Backward assessments or expectations: what determines the consumer confidence index more strongly? Panel model based on the CCI of European countries[1]

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Abstract. The consumer confidence index (CCI) is an index constructed on the basis of subjective assessments of the economic situation (retroactive and future), in many studies used as a variable supplementing the forecasting of consumer behaviour. Its significance is evidenced by the literature on consumer sentiment. Research on developed, economically stable countries focuses on assessments of the economic situation in the preceding period. On the other hand, according to many authors, the analysis of economically unstable states should focus on the expectations of respondents. The aim of the study is to check which respondent assessments (retroactive or expectations for the future) have a statistically significant impact on the level of the CCI and to examine the differences in respondent assessments between countries (cross-sectionally), as well as the time differences (time series effects). The panel modelling was carried out using data for the CCI as a dependent variable and a set of independent variables for all European Union countries and five non-member states. The data were collected from the Eurostat database. The analysis period of seven years and five months (January 2015–May 2022) results from the availability of data. The SAS 9.4 software was used in this research.

The results of the survey showed that higher expectations of respondents result in a higher CCI, and that they have a statistically significant impact on the level of the index. The modelling also demonstrated that the differences in respondent' assessments between countries are significant, whereas the time differences are not.

Keywords: consumer confidence index, CCI, subjective assessment, panel model, European countries

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Oceny wsteczne czy oczekiwania – co silniej determinuje wskaźnik zaufania konsumentów? Model panelowy oparty na CCI krajów europejskich

Streszczenie. Wskaźnik zaufania konsumentów (ang. *consumer confidence index* – CCI), skonstruowany na podstawie subiektywnych ocen sytuacji gospodarczej (wstecznej i przyszłej), jest wykorzystywany w wielu badaniach jako zmienna uzupełniająca prognozowanie zachowań konsumenckich. O dużym znaczeniu CCI świadczy literatura dotycząca nastrojów konsumenckich. Badania nad rozwiniętymi, stabilnymi ekonomicznie gospodarkami koncentrują się na ocenach sytuacji gospodarczej w poprzednim okresie. W gospodarkach niestabilnych ekonomicznie, zdaniem wielu autorów, należy analizować przede wszystkim oczekiwania respondentów. Badanie omawiane w niniejszym artykule ma na celu sprawdzenie, które oceny respondentów (wsteczne czy oczekiwania na przyszłość) mają statystycznie istotny wpływ na poziom CCI oraz czy w ocenie respondentów występują różnice między krajami (przekrojowo) i różnice czasowe (efekty szeregów czasowych). Modelowanie panelowe przeprowadzono na podstawie danych dotyczących CCI jako zmiennej zależnej oraz zbioru zmiennych niezależnych dla krajów Unii Europejskiej oraz pięciu krajów spoza Wspólnoty. Dane pochodzą z bazy danych Eurostatu. Okres analizy obejmuje 7 lat i 5 miesięcy (styczeń 2015–maj 2022 r.), co wynika z dostępności danych. Do obliczeń wykorzystano program SAS 9.4.

   Wyniki badania świadczą o tym, że wyższe oczekiwania respondentów przekładają się na większe wartości CCI i mają statystycznie istotny wpływ na poziom tego wskaźnika. Przeprowadzone modelowanie wykazało, że w ocenie respondentów różnice pomiędzy krajami są znaczące, natomiast różnice czasowe – nie.

Słowa kluczowe: wskaźnik zaufania konsumentów, CCI, ocena subiektywna, model panelowy, kraje europejskie

1. Introduction

In microeconomics, it is widely believed that economic operators collect the vastest amount of economic information – forward and with high frequency – which current and future decisions are based on, thus maximising their utility function (Çelik, 2010). As it is not possible to avoid fluctuations in economic variables, for years, researchers have been seeking new indices while improving the already existing ones, all in order to allow a more accurate prediction of changes in the economic environment. The consumer confidence index (CCI) is among the leading indices of household consumption behaviours and the economic behaviours of management entities. It was developed to assess consumer attitudes (Białowolski, 2014). This indicator is meant to combine consumer sentiment with the theory of economic behaviour. Since the CCI provides information on the current and future economic and material situation, it is considered to be one of the most effective indicators of consumer sentiment (Carroll et al., 1994; Golinelli & Parigi, 2003;

Ludvigson, 2004; Matsusaka & Sbordone, 1995). Many researchers argue that while the CCI is primarily dedicated to assessing consumer sentiment in the context of household consumer spending, it can also be related to, for example, stock market returns (Fisher & Statman, 2003; Jansen & Nahuis, 2003; Lemmon & Portniaguina, 2006) or to the level of GDP (Batchelor & Dua, 1998). Despite the importance of the CCI emphasised by economists, doubts arise whether the set of questions sufficiently reflects consumer confidence and whether the answers are comparable over different study periods. If not, comparative analyses would not be possible and the CCI would be an unreliable source of information. However, insufficient evidence has been found to support these uncertainties, therefore the CCI has become one of the many forecasting indices used to determine the current economic performance and to predict the direction of economic change.

