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CONSUMER CONFIDENCE INDEX (CCI) FOR EUROPEAN COUNTRIES – RELATION TO OBJECTIVE HOUSEHOLD FINANCIAL SITUATION



ABSTRACT

Subjective assessments of economic well-being may differ significantly from the actual economic situation of a household and may not be consistent with objective survey results. They reflect the ability of households to maintain or improve their financial well-being. The Consumer Confidence Index (CCI) has been constructed in order to measure consumer attitudes and thus the potential influence of non-economic factors on household purchase and investment decisions. Its construction takes into account not only the assessment of the current financial and economic situation in the country and the current level of savings, but also the expectations of consumers with regard to the above-mentioned areas of life and the management of financial resources. The objectives of the article are (1) to test and select the components contributing to the Consumer Confidence Index by proposing a new approach to its calculation and (2) to test the links between consumer sentiment and the level of financial instruments held by European households. The modelling was carried out using data on the components of the Consumer Confidence Index (CCI) for the countries of the European Union and data on the financial situation of households. The data were taken from the Eurostat database. The analysis period covers the period 2015-2022, depending on data availability.

JEL: C22, C33, D14, E21

KEYWORDS: *Consumer Confidence Index, European Countries, Financial Assets, Currency, Loans*

INTRODUCTION

The role of the Consumer Confidence Index (CCI) is growing with the development of behavioural economics. The Consumer Confidence Index is used to measure consumer attitudes and the influence of non-economic factors on household purchasing and investment decisions. The advantage of this index is that it takes into account assessments of the current financial situation (including current household savings) and the economic situation of the country, as well as consumer expectations regarding the above-mentioned areas of life and the management of financial resources (Berry, Davey, 2004, p. 284). The Consumer Confidence Index thus indicates the degree of satisfaction (or dissatisfaction) with the current state of the economy (expressed, for example, in the level of savings or consumer spending).

Analyses of the information provided by the CCI can play a significant role in micro – and macroeconomic forecasting. The current conditions component (assessments of the economic situation, the country's economic situation, savings in the run-up to the survey) can be linked to economic activity, while the expectations component (assessments of the expected economic situation, the country's economic situation, savings in the future) can be linked, for example, to the growth rate of the Gross Domestic Product (Islam, Mumtaz, 2016, p. 19). Confirmation of this thesis can be found, for example, in the research of Matsusaka, Sbordone (1995, p. 302), which found that a fall in the Consumer Confidence Index could lead to a fall in output. A causal relationship between consumer expectations and a change in the manufacturing sector was also found by Li (2011, p. 298).

In the literature, the CCI is used to predict consumer spending, asset valuations, stock market and oil prices, etc. (Jansen, Nahuis, 2003, p. 92; Ludvigson, 2004, p.33; Lemmon, Portniaguina, 2006, p. 1521). However, very few studies have looked at the relationship between CCI and economic growth. (Matsusaka, Sbordone, 1995, p.299; Utaka, 2003, p. 1168). This study is an attempt to empirically analyse the relationship between consumer sentiment and the level of financial instruments held by European households. The study was motivated by the fact that the CCI has attracted sustained interest from economists, partly due to the increasing role of subjective factors (assessments of the financial and material situation included in the CCI construct) compared to objective factors. Sorić, et al. (2020, p. 911) show that the relationship between the CCI and hard macroeconomic data has weakened significantly over time. Their study applies to all EU Member States as well as to the EU and the euro area (Sorić, et al. 2020, p. 911). Most work on consumer behaviour suggests that the level of spending, saving or investment depends on the ability to meet consumption goals (income level). This fact has already been pointed out by Katona (1968, p. 22) who emphasises that the level of consumer spending is primarily determined by the income received by the consumer. Cotsomitis and Kwan (2006, p.602) which examined the effectiveness of the Index of Consumer Attitudes (ICA) in predicting household spending at both national and regional levels, found that consumer confidence is a reliable predictor of household spending (Grzywińska-Rapca, 2021a, p. 950; Cotsomitis, Kwan, 2006, p 598).

Gausden and Mohammad (2018, p. 1397) highlight the weaknesses of the consumer confidence index as currently developed by the European Commission. The measures of consumer sentiment identified by this approach suggest that the equal weights assigned to these components are not appropriate (Gausden, Mohammad, 2018, p. 1410). The contribution of all survey questions (12 months) to the CCI and alternative approaches to data standardisation are examined in a study by Lolić, et al. (2022, p. 846). The new approach to constructing the CCI proposed by Lolić, et al. (2022, p. 846) is based on a stronger theoretical foundation and increases the predictive power of the CCI. The correlations with private consumption are higher. Referring to the discussion in the literature on the construction of the Consumer Confidence Index, the paper proposes a new CCI. The variables chosen for the new CCI may increase the likelihood of using an index with fewer components in the analyses, given the greater availability of data. It is difficult to disagree with this, but it should be stressed that income does not fully explain changes in consumption and investment behaviour. The willingness to buy or accumulate financial resources is also influenced by subjective factors and depends on attitudes and expectations regarding personal finances. The Consumer Confidence Index (CCI) can therefore be seen as a measure combining ability (current assessments) and willingness (expectations).

