

## Can Consumer Survey produce a new measure of household financial distress?

Nataša Kurnoga<sup>1,†</sup> and Mirjana Čižmešija<sup>1</sup>

<sup>1</sup>*Faculty of Economics and Business, University of Zagreb, J. F. Kennedy 6, 10 000  
Zagreb, Croatia*

*E-mail: <{nkurnoga, mcizmesija}@efzg.hr>*

**Abstract.** The goal of this paper is the pioneering application of the *Harmonised EU Consumer Survey* (CS) in tracking poverty levels in Croatia. As opposed to the annual *EU Statistics on Income and Living Conditions* (EU-SILC) variables, CS offers considerable benefit by providing monthly information on the financial position of consumers. The interest lies in calculating a CS-based composite indicator of household financial distress using factor analysis. The newly proposed indicator could serve as a timely indicator of cumulous socio-economic problems in Croatia, as well as in all other EU member states, and in that way significantly complement the EU-SILC data. The harmonised European CS offers three questions pointing to the financial situation of households (Q1: *Financial situation over last 12 months*, Q2: *Financial situation over the next 12 months*, and Q12: *Statement on financial situation of the household*). The main advantage of these questions is their monthly frequency, providing better detailed information than annual EU-SILC data on prevailing social trends. Factor analysis calculated the new CS composite indicator of household financial distress based on three selected CS variables, as mentioned above. One factor was extracted, the factor scores were calculated, and then compared to the chosen variables from the EU-SILC data.

**Keywords:** consumer survey, EU statistics on income and living conditions, composite indicator, factor analysis, financial distress

Received: July 23, 2016; accepted: September 25, 2016; available online: December 30, 2016

DOI: 10.17535/crorr.2016.0013

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### 1. Introduction

The recent crisis and recession in Europe has actualized the problem of poverty and all other social problems. The scientific and professional community deal with the different aspects and consequences of poverty and financial problems. Ware [15] has analysed actual problems like debt, poverty and personal financial distress from a theoretical point of view with their clear definitions. Barton,

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<sup>†</sup> Corresponding author

Futris and Nielsen [1] have studied how financial distress and marital quality correlate with each other. Starkey et al. [14] have explored the impact of financial distress on depressive symptoms among African American Women. McNair et al. [12] have investigated individual-level factors in predicting consumer financial behaviour at a time of high pressure. Jonsson, Mood and Bihagen [8] analysed poverty trends during two recessions and two recoveries 1991–2013. They have concluded that recessions can generally be expected to suppress real incomes and increase poverty measured using a fixed poverty line, while the effects on inequality and relative income poverty are more ambiguous, both theoretically and empirically. Different national economies reacted differently (and with different intensity) to recession trend. Cotsomitis, Andy and Kwan [3] made a first formal attempt to examine the ability of consumer confidence in order to forecast household spending within a multicountry framework, using CS data. Klein and Özmucur [9] have suggested that it may be better for researchers to use not just the headline index, but expectations or other indicators derived from Business and Consumer surveys if they want to gain a better prediction of referent macroeconomic variables.

It is well known that the poverty is highly correlated with the quality of life. Therefore, in 2003, following the Eurostat initiation, six EU Member States (Austria, Belgium, Denmark, Greece, Ireland, Luxembourg) and Norway established the EU-SILC project, with the aim of quantifying poverty levels and social problems in individual EU countries. The EU-SILC project started in 2004 in EU-15 (except in Germany, the Netherlands and the United Kingdom), in Estonia, Norway and Iceland. Since 2005, the new EU-SILC has covered EU member states and several non-EU countries [6]. EU-SILC is a source for comparative statistics on income, poverty, social exclusion, housing conditions, labour, education, health and other living conditions in the EU. The survey is organized as a cross-sectional and longitudinal sample survey, and coordinated by Eurostat [2].

