choice of which fundamental variables to include in the regression is inherently somewhat arbitrary. We take the following:

- the real gross household disposable income in euro per capita (current values are deflated by the Harmonized Index of Consumer Prices (HICP) and divided by the number of population; all data published by Eurostat), hereafter IC ,
- the real interest rate, hereafter IR . It equals the nominal interest rate less the rate of inflation (HICP). The nominal interest rate is given by a representative 3-months interest rate for the domestic money market. The euro area rate is the 3-month "Euro InterBank Offered Rate" – EURIBOR. All data are published by Eurostat.

We decided to use quarterly data instead of annual time series as the former better address the forecasting exercise. The sample of countries and the period under analysis are determined by the availability of data. We have constructed a balanced data panel including 14 countries for 58 time periods. The countries taken into account in the study are: Belgium, Czech Republic, Denmark, Germany, Spain, France, Italy, Netherlands, Austria, Poland, Portugal, Finland, Sweden, and United Kingdom. The dataset covers quarterly observations in the period from 2002q1 to 2016q2. The total number of observations is 812. The descriptive statistics of variables are presented in Table 1.

The stationarity of the data are examined using panel unit root test of Im, Pesaran & Shin (2003). The procedure allows to test hypothesis that all cross-sectional data have a unit root (are non-stationary). The test is estimated both in levels and first differences. Table 2 reports the results of the test. Saving Rate, Real Interest Rate and Real Income are non-stationary $I(1)$ in levels and stationary $I(0)$ in first

differences. Consumer Confidence Indicator and its components (except $Q11$) are $I(0)$ both in levels and first differences.

Table 1. Descriptive Statistics

Variables	Mean	Median	Min	Max	SD
Gross Household Saving Rate SR (percentage)	11.22	11.58	0.86	18.31	3.99
Real Gross Disposable Income per Capita IC (euro)	4042	4469	842	5994	1327
Real Interest Rate IR (percentage)	0.18	0.01	-3.49	5.17	1.57
Consumer Confidence Indicator COF (points)	-8.07	-8.60	-51.97	26.73	15.39
Expected Financial Situation $Q2$ (points)	-1.56	-2.33	-31.97	18.20	9.20
Expected General Economic Situation $Q4$ (points)	-9.91	-8.83	-64.40	27.33	15.53
Expected Unemployment $Q7$ (points)	23.65	22.47	-24.73	79.77	21.11
Saving Plans $Q11$ (points)	2.83	2.43	-58.03	59.30	30.00

Source: Own study.

We choose panel data estimation method, because it enables to investigate any common structure present in the time series of interest. There are broadly two classes of panel estimator approaches that can be employed in econometric research, fixed effects models and random effects models (Brooks, 2008). Standard procedure with panel data models is to test the occurrence of the individual fixed effects (with use of F test with H_0 : no significant individual fixed effects) and random effects (with use of Breusch-Pagan test with H_0 : no significant random effect). Hausman test additionally allows to make the plausible choice between random and fixed effects estimator. Preliminary investigations of the data shows that there is strong evidence of individual effects in the data and reasonable choice is fixed effect model.

Linear fixed effects model for N observations and T time periods is described in the following equation:

$$y_{it} = \alpha_0 + X_{it} \cdot \beta + \alpha_i + u_{it} \quad \text{for } t=1, \dots, T \text{ and } i=1, \dots, N, \quad (3)$$

where

y_{it} is the independent variable observed for individual i at time t ,

X_{it} is the time-variant ($1 \times k$) regressor vector, k is the number of regressors,

β is the ($k \times 1$) vector of parameters,

α_i is the unobserved time-invariant individual effect,

α_0 is the intercept,

u_{it} is the error term.

Individual effect α_i is encapsulating all of the variables that affect y_{it} cross-sectionally, but do not vary over time.