LITERATURE REVIEW

CONSUMER CONFIDENCE INDEX (CCI)

The construction of the Consumer Confidence Index (CCI) consists of respondents' answers to survey questions designed according to the methodology of the Economic Survey. The questions relate to the expected financial situation, sentiment about the general economic situation, unemployment and the ability to save. For each question, a weighting is assigned to the response options. The option very *positive* holds the weight of 1, *positive* – the weight of 0.5, *negative* – the weight of – 0.5, whereas very *negative* – the weight of – 1. All other options hold the weight of 0. (Grzywińska-Rapca, Markowski, 2023, p. 38; Grzywińska-Rapca, 2021b,

p.45). According to the procedure, the indicators obtained take values from –100 to 100. Negative values of the indicator mean that the phenomenon in question is met with mainly negative opinions, while positive values mean that positive opinions predominate. It is important to note that public opinion surveys aim to interpret the changes in the balance that have taken place over the periods under consideration, rather than simply assessing their sign and level at a given point in time. This approach makes it possible to take into account psychological and sociological features of society, such as excessive optimism or pessimism. (Grzywińska-Rapca, Markowski, 2023, p. 41, Grzywińska-Rapca, Ptak-Chmielewska, 2023, p. 3).

The Consumer Confidence Index, which measures consumer confidence in the state of the economy and their purchasing power, is considered an important leading economic indicator. Authors (e.g. Throop, 1992, 43; Malovaná, et al., 2021, p. 901) point to different approaches to analysis using this indicator. First, the consumer confidence indicator can be treated as a measure of uncertainty or risk. That is, as the probability of financial distress increases, an individual household saves more in liquid form to cover a possible shortfall in future income. The second view is that the CCI is used to measure optimism or pessimism about future economic conditions. A third view is that the CCI is an important predictor of consumer spending (Ludvigson, 2004, p. 35; Cotsomitis, Kwan, 2006, p. 598). Selected results from studies on the relevance and information content of the CCI in relation to various economic and financial variables that may play a role in household consumption decisions are presented in Table 1.

Based on the results of the studies summarised in Table 1, it can be concluded that the Consumer Confidence Index plays an essential role in providing policy makers and economic forecasters with the necessary information about the current and future economic situation. It also plays a vital role for the economy, as consumer spending increases a country's economic growth. Positive changes in consumer confidence can, therefore, lead to economic growth for countries and vice versa. (Islam, 2016, p. 21).

Table 1. Selected results from studies of the relationship between the Consumer Confidence Index and economic and financial variables

Author	Dependency description
Ramalho, Caleiro, Dionfsio (2011)	The unemployment rate, inflation, exchange rate and political situation have a very significant impact on consumer confidence
Chen (2011)	A positive relationship between trust levels and stock returns.
Oduh, Ekeocha, Chukwuemeka (2012)	The Impact of the Consumer Confidence Index on Consumption
Raaij (2012)	The impact of news in the media related to politics and the economy, unemployment, inflation, interest rates, pensions and health care costs on the Consumer Confidence Index
Dees, Soares Brinca (2013)	The Consumer Confidence Index is a good predictor for controlling economic information
Casey, Owen (2013)	The relationship between news in the media and consumer confidence
Kuzmanovic, Sanfey (2013)	the use of the Consumer Confidence Index to predict the level of the economy.
Sum (2013)	The relationship between the Consumer Confidence Index and stock market quotations
Utaka (2014)	consumer confidence has a very significant impact on GDP
Paradiso, Kumar, Margani (2014)	The relationship between consumer confidence and inflation
Białowolski (2014)	Relationship between the Consumer Confidence Index and unemployment forecasts, as well as with households' forecasts in the area of demand for durable goods
Bruestle, Crain (2015)	Relationship between the Consumer Confidence Index and media ratings and political opinion polls
Islam, Mumtaz, (2016)	The relationship between CCI and economic growth
Baláž, Nežinský (2016)	<i>The CCI Association and Future Economic Development Patterns in the Next 1-2 Months</i>
Çelik, Deniz (2017)	The factors that determine the Consumer Confidence Index are the inflation rate, interest rates, and the depreciation of the national currency
Shayaa et al. (2018)	There is a significant relationship between the Consumer Confidence Index and social media news
Cárdenas-Hurtado, Hernández-Montes (2019)	The Consumer Confidence Index is influenced by political news and events
Evcı, S. (2019)	Relationship between the Economic Confidence Index and investment
Zhang, Jia, Chen (2020)	Gold Futures Returns Affect Consumer Confidence Index
Juhro, Iyke (2020)	The Consumer Confidence Index is a good indicator of consumer spending
Ghosh (2020)	In the long run, changes in unemployment, stock market fluctuations and interest rate fluctuations shape consumer behaviour
Grzywińska-Rapca, Ptak-Chmielewska (2023)	a higher assessment of the financial situation over the last 12 months, in the opinion of respondents, gives a higher value of the Consumer Confidence Index.

Source: own elaboration based on Tjandrasa, Dewi, (2022, p. 9) and Grzywińska-Rapca, Ptak-Chmielewska (2023, p. 14).

