Revenues, Expenses and Savings - Variables of Influence

Mălina-Ionela Burlacu
Alexandru Bîrsan
The Bucharest University of Economics, Romania
malina.burlacu@gmail.com
alexandru.birsan@man.ase.ro

Abstract

At the level of any society, income and expenditure and savings have played and continue to play an important role both from a macroeconomic perspective and from a microeconomic perspective.

The purpose of our paper is to identify the variables of influences between the revenues, the expenses and the savings at a household level, by using the Principal Component Analysis. We have used the results of a questionnaire conducted on a sample of 344 persons nationally representative and we have used SPSS and Monte Carlo PCA in order to analyze the results and Identify the principal components.

Key words: household, revenue, savings, expenses, analysis
J.E.L. classification: I30

1. Introduction

At the level of any society, income, expenditure and savings have played and continue to play an important role both from a macroeconomic perspective (as a key element in the development of a society) and from a microeconomic perspective (viewed at the household level, as a means of describing living standards). of the population). Closely related to each other, they are key elements that play an important role in the entire national economy.

Revenues, obtained from various sources, have been the basis for the development of civilizations, both from the perspective of man as an individual, and of states, viewed in general. Regarding Romania, one's salary represents the most important source of income. Wages and other income associated with them form the most important category of income, characterized by the presence of the largest share in the structure of total household income.

The level, structure and dynamics of expenditures represent the main axes in characterizing the standard of living of a country (from a macroeconomic perspective) but also of a household (from a microeconomic perspective). Expenses incurred for the purchase of goods and services are called consumer expenses. The standard of living in Romania is characterized differently, mainly depending on the total income registered at the level of a family, in relation to the size of each family and in close correlation with consumption expenditures structured on food, non-food products and services.

Income is the main determinant of saving. The way in which individuals, respectively households save can be differentiated depending on the social structure from which the members of the respective household come. Depending on certain characteristics, individuals create their own saving behavior. Usually, the reasons underlying the saving process correlate with certain demographic variables of the population (age, environment, education).

The registration of a high standard of living is closely related to the incomes, expenses and implicitly the savings of the population. Revenues, in view of the importance they reflect on the fluctuation of expenditures and savings, can be seen both as a determining factor and as an explanation of the level of development of the whole society.

In a developed economy, a high level of income allows the registration of a higher volume of consumption expenditures, and implicitly a higher percentage of the amounts intended for saving.

2. Theoretical background

The income of the population is a topic encountered over time alongside the development of civilizations. Revenues, obtained from various sources, were the basis for the development of civilizations, both from the perspective of man as an individual, and of states, viewed in general. The correlation between the income level of a population and the living standard of that population is based on a complex system of indicators. The analysis of this correlation involves the analysis of the evolution of quality of life by highlighting all aspects that contribute to creating a descriptive profile, in terms of level of culture, ways of spending free time, vacation destinations and time allocated to them. have as a source of departure the results regarding a series of indicators, which can be demographic in nature (income level, level of education, occupation) but also indicators of social nature (level of expenditure, health, environment, access to media, level of culture). The importance of knowing all these aspects derives primarily from the fluctuating nature of these indicators.

Highlighting the values of each of these indicators is useful both at the political, economic and social level. Increasing the value of one indicator can lead to an increase or decrease in the other. With the evolution registered both at the scientific and technical level, there are changes in different fields, thus contributing to significant increases in living conditions. But, equally, these developments would not be possible without a good understanding of the importance of each aspect of quality of life.

Specialists in the field (Marginean et al, 2002, p33) consider that the field of quality of life can be defined by all the elements that refer to the physical, economic, social, cultural, political, health situation, in which people carry, the content and nature of the activities they carry out, the characteristics of relations and social processes. who participate, the goods and services they have access to, the consumption patterns adopted, the way and lifestyle, the evaluation of the circumstances and the results of the activities that correspond to the expectations of the population, as well as the subjective states of satisfaction / dissatisfaction, etc.

3. Research methodology

The analysis was compiled based on responses of a sample of 344 people, the responses being obtained through the collection methodology known as CAWI (Computer-assisted web interviewing), which is also known as online interviewing. This implies the respondent to complete the questionnaire directly into the browser, it appearing as a web page. It is a technique of data collection, which major advantage is the speed of data collection. Sample structure is composed of respondents aged 18-64 years. (Burlacu, 2016, 3188)

Ensuring sample representativeness is achieved by allocating a percentage of each demographic variable, so that, once that percentage is reached, the questionnaire cannot be filled by new respondents. Andrei (Andrei, 2001, 82) names this quota sampling method, and the condition of obtaining a good sample is maintaining the designated rates (the percentage determined for each variable).

The data was analyzed in SPSS, using the Principal Components Analysis, a factor analysis technique in which aims to reduce the number of variables initially used, by taking into account a small number of representative variable (Carbureanu, 2010, 188).

4. Findings

Due to a large number of variables that can influence the quality of life and standard of living, it is necessary to identify those variables that are more important than others. Thus, certain analysis techniques are used to simplify the process of analyzing a complex set of variables and, implicitly, reduce the number of variables in order to increase the speed of data processing and identify the best model that shows the relationships between data. Factor analysis consists in the use of a wide

range of statistical techniques used to represent a set of variables in accordance with a small number of hypothetical variables, called factors.