One of the methods of estimating unobserved effects models is through removing time-invariant individual components by first-differencing the data (lagging the model and subtracting) (Wooldridge, 2013):

$$y_{it} - y_{it-1} = (\alpha_0 - \alpha_0) + (X_{it} - X_{it-1}) \cdot \beta + (\alpha_i - \alpha_i) + (u_{it} - u_{it-1}) \quad (4)$$

$$\Delta y_{it} = \Delta X_{it} \cdot \beta + \Delta u_{it} \quad (5)$$

The intercept and the individual component are eliminated. The first difference transformation can be consistently estimated by pooled OLS. This is called the first-difference, or FD estimator. The FD estimator is usually preferred if the errors u_{it} are strongly persistent in time. The first differences Δu_{it} will tend to be serially uncorrelated. We choose this estimator among other consistent alternatives not only because of its relative efficiency, but also due to the fact that all variables are stationary in first differences.

As first differencing eliminates the fixed effects we limit our examination to Breusch-Pagan tests of random effects. If H_0 is not rejected a pooled OLS estimator should be used. The household saving rate function can be approximated for the purposes of estimation as follows:

$$SR = f(I, IC, IR), \quad (6)$$

where I symbolizes a given measure of consumer confidence, namely COF , $Q2$, $Q4$, $Q7$, or $Q11$ alternatively, IC represents real gross disposable income per capita, and IR stands for real interest rate.

The first research question addresses the predictive power of Consumer Confidence Indicator (COF) and its components ($Q2$, $Q4$, $Q7$, $Q11$) for household saving rate on their own. We estimate the following panel data model, using first differences of the variables (to avoid the non-stationarity of data and to address the short-term dependences):

$$\Delta SR_{it} = \beta_0 + \sum_{j=1}^4 \beta_j \Delta I_{i,t-j} + v_{it}, \quad (7)$$

where I represents COF , $Q2$, $Q4$, $Q7$, or $Q11$ alternatively and v_{it} is the error term.

The second research question addresses the additional predictive power of COF and its components ($Q2$, $Q4$, $Q7$, $Q11$) aside from the predictive power contained in other available indicators. For this purpose we first estimate an autoregressive baseline model with two fundamental variables – the real gross household disposable income per capita (IC) and the real interest rate (IR), producing the following form:

$$\Delta SR_{it} = \beta_0 + \sum_{j=1}^4 \beta_j \Delta IC_{i,t-j} + \sum_{j=1}^4 \gamma_j \Delta IR_{i,t-j} + \rho \Delta SR_{t-1} + v_{it}, \quad (8)$$

where $j = 1, \dots, 4$.

Next, each of the measures of confidence, i.e. ΔCOF , $\Delta Q2$, $\Delta Q4$, $\Delta Q7$, $\Delta Q11$ is added one after another to the baseline model:

$$\Delta SR_{it} = \beta_0 + \sum_{j=1}^4 \beta_j \Delta IC_{i,t-j} + \sum_{j=1}^4 \gamma_j \Delta IR_{i,t-j} + \rho \Delta SR_{t-1} + \sum_{j=1}^4 \delta_j \Delta I_{i,t-j} + v_{it} \tag{9}$$

where $I = COF, Q2, Q4, Q7, Q11$ alternatively.

The baseline model (Equation 8) is compared with an alternative that includes both lagged changes in fundamental variables and lagged changes in the given consumer confidence index (Equation 9). The significance of the newly added variables (four lags of the change in the given consumer confidence index) is to be confirmed by an F-test for joint significance of explanatory variables. Moreover adjusted R^2 and Akaike Information Criterion (AIC) values of the baseline model (Equation 8) and its alternatives (following Equation 9) are compared (Table 2).

Table 2. Results of Im, Pesaran & Shin (2003) unit-root test (*p*-value)

Variable	Level	1st Difference
Gross Household Saving Rate <i>SR</i>	0.07	0.00***
Real Gross Disposable Income per Capita <i>IC</i>	0.84	0.00***
Real Interest Rate <i>IR</i>	0.97	0.00***
Consumer Confidence Indicator <i>COF</i>	0.00***	0.00***
Expected Financial Situation <i>Q2</i>	0.02**	0.00***
Expected General Economic Situation <i>Q4</i>	0.00***	0.00***
Expected Unemployment <i>Q7</i>	0.00***	0.00***
Saving Plans <i>Q11</i>	0.17	0.00***

Notes: *** Statistical significance at the 1% level. ** Statistical significance at the 5% level. * Statistical significance at the 10% level.