The aim of the study is to check which respondent assessments (retrospective or expectations for the future) have a statistically significant impact on the level of the CCI and to examine the differences in respondent assessments between countries (cross-sectionally), as well as the time differences (time series effects). The contribution of this article to the existing body of research is manifold. Firstly, previous studies have mainly focused on the relationship between the aggregate CCI and macroeconomic variables and, above all, confirmed the relationship between them. This paper, on the other hand, is based on the authors' own research, whose purpose is to show which questions (variables) determine the level of the CCI to the largest extent. Apart from the article by Jansen and Nahuis (2003), who disaggregated the CCI into four components, and Lopez and Durré (2003), the literature remains silent on the subject. This article aims to fill this gap by basing the relevant analysis on 33 European countries, which is the second contribution of this study to the existing literature on the subject. Such a multi-country framework may reveal some interesting patterns of similarities/differences between the analysed economies.

2. Literature review

In the literature on the investigated subject, the CCI in analyses is often associated with the consumer situation, forecasted changes in production (Islam & Mumtaz, 2016; Matsusaka & Sbordone, 1995), or changes on the stock exchange (Çelik et al., 2010; Görmüş & Güneş, 2010; Utaka, 2014). Abaidoo (2012) described a causal relationship between consumer sentiment and changes in private investment (based on a study on the USA). As basic economic theories suggest, changes in consumption (its level and/or structure) refer only to the objective factors that determine them. In consumer behaviour, however, it is the factors defined by behaviourists as subjective that play the key role. Household decisions related to

consumption behaviour are determined not only by objective financial conditions, but also by their subjective assessment of the economic conditions (Grzywińska-Rąpca, 2019; Wałęga, 2012). A combination of factors from both groups, objective and subjective, allows a more complete assessment of the economic situation of households. The economic situation of a given household may be completely different from what the results of subjective measurements imply. In conclusion, subjective and objective indicators provide a different set of information on the state of the financial situation of households. The available literature in this area suggests that the subjective assessment of the financial situation of a household is determined by socio-economic factors. A highly positive subjective assessment of one's financial condition is associated with: income, savings, debt, improving one's social status or accumulated wealth and impacts one's health, mental state and the level of satisfaction with life.

Subjective factors include the CCI constructed on the basis of subjective assessments of households. Initially, this indicator was created only for research related to consumer spending prediction (Çelik et al., 2010). The relationship between the CCI and household expenditure was also described in Çelik and Özerkek (2009) and Cotsomitis and Kwan (2006). The above-mentioned authors examined the effectiveness of the CCI in predicting spending at national and regional level. They showed that the predictability of consumer spending taking into account the different subcategories of consumer expenditure was higher at national level.

The ongoing discussion on the importance of the CCI in forecasting economic changes has divided researchers into two groups – one confirming the occurrence of cause-and-effect relationships between the CCI and economic measures and the other excluding statistically significant relationships (Table 1).

Table 1. Empirical evidence concerning relationship between CCI and economic measures

Authors	Description
Positive empirical evidence	
Carroll et al. (1994)	delayed consumer sentiment index (CSI) values explain about a 14%-increase in consumer spending
Bram and Ludvigson (1998)	the indicator provides information on future consumption
Batchelor and Dua (1998)	studies covering consumption, GDP and the CCI confirmed the impact of the CCI on economic measures
Golinelli and Parigi (2003)	demonstrated the impact of the CCI on GDP in developed countries
Negative empirical evidence	
Leeper (1992)	low CCI predictive power in determining current economic results
Desroches and Gosselin (2002)	CCI may be helpful in forecasting consumption, but this index contains too little information to forecast consumer spending
Garrett et al. (2005)	CCI is a weak predictor of retail sales

Source: authors' work based on Loría and Brito (2004).