CS results were analysed with the aim of creating new measures that express household financial distress. In fact, CS provides a direct assessment of the otherwise intangible factors such as consumer perceptions and expectations. They measure consumer's willingness as opposed to their ability to consume, invest and save. Hence these psychological factors are crucial in understanding the underlying market forces and consumer behaviour.

Harmonised CS results and EU-SILC data are available at the websites of the European Commission and Eurostat.

## 2. Consumer Surveys and EU statistics on income and living conditions

CS is a part of the harmonised EU Business and Consumer Surveys (BCS). BCS is a qualitative monthly survey conducted across five sectors: manufacturing, services, construction and retail trade, as well as for consumers. The surveys come from the assessments, explanations and expectations by managers and consumers on key economic variables. Some of the variables included in Business Survey (BS) are: production levels, selling prices, stocks of finished products, factors limiting production, order books, export order books, capacity utilisation, firm's employment, competitive position on the domestic and the EU markets, etc. Variables included in the CS are: the financial situation of consumers, general economic situation, consumer prices, unemployment, major purchases of durable consumer goods, savings, savings trends, etc.

The European Commission has defined *The Joint Harmonised EU Programme of Business and Consumer Surveys* to fully synchronize BCS on the EU level. This programme was launched by decision of the European Commission on 15 November 1961, and has been modified in subsequent Council and Commission decisions. The first survey was the harmonised business survey on the manufacturing industry, conducted in 1962. After that, the BCS programme was extended to other sectors. The CSs were included in the Programme in 1972. At this point in time in July 2016, *The Joint Harmonised EU Programme* includes all 28 EU Member States and five candidate countries: Albania, Montenegro, the former Yugoslav Republic of Macedonia, Turkey and Serbia [4]. In essence CS is a qualitative monthly (or quarterly) survey. Questions (variables) have a primarily qualitative nature. The questionnaire has fifteen questions: 12 monthly questions and 3 quarterly questions. The stratified sample with a random choice is usually used for the survey sampling. The answers in CS have four, five or six options.

Answers obtained from the survey are aggregated in the form of a *balance*. The balance is the difference between the percentage of respondents giving positive and negative answers [5]. Therefore, if a question has three alternative options: positive (up, more, more than sufficient, good, to large, increase, improve, etc.), neutral (unchanged, as much, sufficient, satisfactory, adequate, etc.) and negative (down, less, not sufficient, too small, decline, etc.), then P, E and M (with  $P+E+M=100$ ) denote the percentages of respondents having chosen respectively the option positive, neutral, and negative. Then, the balance is  $B = P - M$ .

If the questions have six alternative options (most useful in CS) such as positive, neutral and negative, and in addition, very positive (very much higher, increase sharply, etc.), very negative (very unfavourable, fall sharply, etc.) and don't know, the balance is calculated as a weighted average. If P, E and M are

the same as mentioned above, while PP denotes the percentage of respondents having chosen the option very positive, MM is the percentage of respondents having chosen the option very negative and N is the percentage of respondents without any opinion ( $PP+P+E+M+MM+N=100$ ), the balance is calculated as  $B = (PP + \frac{1}{2}P) - (\frac{1}{2}M + MM)$ . After that, seasonally adjusted balances (for all variables of interest in survey) are used to calculate the composite confidence indicators. These indicators are produced to reflect overall perceptions and expectations at the individual sector level and at the consumer level in a one-dimensional index. In accordance with *The Joint Harmonised EU Programme of Business and Consumer Surveys*, confidence indicators are calculated using the unique methodology. These indicators are simple arithmetic averages of the (seasonally adjusted) balances of answers (in percentage points) for the selected questions (variables). The choice of variables was conducted with the aim of achieving an as high as possible coincident correlation of the confidence indicator with a reference series.

The goal of the CS is to collect information on household spending and savings trends and to assess their perception of factors influencing such decisions. Thus, the Consumer Confidence Indicator (CCI) includes four variables (derived from the CS): the financial situation of households, the general economic situation, unemployment expectations (with an inverted sign) and savings, all over the next 12 months [4]. The referent series for CCI is private consumption (expressed as y-o-y percentage growth rate).