FINANCIAL ASSETS OF HOUSEHOLDS

Household budget management is the subject of analysis by many economists, starting with Kuznets (1946, p.144) or Carroll (2000, p. 471). All the authors mentioned above have focused on households' preferred ways of managing their finances. They are united by the consensus statement that the income received creates the conditions for increased opportunities to accumulate financial surpluses, which follows from the underlying assumptions, namely the consumption function. In the literature on this subject, one can find analyses and studies related to the management of financial resources in different approaches. In broad generalisations, economists focus on specific aspects of household finances: in relation to debt (Brown, Taylor, 2008, p. 621), the demand for financial instruments offered in a particular country (Hochguertel et al., 1997, p. 89) and the savings (Browning, Lusardi, 1996, p. 1822; Yuh, Hanna, 2010, p. 86; Boersch-Supan, Essig, 2005, p. 327).

The demand for financial assets can be determined by a variety of factors. As shown in Table 2, financial asset management behaviour can be categorised into objective and subjective factors.

Table 2. *Objective and subjective factors influencing household budgeting*

Objective	Factors	
	Objective	Subjective
Amount of income		the precautionary motive (building up reserves)
Change in the wage unit		the precautionary motive (preparing for changes in income levels)
Change in propensity to consume*		the calculation motive (future consumption is more desirable than current consumption)
Change in capital values (assets)		the standard of living motive (satisfaction with the level of expenditure that increases the standard of living)
Change in interest rate**		The independence motive
Change in fiscal policy		The entrepreneurial motive (raising funds for investment)
Change in projections of the ratio of future to current income.		The stinginess motive (reluctance to spend)

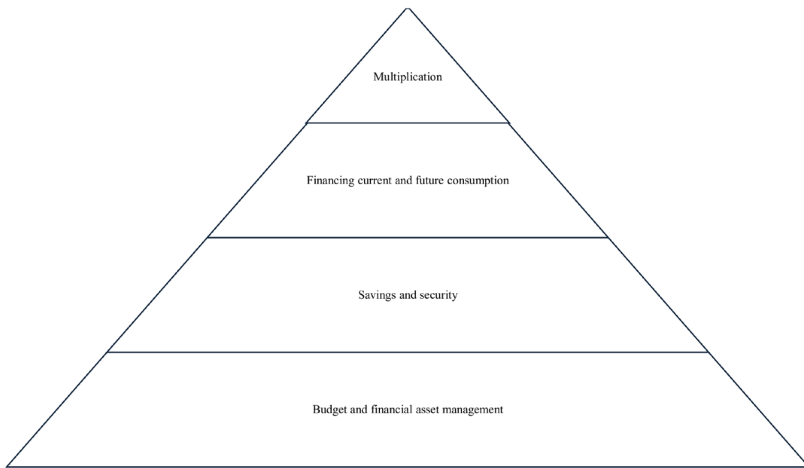
* According to Keynes (1936, p.89-107): an increase in the unit wage increases the propensity to consume; a decrease in the unit wage decreases the propensity to consume.

** According to Keynes (1936, p.201-210): an increase in the (capital) interest rate reduces the propensity to consume; a decrease in the (capital) interest rate increases the propensity to consume.

Source: own elaboration based on: Kulpaka (2013, p.13) and Grzywińska-Rapca (2021, p. 19).

Classical economics points to a positive relationship between the financial resources held by households and savings and consumption. According to classical theories, financial surpluses are a source of income to supplement current and future expenditures and a source of financial wealth. Household investment decisions are forward-looking, and the Consumer Confidence Index can be an significant indicator of the direction of these investments. Household financial behaviour is a specific type of consumption behaviour (Figure 1).

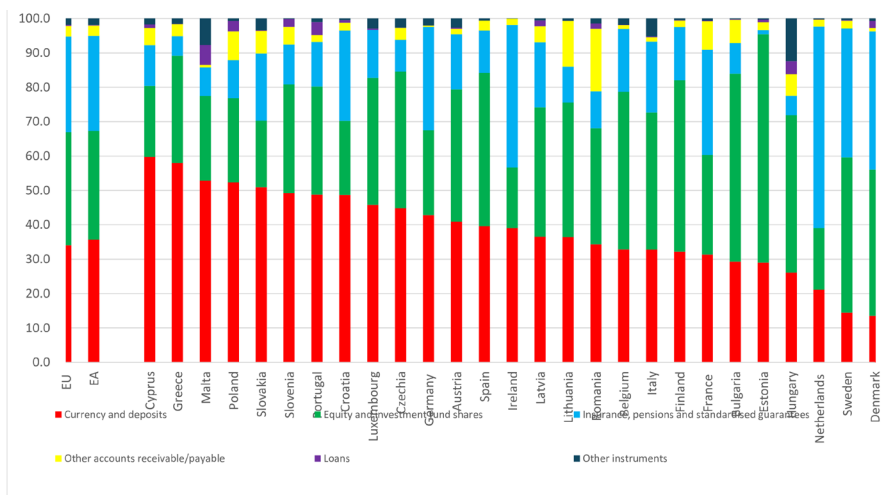
Figure 1. *Consumer Financial Behavior Hierarchy*



Source: own elaboration based on Rys-Jurek (2016, p. 214).