According to the authors mentioned in Table 1, the CCI can prove helpful in forecasting changes in household consumption behaviour. Some researchers emphasise its important role in crisis situations (economic, health, etc.), because the uncertainty resulting from their occurrence affects the subjective assessments of the economic situation of households. Regardless of the direction and strength of this dependency, they emphasise the existence of a relationship between the CCI and the change in consumer behaviour. Cotsomitis and Kwan (2006) indicate that the inclusion of the CCI in the modelling of real consumption improves its forecasts.

However, despite the many studies and approaches related to the CCI, it is still difficult to determine which questions and, in fact, which assessments have the greatest impact on the level of the index. Therefore, the purpose of the modelling carried out in this work was to check which of the following variables:

- *X1*: financial situation last 12 months;
- *X2*: financial situation next 12 months;
- *X3*: general economic situation last 12 months;
- *X4*: general economic situation next 12 months, and
- *X5*: price trends last 12 months

affects the level of the CCI to a statistically-significant degree. In addition, an analysis was conducted to examine the differences between countries (on a cross-sectional basis) as well as the time differences (time series effects). The aim of the analysis was therefore to show which assessments have the greatest impact on the value of the CCI and to show the differences between European countries in this respect.

3. Research method

3.1. Sample and data collection

The analysis of consumer behaviour and its determinants is very important in the research of its impact on the results of modelling economic phenomena. These analyses are carried out on the basis of objective factors such as: the level of expenditure, savings (most often), as well as on the basis of subjective assessments of households' economic situation, etc. Indicators built on the basis of subjective household assessments include the CCI. This indicator is constructed on the basis of questions addressed to respondents. They can be classified into the following groups of questions:

- about the financial situation of households;
- about the economic situation;
- about price trends;
- about large purchases planned by households.

The CCI is the arithmetic average of balances (in percentage points) of the answers to questions about the past and the expected economic situation of households (Daskalopoulou, 2014).

This paper uses panel data for the CCI as a dependent variable and a set of independent variables for European countries. Data were collected from the Eurostat database and the SAS 9.4 software was applied in this research.

The analysis relates to a period of seven years and five months (January 2015–May 2022), which results from the availability and accessibility of the data. Among monthly data only those seasonally adjusted were selected for the research. 12-month arithmetic means were calculated for the years 2015–2021 and a five--month mean for 2022.

3.2. Methodological approach

Panel data models with fixed effects have drawn considerable attention in recent years (Feng et al., 2019). In macroeconomics, interactive fixed effects can account for the heterogeneous influences of unobservable common factors that affect all units, such as countries (Boneva & Linton, 2017; Floro & van Roye, 2017). A model with interactive fixed effects can be used in several sub-fields of economics, including the production economics, construction and international trade (Feng et al., 2019). In microeconomics, panel data models with interactive fixed effects can also be applied in e.g. earnings studies to account for unmeasured skills or other unobservable characteristics such as personal ability, motivation and work-oriented attitudes (Bai, 2009). Considering the examined issue, the authors consider panel data models with fixed effects the most reasonable choice for this paper.

Furthermore, the panel data model can be separated into two classes. The first class includes random-effects panel data models, where the individual effects are random and uncorrelated with the explanatory variables. The other class includes fixed effects panel data models, where the individual effects are not random or the individual effects are random but correlated with the explanatory variables (Hu et al., 2014). However, if the individual effects are fixed, using the random effects panel data modelling method will result in an inconsistent estimator. On the other hand, in the cases where the individual effects are random, using the fixed effects panel data modelling method will still result in a consistent estimator, although an inefficient one. Thus, fixed effects panel data modelling is more robust than random effects panel data modelling. Fixed effects panel data modelling has been a hot topic in econometrics since it was first proposed (Baltagi, 2013; Hu et al., 2014). For this reason, panel data models with interactive fixed effects have received considerable attention in the last decade and have been widely used in practice (Feng et al., 2019).

In panel fixed effects models, idiosyncratic errors are assumed to be mutually independent both within the individual and between individuals. Due to an increasing availability of data, serial correlations and cross-sectional dependencies are common in large panel data, where both the cross-section dimension and the time series dimension are extensive (Qiu et al., 2019). Finally, the observations in panel data can include at least two dimensions: a cross-sectional dimension and a time-series dimension. Such a two-dimensional data set enables researchers to construct complex models and conduct efficient statistical implications using pure cross-section or time-series data (Hu et al., 2014).