Furthermore, more complex quantification methods were developed. Nardo [13] gave a critical review of the different quantification methods, while Goldrian, Lindlbauer and Nerb's [7] motto is that there is no general construction principle for a perfect composite leading indicator. New approaches and applications are welcome.

EU-SILC data, available at the Eurostat webpage, is presented as multidimensional datasets and as a list of policy indicators (income and living conditions: people at risk of poverty or social exclusion, income distribution and monetary poverty, living conditions and material deprivation). Nevertheless, the comparison of EU-SILC country data produces some difficulties arising from differences in data collection approaches across countries. One of the major differences is that some countries rely entirely on household surveys, while others also use administrative or 'register' data [11]. It means that there are differences in the relationship among employment, earnings and poverty changes, when different data collection approaches are used.

In addition, the estimates of the indicator of poverty (at-risk-of-poverty rate) vary across countries. This is because the indicator is sensitive to the different measures used and explores the underlying patterns across the vulnerable groups and the likely causes of poverty in these countries [10].

All these things show that the EU-SILC produce important variables related to the general national poverty levels. However, the EU-SILC data is published annually and has a limited international comparability. In a turbulent environment, monthly data may be used to promptly signalise a change of variables in a timely manner. Therefore, the main advantage of CS results is exactly in their monthly frequency, which provides more detailed information about the prevailing social trends than the annual EU-SILC data. Additionally, CS data is fully harmonised on EU level. With this in mind, the aim of this research is to assess the value of CS responses on household financial distress. This is expressed as a new monthly, inter-EU comparable indicator by correlating them to the common measures of poverty in Croatia.

### 3. Data set and methodology

CS is qualitative survey based on questionnaire. The questionnaire has twelve questions on a monthly basis and three additional questions on a quarterly basis. This paper focuses on questions on a monthly basis. The monthly questions (variables) in CS questionnaire [4] are presented in Table 1.

Questions (variables)
1. How has the financial situation of your households changed over the last 12 month?
2. How do you expect the financial position of your household to change over the next 12 months?
3. How do you think the general economic situation in this country has changed over the past 12 months?
4. How do you expect the general economic situation in this country to develop over the next 12 months?
5. How do you think consumer prices have developed over the last 12 months?
6. In comparison with the past 12 months, how do you expect consumer prices will develop in the next 12 months?
7. How do you expect the number of people unemployment in this country will change over the next 12 months?
8. In view of the general economic situation, do you think now is the right time for people to make major purchases such as furniture or electrical goods?
9. Compared to the last 12 months, do you expect to spend more or less money on major purchases such as furniture or electrical goods?
10. In view of the general economic situation, do you think that now is?

11. Over the next 12 months, how likely will you be to save any money?
12. Which of these statements best describes the current financial situation of your household?

Table 1: *Questions in CS questionnaire*

Questions have a similar response pattern e.g. got a lot better, got a little better, stayed the same, got a little worse, got a lot worse, don't know. Of all the monthly questions from the CS questionnaire given in Table 1, three of them indicate the financial condition of households: financial situation over the last 12 months (Q1 hereinafter); financial situation over the next 12 months (Q2 hereinafter); statement on financial situation of household (Q12 hereinafter). The exact wording of these questions and given answers is as follows [4]

Q1: How has the financial situation of your households changed over the last 12 month? It has... (1) got a lot better, (2) got a little better, (3) stayed the same, (4) got a little worse, (5) got a lot worse, (6) don't know,

Q2: How do you expect the financial position of your household to change over the next 12 months? It will... (1) get a lot better, (2) get a little better, (3) stay the same, (4) get a little worse, (5) get a lot worse, (6) don't know,

Q12: Which of these statements best describes the current financial situation of your household? (1) we are saving a lot, (2) we are saving a little, (3) we are just manging to make ends meet on our income, (4) we are having to draw on our savings, (5) we are running into debt, (6) don't know.