The management of budgets and financial assets occupies a critical position in the hierarchy of household financial behaviour. Daily budget management has an impact not only on savings and collateral but also, in the longer term, on the multiplication of financial resources and the stock of financial assets. The level of financial assets varies across European countries, but the structure of financial assets is similar. Currency and deposits accounted for the largest share (34.1%) of total household financial assets in the EU in 2022, closely followed by shares and other equities (32.8%) and insurance, pensions and standard guarantees (27.8%). Other accounts receivable/payable (3.1%), other instruments (1.8%) and loans (0.3%) had smaller shares (Figure 2).

Figure 2. Share of type of household financial assets in 2022 (% of total household financial assets)



Source: elaboration based on <https://ec.europa.eu/eurostat/databrowser/bookmark/406aa3f-96a1-4554-a45e-f07ef69f92dd?lang=en> (aces: 20.04.2024).

The data in Figure 2 show that in 2022, cash and deposits accounted for the largest share of household assets. Household asset data was recorded in 14 Member States and accounted for more than half of the total in five of them: Cyprus (59.7%), Greece (58.0%), Malta (52.9%), Poland (52.3%) and Slovakia (51.0%). Shares and equities were the dominant category in 11 European countries. Their share ranged from 37.7% to 66.4%. In terms of financial liabilities, loans accounted for as much as 93.2% of total household financial liabilities in 2022. They accounted for at least 82.1% of the total, with the exception of Romania, where the share was 71.3% (<https://ec.europa.eu/eurostat/databrowser/bookmark/406aa3f-96a1-4554-a45e-f07ef69f92dd?lang=en> (access: 20.04.2024)).

RESEARCH METHODS

For the selection of variables and their weights in the new CCI proposal, Principal Components Analysis (PCA) was applied. In this method, a correlation matrix and varimax rotation were used. In this method correlation matrix was used and varimax rotation. According to the principal component method it is a correlation matrix that uses its eigenvalues with eigenvectors to calculate the coefficients for the linear combination of variables. The linear combination of the variables and the values of the coefficients provides information on hidden factors. The coefficients provides the input from each variable into factor with a sign informing on the correlation between the variable and the factor itself. This information allows the interpretation of hidden factors (Panek, Zwierzchowski, 2013, p. 203).

In data exploration, it is quite common is to deal with a significant number of variables (dimensions) describing analysed objects. Some of those variables are redundant and makes analysis complicated. Grouping variables into homogenous clusters and selecting only cluster component or representative variable make analysis more transparent and reduces dimensionality. The additional advantage is the possibility to build models using different sets of variables from different clusters. The algorithm applied by SAS Enterprise Miner makes optional clusters with and without hierarchy. Final clusters may be treated as linear combinations of variables within a cluster. This linear combination is based on the first principal component. Weights are calibrated as a maximum of variance explanation. As contrary to traditional PCA, in this approach, principal components may be correlated. In traditional PCA, subsequent components are based on the same set of variables. In variable clustering, we take only the first principal component and each of them is based on a different set of variables.

The panel data models can be separated into two classes: the random effects panel data model, in which the individual effects are random and uncorrelated with the explanatory variables, and the fixed effects panel data model in which the individual effects are not random or the individual effects are random but are correlated with the explanatory variables (Hu et al., 2014, p.76). However, if the individual effects are fixed, using the random effects panel data modelling

method will effect in a biased estimator. If the individual effects are random, using the fixed effects panel data modelling method, the estimator is not efficient. The fixed effects panel data modelling is more robust than the random effects panel data modelling (Baltagi, 2008, p. 14; Hu et al., 2014, p. 65). The coefficients provide the contribution of each variable to the factor, with the sign indicating the correlation between the variable and the factor itself. Panel data models with fixed effects were recently selected as the most popular choice (Feng et al., 2019, p. 611). Particularly in macroeconomic analysis, that kind of models can be applied to account for the differentiated influence of unobservable common factor (Floro, van Roye, 2017, p. 601; Boneva, Linton, 2017, p. 1231). Fixed effects are the best choice for units like countries. For the examination of the Consumer Confidence Index the authors considered the panel data models with fixed effects the most suitable choice for this research. On top of those arguments, we also considered that the observations in panel data can include at least two dimensions: a cross-sectional dimension and a time series dimension, as we have in our data.

EMPIRICAL RESULTS

Data comes from harmonised surveys of European Union economies published by Eurostat. Those surveys are placed on the country level by partnership institutions like Ministries, Statistical offices, central banks, research institutes. DG ECFIN (The Directorate-General for Economic and Financial Affairs is the Commission department responsible for EU policies promoting economic growth and recovery, higher employment, stable public finances and financial stability) calculates aggregates for the EU and Eurozone as weighted averages (The weights are the shares of each Member State in the EU (euro area) reference series, smoothed by calculating a two-year moving average. The scales are normally updated in January of each year. The reference series are taken from Eurostat and the DG ECFIN forecast is used for the last period for which annual reference series are not available) based on countries' results and seasonally adjusted balance series. The size of the sample is different between countries according to the heterogeneity of their economies and is positively

correlated to the population size. Every month in all EU a questionnaire is conducted among 32 000 consumers. Samples come from the basis of all population registers (statistical or institutional). To make the sample more effective, the stratification is performed by gender, age, education, income and region. Surveys deliver every month's prices and prognoses of different aspects. Next Commission Business and Consumer Surveys (DG ECFIN) calculates and publishes monthly indexes. Published values are balanced as the difference between positive and negative answers measured as percentage points of all answers. If the question has three answers: positive (P), neutral (E) and negative (M) and if P, E and M ($P + E + M = 100$) means the percent of respondents who selected answer positive, neutral and negative the balance is calculated as $B = P - M$.