3.3. Dependent variable

The data are sourced from the results of a Eurostat survey examining the subjective opinions of households about their economic situation. Data were available for the 33 observations (countries). The majority of available observations were for EU member states, although due to the availability of data, also four candidates to the EU, i.e. Albania, Montenegro, North Macedonia and Serbia were included in the modelling. For each question, the balance was calculated as the difference between positive and negative answers, with weights assigned to individual answer options. The 'very positive' option maintains weight 1, 'positive' weight 0.5, 'negative' weight –0.5, and 'very negative' weight –1. All other options keep the weight of 0. Depending on the age and education of the respondent, the weight of the response is further adjusted to ensure that the results are representative on a national scale. Indicators assume values from the range of –100 to 100. The data are published as balances, i.e. the differences between positive and negative answers (in percentage points of the total answers), as an index, as confidence indicators (arithmetic average of balances), and the unadjusted (NSA) as well as seasonally adjusted data (SA; Eurostat, n.d.). Negative values of the indicator mean a negative assessment of the studied phenomena, while positive values suggest that positive opinions prevail.

3.4. Independent variables

As independent variables, the following 12-month averages for years 2015–2021 and January–May 2022 were calculated (eight panels created):
- *X1*: financial situation last 12 months;
- *X2*: financial situation next 12 months;
- *X3*: general economic situation last 12 months;
- *X4*: general economic situation next 12 months;
- *X5*: price trends last 12 months.

Only seasonally adjusted data were selected. The missing data for Romania and the UK for the years 2021–2022 were imputed by the values from 2020. The missing data for Albania for 2015 were imputed by the 2016 values. The correlations between independent variables have been examined. As expected, the correlation between pairs *X1* and *X2*, *X3* and *X4* were strong. There were no strong correlations between *X5* and other variables observed.

3.5. Research model

A pooled fixed effects panel model was developed using the CCI as the dependent variable and an ordinary least squares (OLS) regression test was used to estimate the model. The OLS multiple regression was considered appropriate for the research aim specified in the paper. According to Baltagi (2013), Hair et al. (2018), Hsiao (2014) and Wooldridge (2010), the following research model was utilised in the research which is presented in the following econometric form:

$$CCI_{it} = \alpha_0 + \beta X1_{it} + \beta X2_{it} + \beta X3_{it} + \beta X4_{it} + \beta X5_{it},$$

where:
CCI is the index employed in year t for country i,
α_0 indicates the constant term,
$\beta X1_{it}$ is the financial situation for the last 12 months,
$\beta X2_{it}$ is the financial situation next for the 12 months,
$\beta X3_{it}$ is the general economic situation for the last 12 months,
$\beta X4_{it}$ is the general economic situation next for the 12 months,
$\beta X5_{it}$ represents the price trends for the next 12 months.

4. Results and discussions

4.1. Descriptive statistical analysis

The mean value of the CCI for each year is presented in Figure. As could be expected, there is a significant drop in 2020 due to the COVID-19 pandemic and lockdown that all European countries experienced. In 2021, the situation slightly improved, although in first five months of 2022 the situation again dramatically deteriorated to the lowest observed level. It is likely that the data for the second half of 2022 might show a slight increase.

Table 2 shows the means for the independent variables for the studied European countries.

Figure. Mean value for dependent variable CCI for European countries
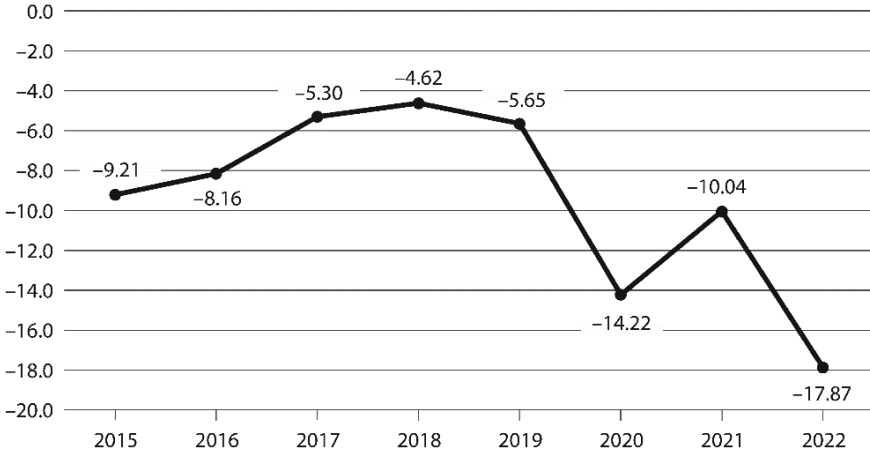
Source: authors' work based on Eurostat data.