Source: Own study.

Both the research questions and methodology applied in this study are inspired by the seminal paper of Carroll *et al.* (1994). However, they study the predictive power of consumer sentiment on household spending, whereas the predictive power of consumer sentiment on household saving rate is examined in the present paper. The left-hand side variable in their regressions is the log difference of the indicated category of real household spending while changes in the smoothed saving rate are regressed here. Moreover, Carroll *et al.* (1994) use only one composite sentiment index (the University of Michigan's Index of Consumer Sentiment) while in this study in addition to aggregate Consumer Confidence Indicator, its components are used to provide more precise information. We broaden the set of fundamentals applied by Carroll *et al.* (1994) with changes in real interest rate.

4. Results and Discussion

The following section presents and discusses empirical findings of a regression analysis.

4.1 The Predictive Power of Consumer Confidence Indexes on their Own

Table 3 reveals results of models estimated according to Equation 7. It summarizes the appraisal of the predictive power of Consumer Confidence Indicator and its components upon future household saving rate on their own. There is an information about estimated coefficients, p-values, and significance of the variables. Next columns report the evidence of adjusted R^2 , AIC, p-values of F test for joint significance of the explanatory variables, and p-values of Breusch-Pagan test. As test results do not identify random effects we use pooled OLS estimator.

The results of Model 1 (Table 3) exhibit that movements in the composite Consumer Confidence Indicator are of relevance for the future behavior of household saving rate. As the model is estimated on the first differences of panel data, not surprisingly, the adjusted R^2 is relatively low. Its value for Model 1 is 0.035. However the model confirms the significance of third and fourth lag of the changes of Consumer Confidence Indicator as explanatory variables at better than the 1-percent level of significance. By virtue of performing analysis at a disaggregated level, it is possible to discern whether or not household saving rate is equally sensitive to changes in component measures of consumer sentiment.

The results of Models 2-5 reveal a statistically significant relationship between changes in household saving rate and lagged changes in all analyzed questions of consumer confidence survey except *Q11* referring to household saving plans. In Models 1-4 the coefficients on four lags of changes in the given confidence measure are jointly significant at better than the 1-percent level of significance.

The minimum value of AIC is recorded for Model 4. Simultaneously this model has the highest value of adjusted R^2 . That means that the highest influence is exerted by lagged change in *Q7*, which addresses household expectation concerning unemployment level. It is worth emphasizing that the component index *Q7* succeeds in generating more accurate forecasts than the composite Consumer Confidence Indicator. This is in line with findings of Bram and Ludvigson (1998). They discover that questions asking specifically about job prospects in the respondent's area have the most explanatory power for consumer expenditures.

Carroll *et al.* (2012) also find a statistically significant role of answers to the question about the expected change in unemployment in the Thomson Reuters/University of Michigan Surveys of Consumers for the personal saving rate in the US.

Table 3. Predictive power of Consumer Confidence Indicator and its components upon future household saving rate on their own – alternative models $\Delta SR_{it} = \beta_0 + \sum_{j=1}^4 \beta_j \Delta I_{i,t-j} + v_{it}$ (according to Eq. 7)