The monthly CS data covers the period from 2005/5 to 2016/5 and the annual EU-SILC data covers the period from 2010 to 2015. The data sources were the European Commission (Directorate General for Economic and Financial Affairs) and Eurostat EU-SILC.

The empirical analysis consists of two parts. In the first part, the new CS composite indicator of household financial distress was calculated using factor analysis. One factor was extracted out of the three mentioned variables. In the second part, this one extracted factor which represents the new CS composite indicator was compared with the selected EU-SILC variables.

Factor analysis was carried out in the several steps: verification of the adequacy of the data for application of factor analysis, extraction of factors and calculation of factor scores. First, the appropriateness of factor analysis has to be evaluated (stationarity, examination of the correlations and measures of sampling adequacy – MSA values). After that, a decision is made as to which factor model is to be applied for extracting the factors. In this paper, the principal component factor analysis was used to calculate the new CS composite indicator. It is a factor model where units are placed on the diagonal of the

correlation matrix and the total variance is carried into the factor matrix. Finally, the factor scores for the retained factors are calculated. The calculated scores in the principal component factor analysis are actual scores. It is precisely because of the direct computation of factor scores that this model is appropriate when these scores are used in further analyses.

Prior to the application of factor analysis, the Augmented Dickey–Fuller (ADF) unit root tests were performed. The analysed variables did not meet the stationarity condition. Therefore, the first differences were used in further analysis.

In applying factor analysis, one factor was extracted and the factor scores were calculated. Given that the calculated factor scores are monthly and EU-SILC data is annual, these factor scores were transformed into annual data using arithmetic average with the aim of comparing CS and EU-SILC data.

#### 4. Research results

Factor analysis was used on Croatian CS data to calculate the new CS composite indicator of household financial distress. As already mentioned, factor analysis was conducted on three variables: the financial situation over the last 12 months, the financial situation over the next 12 months, and a statement on the household financial situation. First, the appropriateness of factor analysis was checked (stationarity, correlation matrix and MSA values). As already mentioned, due to the stationarity condition, the first differences were used. The correlation matrix given in Table 2 reveals that all coefficients are significant at the 5% significance level. This indicates the appropriateness of factor analysis.

Variables	Q1	Q2	Q3
Q1	1.0000	0.6613*	0.2801*
Q2	0.6613*	1.0000	0.2212**
Q3	0.2801*	0.2212**	1.0000

\*Correlations are significant at  $p < 0.01000$

\*\*Correlations are significant at  $p < 0.05000$

Table 2: *Correlations*

Table 3 shows the values of Kaiser's measure of sampling adequacy (MSA). It is evident that the overall MSA value and all individual MSA values are greater than 0.5, which also indicates the appropriateness of factor analysis. Based on all that has been said, it is possible to proceed to the next step, i.e. extraction of the factors.

Variables	Overall MSA = 0.55883186
	Individual MSA values
Q1	0.53777833
Q2	0.54112784
Q3	0.77976708

Table 3: *Kaiser's measure of sampling adequacy*

The data was analysed using principal component factor analysis and the eigenvalue criterion (all factors that have eigenvalues greater than one should be extracted) was used for the extraction of factors. Table 4 gives the eigenvalues, differences, proportions and cumulative proportions. According to this criterion, only one factor was extracted. This extracted factor alone explains 60.52% of the total variance.

	Eigenvalues	Differences	Proportions	Cumulative proportions
1	1.81555609	0.96680702	0.6052	0.6052
2	0.84874907	0.51305422	0.2829	0.8881
3	0.33569485		0.1119	1.0000

Table 4: *Eigenvalues, differences, proportions and cumulative proportions*

The factor matrix is given in Table 5. It clearly appears that all factor loadings are greater than 0.5, which means that they are all satisfactory. The extracted factor represents the new CS composite indicator of household financial distress on those three chosen variables. For the purpose of further analysis, the factor scores were calculated for this one retained factor.