Data for CCI covered 33 countries: Albania, Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Montenegro, Netherlands, North Macedonia, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Türkiye, United Kingdom.

Data were seasonally adjusted data, not calendar adjusted data and covered 12 indicators:

- x1 – Financial situation over the last 12 months
- x2 – Financial situation over the next 12 months
- x3 – General economic situation over the last 12 months
- x4 – General economic situation over the next 12 months
- x5 – Price trends over the last 12 months
- x6 – Price trends over the next 12 months
- x7 – Unemployment expectations over the next 12 months
- x8 – The current economic situation is adequate to make major purchases
- x9 – Major purchases over the next 12 months
- x10 – The current economic situation is adequate for savings
- x11 – Savings over the next 12 months
- x12 – Statement on the financial situation of the household

Data for household finances covered only 27 EU countries and were expressed a percentage of gross domestic product (GDP). For liabilities, only limited variables were available (Table 3).

Table 3. *Variables used in the analysis (Monthly data)*

Assets	Liabilities
x1 – Total financial assets,	x15 – Total liabilities,
x2 – Currency and deposits,	x16 – Loans,
x3 – Currency,	x17 – Short-term – Loans,
x4 – Transferable deposits; other deposits,	x18 – Long-term – Loans,
x5 – Transferable deposits,	x19 – Other payable.
x6 – Debt securities,	
x7 – Short-term debt securities,	
x8 – Long-term debt securities,	
x9 – Loans,	
x10 – Short-term – Loans,	
x11 – Long-term – Loans,	
x12 – Listed shares,	
x13 – Unlisted shares,	
x14 – Other accounts receivable	

Source: own elaboration.

The principal component analysis was applied to select only important indicators. A strong correlation with the principal component was a selection criterion. First, eigenvalues vector coefficients were expressed as correlation coefficients (Table 4).

Selection of variables for the new CCI was based on a correlation coefficient above 0.7 (strong correlation). The variable was selected when at least for 50% of the time (years) the correlation with the first principal component was strong. Weights were calculated as share in the sum of all correlation ratios for selected variables (Table 5).

Correlation coefficient between CCI and the new proposed CCI ranged 0.7-0.93 in the years 2000-2022 and can be interpreted as a strong correlation. The proposed new CCI demonstrated a similar time pattern to the existing CCI. (Figure 3).

In the years 2009-2012, of the financial crisis in Europe, a deep decrease can be observed. The same level of decrease is also visible for pandemic years, starting in 2020. For pandemic years the decrease can be even more profound.

Table 4. Correlation coefficients for first eigenvalue vector in years 2000-2022

Variables/ year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
x1	0.94	0.92	0.92	0.93	0.93	0.92	0.91	0.91	0.87	0.90	0.93	0.95	0.95	0.96	0.95	0.93	0.90	0.89	0.88	0.89	0.92	0.92	0.88
x2	0.92	0.90	0.91	0.87	0.84	0.85	0.86	0.86	0.83	0.95	0.94	0.93	0.93	0.92	0.87	0.85	0.85	0.82	0.80	0.74	0.79	0.83	0.80
x3	0.85	0.71	0.63	0.58	0.60	0.75	0.85	0.89	0.73	0.47	0.89	0.88	0.86	0.86	0.87	0.81	0.82	0.86	0.87	0.72	0.08	0.57	0.53
x4	0.78	0.24	0.66	0.67	0.63	0.68	0.78	0.80	0.69	0.83	0.91	0.86	0.78	0.81	0.72	0.58	0.67	0.73	0.70	0.24	0.27	0.67	0.51
x5	-0.71	-0.54	-0.50	-0.66	-0.68	-0.69	-0.58	-0.50	-0.51	-0.65	-0.69	-0.48	-	-	-	-	-	-	-	-	-	-	-
x6	-0.80	-0.65	-0.48	-0.30	-0.31	-0.26	-0.15	-0.16	-0.27	-0.60	-0.34	-0.27	-	-	-	-	-	-	-	-	-	-	-
x7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
x8	0.73	0.60	0.64	0.75	0.58	0.71	0.71	0.73	0.72	0.63	0.75	0.81	0.81	0.76	0.65	0.55	0.59	0.76	0.73	0.32	0.18	0.74	0.54
x9	0.77	0.44	0.44	0.47	0.36	0.47	0.58	0.58	0.52	0.65	0.78	0.81	0.86	0.87	0.80	0.75	0.68	0.66	0.52	0.46	0.63	0.61	0.45
x10	0.77	0.79	0.57	0.50	0.64	0.54	0.58	0.59	0.55	0.77	0.70	0.68	0.59	0.50	0.54	0.61	0.63	0.66	0.72	0.69	0.73	0.69	0.61
x11	0.89	0.86	0.77	0.68	0.80	0.74	0.75	0.74	0.68	0.88	0.88	0.82	0.79	0.74	0.80	0.81	0.80	0.84	0.87	0.85	0.89	0.87	0.79
x12	0.82	0.87	0.78	0.66	0.75	0.72	0.71	0.59	0.58	0.74	0.73	0.70	0.67	0.66	0.75	0.76	0.77	0.82	0.85	0.87	0.82	0.78	0.71
Eig	8.14	6.11	5.68	5.02	5.06	5.59	6.03	5.99	5.16	6.46	7.67	7.25	6.61	6.51	6.25	5.86	5.87	6.36	6.35	5.19	4.99	5.96	4.55