Table 2. Mean values for independent variables

Variable	2015	2016	2017	2018	2019	2020	2021	2022
X1	−11.9462	−8.8154	−5.8328	−4.1611	−2.9691	−8.4537	−10.5068	−14.6425
X2	−0.6831	0.1702	1.8601	2.8805	3.1785	−3.4810	−0.5518	−10.6552
X3	−15.5894	−12.9169	−5.5962	−3.4522	−8.5300	−33.7611	−39.8793	−38.2791
X4	−3.4381	−5.0540	−0.0247	−0.7969	−6.7383	−23.0217	−11.5626	−28.0010
X5	5.6141	3.9959	15.0502	21.6757	21.9638	15.4846	31.7043	60.6937

Source: authors' work based on Eurostat data.

In 2020, the first year of the COVID-19 pandemic lockdown, the values of all five variables significantly dropped. The biggest drop was observed for *X3*, which was further decreasing in 2021–2022. *X2* and *X4*, after a drop in 2020 experienced a small increase in 2021 and a further decrease in 2022. *X5* saw a significant increase in 2022, but due to a growing inflation, this trend was likely to change by the end of 2022.

4.2. Fixed two-way estimates

The panel data has a time dimension (*t* period = 8 years) from 2015 to 2022 smaller than the cross-sectional dimensions (*n* countries = 33). It is more 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 all the countries that are taken into account. The results obtained in the *F*-test also confirm that the fixed effects model is better than the random effects model. The results of the Hausman test too are in favour of the

fixed effects and not the random-effects model. The final model applies a two-way fixed effects model. The statistical output of the fixed two-way estimates is presented in Table 3.

Table 3. Results of the fixed effects regression model for dependent variable CCI

Variable	Estimate	Standard error	t value	Pr > |t|
CS1	−4.6930	0.7215	−6.50	<0.0001
CS2	−7.0607	0.6456	−10.94	<0.0001
CS3	−3.9196	0.8081	−4.85	<0.0001
CS4	−2.8409	0.8747	−3.25	0.0013
CS5	−4.2219	0.8740	−4.83	<0.0001
CS6	−7.7311	0.7504	−10.30	<0.0001
CS7	−3.9483	0.8000	−4.94	<0.0001
CS8	−8.0848	0.8445	−9.57	<0.0001
CS9	−5.0682	0.7475	−6.78	<0.0001
CS10	−0.4410	0.7027	−0.63	0.5310
CS11	−5.8060	0.7701	−7.54	<0.0001
CS12	−7.0637	0.7648	−9.24	<0.0001
CS13	−7.5669	0.7458	−10.15	<0.0001
CS14	−6.5591	0.8111	−8.09	<0.0001
CS15	−0.6173	0.7569	−0.82	0.4156
CS16	−5.2767	0.7383	−7.15	<0.0001
CS17	−4.7052	0.7204	−6.53	<0.0001
CS18	−5.4837	0.7766	−7.06	<0.0001
CS19	−5.3385	0.7193	−7.42	<0.0001
CS20	−5.2702	0.7463	−7.06	<0.0001
CS21	−1.4398	0.7514	−1.92	0.0566
CS22	−7.8663	0.7393	−10.64	<0.0001
CS23	−5.9740	0.7821	−7.64	<0.0001
CS24	−7.0799	0.6688	−10.59	<0.0001
CS25	−5.2507	0.7329	−7.16	<0.0001
CS26	−5.9034	0.8761	−6.74	<0.0001
CS27	−3.6916	0.9419	−3.92	0.0001
CS28	−4.1467	0.8803	−4.71	<0.0001
CS29	−7.9413	0.7626	−10.41	<0.0001
CS30	−7.2373	0.7877	−9.19	<0.0001
CS31	−11.6751	0.7847	−14.88	<0.0001
CS32	−3.0014	0.8935	−3.36	0.0009
TS1	−0.2105	0.5952	−0.35	0.7239
TS2	−0.1029	0.5822	−0.18	0.8598
TS3	−0.3570	0.5112	−0.70	0.4857
TS4	−0.4123	0.4773	−0.86	0.3886
TS5	−0.3364	0.4648	−0.72	0.4700
TS6	−0.9267	0.4789	−1.93	0.0543
TS7	−0.1173	0.4393	−0.27	0.7898
Intercept	2.1764	0.8743	2.49	0.0135
X1	0.4325	0.0284	15.25	<0.0001
X2	0.1690	0.0363	4.66	<0.0001
X3	−0.0178	0.0119	−1.50	0.1360
X4	0.2966	0.0172	17.24	<0.0001
X5	0.0157	0.0089	1.76	0.0796