Variables	Factor1
Q1	0.88428
Q2	0.86281
Q3	0.53774

Table 5: *Factor matrix*

The new CS indicator, based on first differences of time series data (as shown in Figure 1), represents monthly changes in consumer assessments and expectations regarding their financial situation.

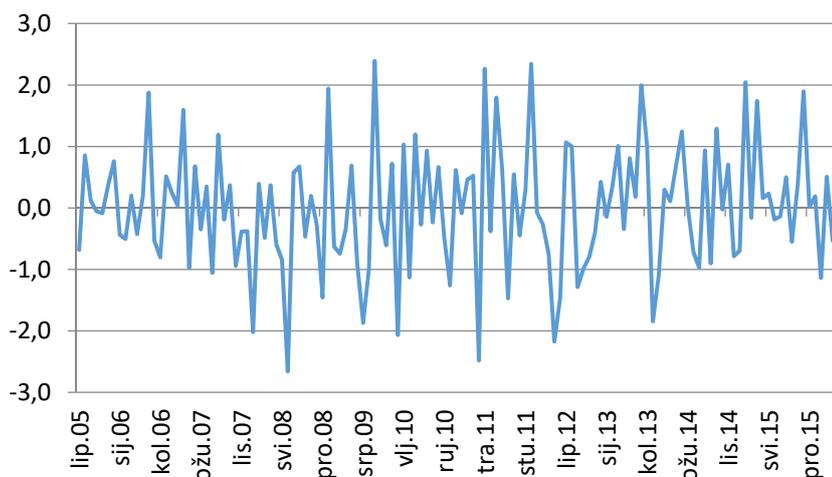
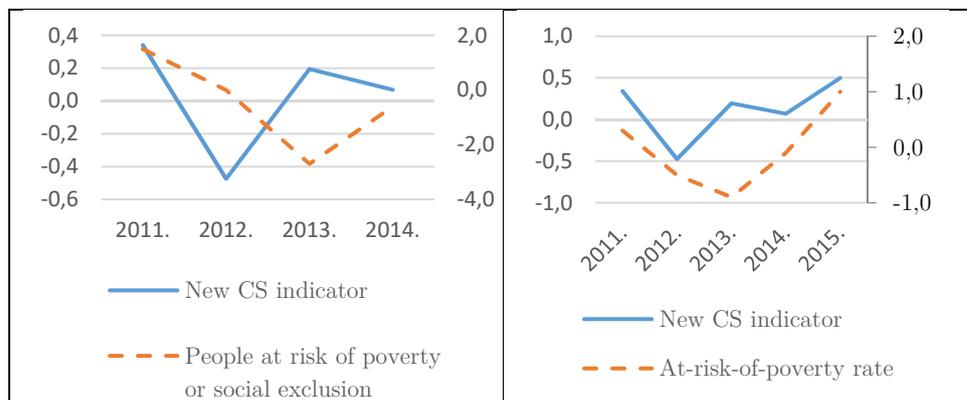


Figure 1: *New CS indicator*

These calculated factor scores were used for comparing the selected variables from the EU-SILC data: people at risk of poverty or social exclusion, the at-risk-of-poverty rate, the at-risk-of-poverty rate before social transfers (pensions excluded from social transfers), and the at-risk-of-poverty rate before social transfers (pensions included in social transfers). Since the variables of the EU-SILC data are annual and these factor scores are based on monthly data, they were transformed into annual data. Furthermore, the first differences for the EU-SILC data were used, as they were used for the CS data in factor analysis. Figure 2 shows the comparison between the new CS indicator and selected EU-SILC variables.