Source: own elaboration.

Table 5. Selection of variables for new CCI

Years with correlation $r > 0.7$	Average correlation ratio	Share in sum (Sum =4.80)	Variables
23	0.92	19.1%	x1
23	0.86	18.0%	x2
16	0.73	15.1%	x3
18	0.74	15.5%	x8
21	0.81	16.8%	x11
17	0.74	15.5%	x12

Source: own elaboration.

Figure 3. Average CCI in years 2000-2022

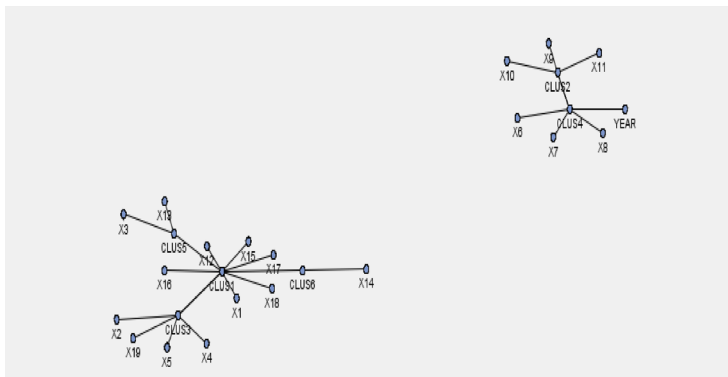
Source: own elaboration.



Data for household finance are quarterly data expressed a percentage of GDP. All quarterly data were re-calculated as averages for annual data. For the year 2022, as an exception, the average was based only on three quarters. Due to missing data, the time range was limited to the years 2012-2022. For Croatia, data from 2012 was imputed by data from 2013. For Irland, for all years, missing data for x9, x10 and x11 were imputed by 0 as no loans.

The variable grouping method results in clusters of variables correlated within a cluster but not correlated to another group. From each one, the representant variable is selected based on the closest distance (highest correlation) to cluster members (Figure 4, Table 6).

Figure 4. Results of variables clustering



Source: own elaboration (SAS Enterprise Miner).

Table 6. Variables representing clusters

Cluser Representant	Assets/Debt	Financial instrument	description
x2	Assets	Currency and deposits	Cash in circulation, both in domestic and foreign currencies.
x3	Assets	Currency	Currency includes: (a) banknotes and coins issued by resident monetary authorities as the national currency in circulation. held by residents and non-residents, and (b) banknotes and coins issued by non-resident monetary authorities as foreign currencies in circulation and held by residents
x6	Assets	Debt securities	Debt securities include financial assets and liabilities that can be described by various classifications - by maturity, by holding and issuing subsectors, by currency and by type of interest rate.
x9	Assets	Loans	Loans arise when creditors lend money to debtors.
x14	Assets	Other accounts receivable	Financial assets created as the equivalent of transactions where there is a time difference between these transactions and the corresponding payments.
x16	Debt	Loans	Loans are recorded when a loan is taken out.

Source: own preparation based on <https://ec.europa.eu/eurostat/web/products-manuals-and-guidelines/-/ks-02-13-269> (access: 19.04.2024).

The panel data has the time dimension (T period = 11 years) from 2015 to 2022, which is smaller than the cross-sectional dimensions (No. UE countries = 26). It is appropriate to use the fixed effects regression model rather than the random effects model (Fan et al., 2017). Furthermore, the fixed effects panel model was the more reasonable choice because this is not a sample but it embraces all countries. In addition, the results obtained in F-test confirm that the fixed effects model is better than the random effects model. Hausman test (Greene, 2012, p. 234–237) results also are in favour of the fixed effects than the random effects model (p-value 0.0268). Final model applies two-way fixed effects model. The statistical output of the two-way fixed model estimates is presented in Table 7.

Hausman test (Greene, 2012, p. 234–237) results also are in favour for the fixed effects model rather than the random effects model (p-value 0.005). The final model applies the two-way fixed effects model and estimates are presented in Table 8. Comparing to the previous CCI model, additional x_{16} is significant.