Model	Regressor	Coefficient	p-value	Adj. R ²	AIC	F test for joint significance (p-value)	Breusch-Pagan test (p-value)
1	Const	-0.0230	0.31				
	ΔCOF_{t-1}	-0.0044	0.38				
	ΔCOF_{t-2}	-0.0044	0.41				
	ΔCOF_{t-3}	-0.0168	0.00***				
	ΔCOF_{t-4}	-0.0142	0.00***				
					0.0352	1083.1	0.00
2	Const	-0.0284	0.32				
	$\Delta Q2_{t-1}$	0.0079	0.32				
	$\Delta Q2_{t-2}$	0.0032	0.69				
	$\Delta Q2_{t-3}$	-0.0195	0.02**				
	$\Delta Q2_{t-4}$	-0.0224	0.01***				
					0.0189	1098.4	0.00
3	Const	-0.0266	0.18				
	$\Delta Q4_{t-1}$	0.0013	0.69				
	$\Delta Q4_{t-2}$	0.0003	0.94				
	$\Delta Q4_{t-3}$	-0.0109	0.00***				
	$\Delta Q4_{t-4}$	-0.0079	0.01**				
					0.0238	1090.1	0.00
4	Const	-0.0341	0.25				
	$\Delta Q7_{t-1}$	0.0050	0.03**				
	$\Delta Q7_{t-2}$	0.0055	0.03**				
	$\Delta Q7_{t-3}$	0.0059	0.02**				
	$\Delta Q7_{t-4}$	0.0067	0.00***				
					0.0463	1076.7	0.00
5	Const	-0.0319	0.52				
	$\Delta Q11_{t-1}$	0.0013	0.86				
	$\Delta Q11_{t-2}$	0.0034	0.64				
	$\Delta Q11_{t-3}$	-0.0142	0.05*				
	$\Delta Q11_{t-4}$	-0.0068	0.35				
					0.0043	1110.2	0.13

Notes: COF denotes Consumer Confidence Indicator, Q2 denotes expected financial situation, Q4 denotes expected general economic situation, Q7 denotes expected unemployment, Q11 denotes saving plans. *** Statistical significance at the 1% level. ** Statistical significance at the 5% level. * Statistical significance at the 10% level.

Source: Own study.

One possible interpretation is that, as many households build their economic security on job stability (Kosny and Piotrowska, 2013), a growth in uncertainty associated with job prospects triggers precautionary savings and substantially increases households propensity to save. Moreover, if expected unemployment rise comes true and the number of unemployed is increased then the newly unemployed may not only stop to save but start to dissave (use their savings) to maintain their consumption at the unchanged or only slightly lower level.

The negative sign of statistically significant coefficients of *COF*, *Q2*, *Q4*, and *Q11* lags as well as the positive sign of statistically significant coefficients of *Q7* lags confirm that the growing pessimism about future situation forecasts an increase in household propensity to save, and *vice versa*, the growing optimism about future situation anticipate a decrease in household propensity to save. This is along the line of uncertainty hypothesis according to which the precautionary savings act as self-insurance providing a buffer of wealth that helps protect the household.

4.2 The Incremental Predictive Power of Consumer Confidence Indexes

Table 4 presents estimation results of the baseline model (according to Equation 8). This evidence confirms the statistically significant role of Real Interest Rate and Real Income in household saving forecasts. Table 5 reveals results of augmented models including additional variables representing confidence i.e., Consumer Confidence Indicator or its components (according to Equation 9) in comparison to the baseline model. First of all, estimation results confirm that lagged changes of Consumer Confidence Indicator and three of its components (*Q2*, *Q4*, and *Q7*) are statistically significant. Moreover, adding them to the baseline model results in the enhancement of both adjusted R^2 (i.e. an increase of its value) (recorded for *Q2*, *Q4*, and *Q7*) and AIC (i.e., a decrease of its value) (recorded for *Q2* and *Q4*). The influence exerted by composite indicator and above mentioned component questions is similar.

Consumer Confidence Indicator offers an improvement in the adjusted R^2 by approximately 1.8 percentage points (row 2 column 3). As a result, adjusted R^2 equals 0.1752 what should be interpreted that 17.5% of the variation of change in the household saving rate is explained by the model (row 2 column 2). In general terms, this evidence suggests that consumer confidence play an active, or at least a forecast-performance-enhancing, role in household saving.

It has to be acknowledged that the results of augmented models do not confirm the previously marked superiority of unemployment expectation component. Interestingly, the unemployment expectation index diminishes the effect of interest rate for household saving. It suggests low effectiveness of interest rate manipulation (within monetary policy) for household saving decisions in the presence of high volatility in employment uncertainty.