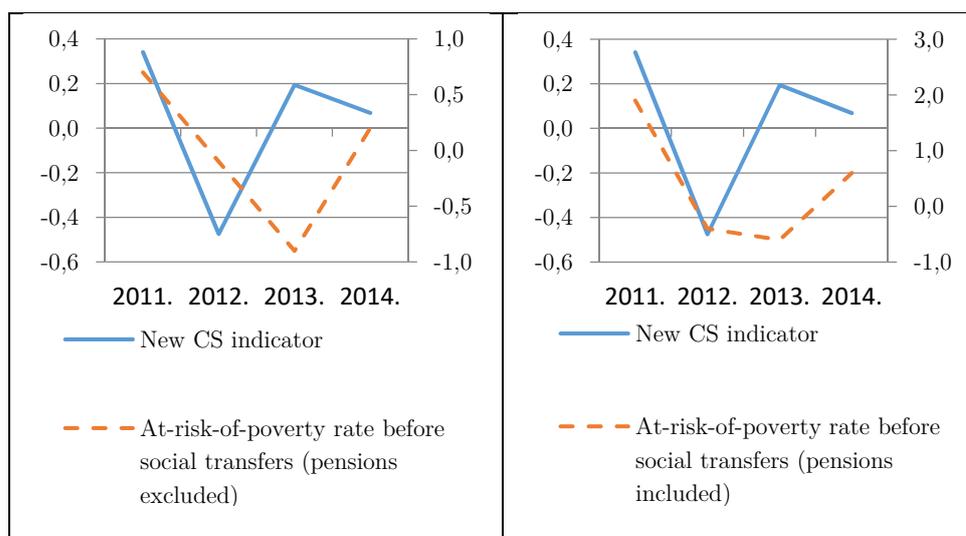


Figure 2: Comparison of new CS indicator and selected EU-SILC variables

It clearly appears that the new CS indicator and the chosen EU-SILC variables share a similar pattern, except for the variable people at risk of poverty or social exclusion in 2013.

The graphs show that the new CS indicator increased in 2013, while all the other variables of the EU-SILC have not increased.

One reason is the increase in optimism amongst Croatian citizens upon entering the EU. Their optimism was present in the CS indicator given that it is based on consumer estimates and expectations, rather than on measuring the actual state of poverty.

## 5. Conclusion

One of the key targets defined in Europe 2020 Strategy (for the period 2010-2020) is stimulating social inclusion and poverty reduction. In accordance with this, Croatian Government has adopted the Strategy for Combating Poverty and Social Exclusion in Croatia (2014-2020). This strategy is based on ensuring conditions for achieving three main objectives: the fight against poverty and social exclusion; preventing the emergence of new categories of the poor; and the establishment of a coordinated system of support for groups at risk of poverty and social exclusion.

Therefore, different measures (variables) of poverty levels should be available. The established EU-SILC monitors and publishes several variables related to the general national poverty levels (at risk of poverty rate, people at risk of poverty or social exclusion, etc.).

Importantly, poverty (and other variables) should be observed and measured on a monthly basis during dynamic and turbulent macroeconomic conditions. The important, but as yet unrecognized and underutilized source of such monthly data is CS data. The monthly frequency of CS data is its advantage in comparison to EU-SILC.

Based on what has been said, it is obvious that the EU-SILC provides important variables related to national poverty. However, the EU-SILC data is annual, while the CS data is monthly, which is their major advantage. Accordingly, the aim of this research is to obtain a new indicator of household financial distress. Factor analysis was used on three selected CS variables to calculate the new CS composite indicator of household financial distress. Three chosen CS variables pointing to the household financial situation are: the financial situation over the last 12 months, the financial situation over the next 12 months, and a statement on the household financial situation. Having determined that the data is suitable factor analysis, one factor was retained and the factor scores were calculated. Given that the obtained factor scores are monthly based, they were subsequently transformed to annual values and then were compared with the chosen annual variables for the EU-SILC data.

The outcome of this research is a monthly, internationally comparable CS-based composite indicator of household financial distress which has pattern similar to the chosen EU-SILC variables. The new indicator is applicable to all EU member states, as well as Croatia. Accordingly, further research on this subject should include other EU member states.

## Acknowledgement

This paper has been supported in part by the Croatian Science Foundation under project No. 3858.

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