Note. *CS* – cross sectional effect: observations (countries) from 1 to 32 and 33 as reference level (not shown in the table), *TS* – time series effect: time periods (years) from 1 to 7 and 8 as reference level (not shown in the table), *DF* – degrees of freedom = 1.
Source: authors' work using SAS 9.4.

At a 0.1 significance level only *X3* is not significant. The *X1* effect is positive: a 1-unit increase in *X1* gives a 0.43-unit increase in the CCI. The same situation occurs as regards *X2*, but the effect is weaker: a 1-unit increase in *X2* gives a 0.17-unit increase in the CCI. The *X4* effect is positive: a 1-unit increase in *X4* gives a 0.29-unit increase in the CCI. The *X5* effect is significant only at a 0.1 significance level and is positive, but very weak: a 1-unit increase in *X5* gives only a 0.015-unit increase in the CCI.

Additionally, with the panel model with two-way effects, the authors attempted to check differences between countries (cross sectionally) and differences in time (time series effects), but the results for the time series effects indicated that there are no significant differences. Only for *TS6* compared to *TS8* (reference level) the difference is significant at a 0.1 significance level. This shows a considerable difference between 2020 and 2022, which can be assumed as being the effect of the COVID-19 pandemic.

There is no significant difference only between the following countries: France (*CS10*) and Lithuania (*CS15*) versus Turkey (*CS3*) which is the reference level (not presented in Table 3). Other differences between countries are significant.

4.3. Discussion

The CCI calculated on the basis of a set of questions relating to the assessment of the financial situation of households, of the general economic situation of the country which the respondent comes from, the assessment of the unemployment (generally in the country) and the savings of households plays an important role in providing decision-makers and economic forecasters with crucial information on the current and future economic situation. Including all areas of the CCI in the modelling may not be effective in the context of the researcher's goal. The obtained forecasts based on the standard CCI specification may show imperfections.

Therefore, it is necessary to look for an answer to the question of what determines the value of the CCI. One solution could be to construct a new indicator based solely on respondents' assessments of one dimension (e.g. the financial situation of households). Another way out is to isolate all the items related to a given dimension. Such a solution was proposed, for example, by Białowolski (2014). Białowolski's assessment of measurement compliance for the indicator variables used in the calculation of the CCI showed that the set of indicators determined by the European Commission guidelines is not complete. This non-compliance might lead to the lack of comparability between time periods.

Certainly, this study is a starting point for further discussion on the methodology used to measure complex, hidden phenomena in economic research. Therefore, it

seems reasonable for an analysis of this kind to be carried out in such a way that it concerns real assessments (retroactive or expectations for the future) significantly affecting the level of the CCI and verifies the differences between countries (cross-sectionally) as well as time differences (time series effects).

5. Conclusions

The number of possibilities of using the CCI presented in the article confirms the legitimacy of the analysis. The study of the impact of the individual CCI components on the index therefore constitutes a very important area of research crucial for modelling economic phenomena.

Given the growing role of consumer confidence in econometric models, the article proposes a more detailed analysis of the parameters that the CCI is composed of. It has been proven that not all respondent assessments have a statistically significant impact on the index. Among the analysed variables, expectations of changes in the financial situation in the next 12 months (*X2*) and the expected change in the general economic situation (*X4*) have the highest impact on the increase of the CCI. This means that higher expectations for the future result in a higher CCI. Therefore, the first objective of the research was achieved: it was determined which respondent assessments (retroactive or expectations for the future) have a statistically significant impact on the level of the CCI. The second objective of the analysis was to examine the differences in respondent assessments between countries (cross-sectionally) and the time differences (time series effects). The performed modelling showed that the differences in respondent assessments between countries were significant, whereas time differences were not.

Considering the obtained results, the next natural stage of research within the discussed topic would be to link the components of the CCI, such as the assessment of the financial situation in the next 12 months and the assessment of the general economic situation in the next 12 months with selected macroeconomic measures and indicators, as the monitoring of the levels and components of the CCI has been proved to be justified and necessary.

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