Table 4. Estimation results for the baseline model

$$\Delta SR_{it} = \beta_0 + \sum_{j=1}^4 \beta_j \Delta IC_{i,t-j} + \sum_{j=1}^4 \gamma_j \Delta IR_{i,t-j} + \rho \Delta SR_{t-1} + v_{it} \quad (\text{according to Eq. 8})$$

Regressor	Coefficient	p-value	Adj. R ²	AIC	F test for joint significance (p-value)	Breusch-Pagan test (p-value)
Const	0.0293	0.28				
ΔIR_{t-1}	-0.1729	0.04**				
ΔIR_{t-2}	-0.0182	0.76				
ΔIR_{t-3}	-0.0486	0.50				
ΔIR_{t-4}	0.2161	0.02***				
ΔIC_{t-1}	-2.4794	0.00***				
ΔIC_{t-2}	1.8837	0.01***				
ΔIC_{t-3}	0.7857	0.34				
ΔIC_{t-4}	-2.3076	0.02**				
ΔSR_{t-1}	0.3429	0.00***				
			0.1572	1058.52	0.00	0.14

Notes: *IC* denotes disposable income, *IR* denotes interest rate, *I* denotes a chosen measure of consumer confidence, *COF* denotes Consumer Confidence Indicator, *Q2* denotes expected financial situation, *Q4* denotes expected general economic situation, *Q7* denotes expected unemployment, *Q11* denotes saving plans. *** Statistical significance at the 1% level. ** Statistical significance at the 5% level. * Statistical significance at the 10% level.

Source: Own study.

Table 5. Incremental predictive power of Consumer Confidence Indicator and its components upon future household saving rate - baseline model

$$\Delta SR_{it} = \beta_0 + \sum_{j=1}^4 \beta_j \Delta IC_{i,t-j} + \sum_{j=1}^4 \gamma_j \Delta IR_{i,t-j} + \rho \Delta SR_{t-1} + v_{it} \quad (\text{according to Eq. 8}) \text{ versus augmented models}$$

$$\Delta SR_{it} = \beta_0 + \sum_{j=1}^4 \beta_j \Delta IC_{i,t-j} + \sum_{j=1}^4 \gamma_j \Delta IR_{i,t-j} + \rho \Delta SR_{t-1} + \sum_{j=1}^4 \delta_j \Delta I_{i,t-j} + v_{it} \quad (\text{according to Eq. 9})$$

Model	Adj. R ²	Incremental adj. R ²	AIC	F test for joint significance of four lags of ΔIC (p-value)	F test for joint significance of four lags of ΔIR (p-value)	F test for joint significance of four lags of ΔI (p-value)	F test for joint significance of all independent variables (p-value)	Breusch-Pagan test (p-value)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)

1	Baseline	0.1572		1058.5	0.00	0.00	0.00	0.15
	Augmented by four lags of			2	***	***		
2	Δ COF	0.1752	0.0180	1057.4	0.00	0.02	0.00	0.35
				9	***	**	***	
3	Δ Q2	0.1747	0.0175	1057.8	0.00	0.00	0.01	0.36
				9	***	***	***	
4	Δ Q4	0.1757	0.0185	1057.0	0.01	0.01	0.04	0.42
				1	**	**	**	
5	Δ Q7	0.1733	0.0161	1059.2	0.04	0.06	0.03	0.29
				3	**	*	**	
6	Δ Q11	0.1698	0.0126	1062.3	0.02	0.00	0.27	0.34
				5	**	***		

Notes: *IC* denotes disposable income, *IR* denotes interest rate, *I* denotes a chosen measure of consumer confidence, *COF* denotes Consumer Confidence Indicator, *Q2* denotes expected financial situation, *Q4* denotes expected general economic situation, *Q7* denotes expected unemployment, *Q11* denotes saving plans. *** Statistical significance at the 1% level. ** Statistical significance at the 5% level. * Statistical significance at the 10% level.

Source: Own study.

Four lags of changes in *Q11* (reflecting the likelihood of household future savings) are not proved to be jointly significant at any of the usual levels (column 7 row 6). At first glance it may be rather surprising that lagged change in component index that directly relates to household saving prospects has practically no explanatory power for changes in household saving rate. However along the line of reasoning by Gausden and Hasan (2016) in case of question *Q11*, in contrast to the other three questions, a common answer may have different implications for the subsequent behavior of household spending.