Table 7. Panel regression model for fixed effects (CCI)

Variable	DF	Coefficient	STD Error	t value	Pr. > t	Label
CS1	1	8.242262	7.4116	1.11	0.2672	Cross Sectional Effect 1
CS2	1	11.74248	8.4843	1.38	0.1676	Cross Sectional Effect 2
CS3	1	-19.0018	6.9451	-2.74	0.0067	Cross Sectional Effect 3
CS4	1	-5.39177	7.0971	-0.76	0.4481	Cross Sectional Effect 4
CS5	1	20.55072	12.4445	1.65	0.0999	Cross Sectional Effect 5
CS6	1	4.663834	7.2281	0.65	0.5194	Cross Sectional Effect 6
CS7	1	8.949451	3.5325	2.53	0.0119	Cross Sectional Effect 7
CS8	1	-8.62824	4.1443	-2.08	0.0384	Cross Sectional Effect 8
CS9	1	0.365218	3.4014	0.11	0.9146	Cross Sectional Effect 9
CS10	1	0.907058	6.0974	0.15	0.8819	Cross Sectional Effect 10
CS11	1	11.53143	7.0751	1.63	0.1044	Cross Sectional Effect 11
CS12	1	-21.9014	8.9783	-2.44	0.0154	Cross Sectional Effect 12
CS13	1	-5.18282	6.2961	-0.82	0.4112	Cross Sectional Effect 13
CS14	1	1.372535	4.4891	0.31	0.7600	Cross Sectional Effect 14
CS15	1	5.168368	9.2525	0.56	0.5769	Cross Sectional Effect 15
CS16	1	-0.11299	5.7309	-0.02	0.9843	Cross Sectional Effect 16
CS17	1	0.93682	5.8800	0.16	0.8735	Cross Sectional Effect 17
CS18	1	5.998958	5.8264	1.03	0.3042	Cross Sectional Effect 18
CS19	1	39.26677	12.5654	3.13	0.0020	Cross Sectional Effect 19
CS20	1	0.046015	2.8209	0.02	0.9870	Cross Sectional Effect 20
CS21	1	4.59906	5.9608	0.77	0.4411	Cross Sectional Effect 21
CS22	1	8.255291	8.2979	0.99	0.3208	Cross Sectional Effect 22
CS23	1	-13.5835	6.1521	-2.21	0.0281	Cross Sectional Effect 23
CS24	1	-6.71803	5.7415	-1.17	0.2431	Cross Sectional Effect 24
CS25	1	-5.58449	7.2913	-0.77	0.4444	Cross Sectional Effect 25
CS26	1	2.724453	6.7306	0.40	0.6860	Cross Sectional Effect 26
TS1	1	-2.50731	1.9990	-1.25	0.2109	Time Series Effect 1
TS2	1	2.22217	1.8802	1.18	0.2384	Time Series Effect 2
TS3	1	9.275995	1.7693	5.24	<.0001	Time Series Effect 3
TS4	1	13.54059	1.7140	7.90	<.0001	Time Series Effect 4
TS5	1	14.34398	1.6787	8.54	<.0001	Time Series Effect 5
TS6	1	17.40774	1.6786	10.37	<.0001	Time Series Effect 6
TS7	1	17.97016	1.6783	10.71	<.0001	Time Series Effect 7
TS8	1	16.93694	1.6511	10.26	<.0001	Time Series Effect 8
TS9	1	9.618853	1.5572	6.18	<.0001	Time Series Effect 9
TS10	1	15.92123	1.5904	10.01	<.0001	Time Series Effect 10
Intercept	1	-0.24274	4.6850	-0.05	0.9587	Intercept
x2	1	-0.33065	0.1259	-2.63	0.0092	
x3	1	-0.55594	0.2312	-2.40	0.0169	
x6	1	-0.0339	0.1206	-0.28	0.7789	
x9	1	-0.77278	0.4085	-1.89	0.0597	
x14	1	-0.16286	0.2209	-0.74	0.4616	
x16	1	0.042665	0.0877	0.49	0.6269	

Source: own elaboration.

Table 8. Panel regression model for fixed effects (new CCI)