For example, the intention to save money over the following twelve months may be derived from a precautionary motive, i.e., the accumulation of funds in order to offset (anticipated) future falls in income. In such a case, a commitment towards savings would be combined with a contraction of expenditure and an increase in saving rate. Alternatively, a positive approach towards savings may originate from an optimistic outlook with respect to income growth, which permits simultaneously an increase in consumption. If consumption rises faster than saving a decrease in saving rate is observed. The negative signs of *Q11* coefficients in our regressions suggest that the second effect is stronger. Still it is mitigated by the first one and the final outcome of *Q11* for saving rate is ambiguous. Similarly, Jonsson and Lindén (2009) comparing eleven questions included in the European Commission harmonised consumer questionnaire find relatively low usefulness of question *Q11* in terms of its predictive power of private consumption.

Generally, our results are in line with the broad body of the literature that stresses the importance of consumer confidence for stimulating household economic behavior. One of the strands in this literature confirms the usefulness of consumer confidence indicators as explanatory variables in household consumption forecasts (Carroll *et al.*, 1994). One can expect that consumer confidence indicators should also improve household saving forecasts.

In fact, our results provide convincing support for the premise that a part of variation in household saving behavior is due to consumer confidence. Moreover, it has been demonstrated that confidence indexes (subjective indicators) contain predictive ability beyond economic fundamentals (objective indicators). This is in line with Malgarini and Margani (2007) findings that sentiment does not seem to be well explained by economic fundamentals alone because it also captures the effects of the political cycle and exceptional circumstances. Our results are consistent with earlier recommendations to combine subjective and objective indicators to achieve a broader picture and a more reliable basis for forecasts and policy assessments (Veenhoven, 2002; Bialowolski and Weziak-Bialowolska, 2014).

5. Conclusions

Household saving rate is commonly used aggregate metrics. There have been a significant amount of empirical studies that aim to explain household saving rate by using various macroeconomic and demographic variables. We suggests to include widely tracked confidence indicators as a measure of uncertainty within the list of household saving rate determinants.

To the best of our knowledge, this paper provides a unique appraisal of the predictive ability of composite and component consumer confidence indexes for household saving rate in the broad cross-country settlement. Presented empirical study on panel data of 14 European countries confirms that Consumer Confidence Indicator and most of its component questions have predictive power for the forecasts of household saving rate in both cases - as distinct predictor and as additional variable to the baseline model.

This paper broadens the discussion on the predictive power of consumer confidence for macroeconomic outlook and adds depth to reasoning on household saving determinants. Our findings suggest that financial optimism is inversely associated with saving, supporting the precautionary motive.

The results may be of special interest in terms of the global pandemic COVID-19 that triggered a profound drop in consumer confidence. There are already available some back-of-the-envelope calculations of the COVID-induced precautionary saving in the US (Ercolani 2020).

Further research on the usefulness of the consumer confidence variables in analyzing and forecasting household saving behavior at the household level is recommended. Aggregate measures are not likely to provide as precise information on the uncertainty (faced by individuals) as microeconomic data. Moreover, saving decisions are taken at the micro level therefore micro data should be a better option than macro data for an in-depth exercise. This is one of the possible lines to expand the discussion.

Better understanding of the household financial expectations to household financial decisions relationship should be valuable input into a number of policy areas, in particular into monetary policy and financial stability analysis. The significant role played by confidence in household saving has important policy implications for central banks. It supports efforts to maintaining the credibility of monetary policy, including good communication strategies as important steps towards increasing public confidence.

A significant effect of unemployment expectations on household saving decisions suggests that policy targeted at keeping low and stable unemployment level would help in reducing the volatility of the household saving rate. Generally, our results support the recommendations to combine subjective (confidence indexes) and objective (economic fundamentals) indicators to achieve a broader picture and a more reliable basis for forecasts and policy assessments in the area of household finance.

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