Variable	DF	Coefficient	STD	t value	Pr. > t	Label
CS1	1	-1.64427	6.9899	-0.24	0.8142	Cross Sectional Effect 1
CS2	1	-3.96729	7.9991	-0.50	0.6204	Cross Sectional Effect 2
CS3	1	-46.5635	6.5552	-7.10	<.0001	Cross Sectional Effect 3
CS4	1	-34.9246	6.7022	-5.21	<.0001	Cross Sectional Effect 4
CS5	1	6.453191	11.7440	0.55	0.5832	Cross Sectional Effect 5
CS6	1	-12.4834	6.8226	-1.83	0.0685	Cross Sectional Effect 6
CS7	1	3.52648	3.3323	1.06	0.2910	Cross Sectional Effect 7
CS8	1	-26.0249	3.9108	-6.65	<.0001	Cross Sectional Effect 8
CS9	1	-3.89255	3.2092	-1.21	0.2263	Cross Sectional Effect 9
CS10	1	-20.925	5.7528	-3.64	0.0003	Cross Sectional Effect 10
CS11	1	-0.50522	6.6772	-0.08	0.9397	Cross Sectional Effect 11
CS12	1	-43.5469	8.4789	-5.14	<.0001	Cross Sectional Effect 12
CS13	1	-36.1373	5.9341	-6.09	<.0001	Cross Sectional Effect 13
CS14	1	-13.068	4.2387	-3.08	0.0023	Cross Sectional Effect 14
CS15	1	-20.2887	8.7292	-2.32	0.0209	Cross Sectional Effect 15
CS16	1	-28.1811	5.4094	-5.21	<.0001	Cross Sectional Effect 16
CS17	1	-25.3951	5.5480	-4.58	<.0001	Cross Sectional Effect 17
CS18	1	3.416012	5.4945	0.62	0.5347	Cross Sectional Effect 18
CS19	1	24.78643	11.8409	2.09	0.0373	Cross Sectional Effect 19
CS20	1	-5.5798	2.6585	-2.10	0.0368	Cross Sectional Effect 20
CS21	1	-21.7229	5.6280	-3.86	0.0001	Cross Sectional Effect 21
CS22	1	-10.8829	7.8232	-1.39	0.1654	Cross Sectional Effect 22
CS23	1	-48.1232	5.8356	-8.25	<.0001	Cross Sectional Effect 23
CS24	1	-26.3988	5.4189	-4.87	<.0001	Cross Sectional Effect 24
CS25	1	-26.0719	6.8844	-3.79	0.0002	Cross Sectional Effect 25
CS26	1	-20.8821	6.3536	-3.29	0.0012	Cross Sectional Effect 26
TS1	1	-4.15438	1.8902	-2.20	0.0289	Time Series Effect 1
TS2	1	-0.79099	1.7769	-0.45	0.6566	Time Series Effect 2
TS3	1	6.037515	1.6713	3.61	0.0004	Time Series Effect 3
TS4	1	10.37798	1.6178	6.41	<.0001	Time Series Effect 4
TS5	1	12.49473	1.5839	7.89	<.0001	Time Series Effect 5
TS6	1	16.06339	1.5836	10.14	<.0001	Time Series Effect 6
TS7	1	17.79292	1.5830	11.24	<.0001	Time Series Effect 7
TS8	1	17.37963	1.5571	11.16	<.0001	Time Series Effect 8
TS9	1	10.32899	1.4985	6.89	<.0001	Time Series Effect 9
TS10	1	12.79067	1.4987	8.53	<.0001	Time Series Effect 10
Intercept	1	30.75714	4.4159	6.97	<.0001	Intercept
x2	1	-0.33918	0.1188	-2.85	0.0047	
x3	1	-0.44861	0.2179	-2.06	0.0406	
x6	1	-0.0289	0.1152	-0.25	0.8021	
x9	1	-1.02805	0.3852	-2.67	0.0081	
x14	1	-0.17975	0.2083	-0.86	0.3890	
x16	1	-0.0959	0.0827	-1.16	0.2476	

Source: own elaboration.

SUMMARY AND CONCLUSIONS

The results presented in this study indicate a statistically significant relationship between the subjective assessment of household finances and the actual financial situation of households. The analyses carried out enabled the research objectives to be achieved. The analysis carried out made it possible to select the components that constitute the Consumer Confidence Index and to propose a new approach to its calculation. Given the growing role of consumer confidence in econometric models, the article proposes a more detailed analysis of the parameters that make up the CCI. It has been proven that not all respondent assessments have a statistically significant impact on the index.

The second objective was the examination of the relationship between consumer sentiment and the level of financial instruments held by European households. These differences were analysed both across countries (cross-country analysis) and over time (time series analysis). Cross-sectional differences between countries are significant compared to reference country of Sweden for: Czech, Ireland, Greece, Italy, Netherlands, Portugal for current CCI and much more significant for new CCI. For new CCI, there is no significant difference only between Sweden and Belgium, Bulgaria, Germany, Estonia, Ireland, Spain, Croatia, Malta and Portugal. For the remaining countries, differences are substantial.

For time effects, there is no significant difference between the 2012 and 2013 years compared to the reference year 2022. In the remaining years, the differences are significant and the correlation is positive both for the current and newly proposed CCI.

From all included explanatory variables, only three of them are crucial and negatively correlated with CCI: x2 (Currency, Deposits – Assets), x3 (Currency – Assets) and x9 (Loans – Assets).

The scale of the possibility of using the CCI proposed in the article confirms the legitimacy of the analysis. The study of the impact of the individual components of the CCI, therefore, constitutes a critical area of research crucial for modelling economic phenomena.

Based on the available literature, we can conclude that the issue of household financial well-being is a complex, multidimensional phenomenon. Relying solely on objective monetary factors does not allow us to identify

the main determinants of household financial behaviour. The role of subjective evaluations and perceptions is emphasised by behavioural economists. The variables selected for the new CCI may make it more likely that an index with fewer components will be used in analyses, given the greater data availability. It should be stressed that the reduced number of variables (subjective evaluations) does not reduce the information content of the new CCI. The material presented on the relationship between the Consumer Confidence Index and the level of household financial assets is one stage of the research. Further research may include other categories of subjective judgements, research methods, and techniques other than those presented, but it will be primarily concerned with analysing the long-term relationship between the proposed new CCI and economic developments for selected European countries.

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