Principal Component Analysis (PCA) is one of the most widely used factor analyzes, both for its ease of use and its ability to obtain a small number of linear combinations from a set of variables, but also to retain as much information as possible from the initial variables.

In order to apply the Analysis in main components, we used SPSS. The database used in the analysis consists of 11 questions and comes from the application of a statistical questionnaire to a sample of 344 people, through the online collection method.

Table no. 1 SPSS coding of the analyzed questions

Question	SPSS Coding
How old are you?	Cod_varsta
What is the region of residence?	Cod_regiune
In which of the following categories does your personal monthly net income fall?	Cod_venit
What is your current occupation?	codq1
What is the last level of education completed?	codq2
Please appreciate how was the level of income in your household in the previous year, compared to that of acquaintances / friends?	codq3
Please assess (estimate) the level of income in your household in the current year compared to the previous year?	codq4
Think about the current situation of your household, how do you appreciate the income at the moment?	codq5
Are you used to saving on a monthly basis?	codq6
Please appreciate, using the answer below, to what extent do you cope with household expenses (please think, compared to other acquaintances / friends of yours)?	codq7
In the previous year did you go on holiday with the other members of your household?	codq8

Source: own analysis

Output resulting from the application of Principal Component Analysis consists of a series of results such as: correlation matrix, KMO and Bartlett test, total variance explained, Scree Plot graph, component matrix and component matrix after rotation.

Figure no. 1. Correlation Matrix

Correlation Matrix[a]

		codvarsta	codregiune	codvenit	codq1	codq2	codq3	codq4	codq5	codq6	codq7	codq8
Correlation	codvarsta	1.000	.164	.114	-.054	.181	.035	-.024	-.005	.069	-.025	-.021
	codregiune	.164	1.000	.016	-.061	.145	.049	.051	.097	.026	.055	-.040
	codvenit	.114	.016	1.000	-.181	.216	.418	.196	.375	-.175	.344	-.245
	codq1	-.054	-.061	-.181	1.000	-.199	-.109	-.030	-.113	.054	-.090	.103
	codq2	.181	.145	.216	-.199	1.000	.075	-.082	.130	-.036	.072	-.160
	codq3	.035	.049	.418	-.109	.075	1.000	.236	.564	-.238	.501	-.239
	codq4	-.024	.051	.196	-.030	-.082	.236	1.000	.380	-.010	.350	-.100
	codq5	-.005	.097	.375	-.113	.130	.564	.380	1.000	-.268	.680	-.322
	codq6	.069	.026	-.175	.054	-.036	-.238	-.010	-.268	1.000	-.240	.235
	codq7	-.025	.055	.344	-.090	.072	.501	.350	.680	-.240	1.000	-.333
	codq8	-.021	-.040	-.245	.103	-.160	-.239	-.100	-.322	.235	-.333	1.000
Sig. (1-tailed)	codvarsta		.001	.017	.159	.000	.261	.327	.463	.099	.319	.349
	codregiune	.001		.384	.130	.004	.182	.172	.036	.317	.154	.231
	codvenit	.017	.384		.000	.000	.000	.000	.000	.001	.000	.000
	codq1	.159	.130	.000		.000	.022	.288	.018	.157	.048	.028
	codq2	.000	.004	.000	.000		.083	.065	.008	.253	.092	.001
	codq3	.261	.182	.000	.022	.083		.000	.000	.000	.000	.000
	codq4	.327	.172	.000	.288	.065	.000		.000	.428	.000	.032
	codq5	.463	.036	.000	.018	.008	.000	.000		.000	.000	.000
	codq6	.099	.317	.001	.157	.253	.000	.428	.000		.000	.000
	codq7	.319	.154	.000	.048	.092	.000	.000	.000	.000		.000
	codq8	.349	.231	.000	.028	.001	.000	.032	.000	.000	.000	

a. Determinant = .136

Source: SPSS

Figure no. 2. KMO and Bartlett's Test

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.789
Bartlett's Test of Sphericity	Approx. Chi-Square	676.588
	df	55
	Sig.	.000

Source: SPSS

Given that the KMO test indicates a high value (closer to 1 than 0) and Chi-Squared registers a value equal to 676,588, which corresponds to a significance level less than 0.05 (Sig. = 0.000), considers that there is a strong link between the analyzed data. Therefore, the null hypothesis (independence hypothesis) is rejected and, therefore, there are a number of common factors that allow the application of Principal Component Analysis.

Figure no. 3. Total Variance Explained

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings[a]
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	3.054	27.765	27.765	3.054	27.765	27.765	2.946
2	1.431	13.006	40.771	1.431	13.006	40.771	1.650
3	1.122	10.201	50.972	1.122	10.201	50.972	1.247
4	.943	8.569	59.542				
5	.884	8.040	67.581				
6	.782	7.106	74.687				
7	.741	6.737	81.424				
8	.652	5.923	87.347				
9	.628	5.711	93.058				
10	.459	4.172	97.230				
11	.305	2.770	100.000				

Extraction Method: Principal Component Analysis.

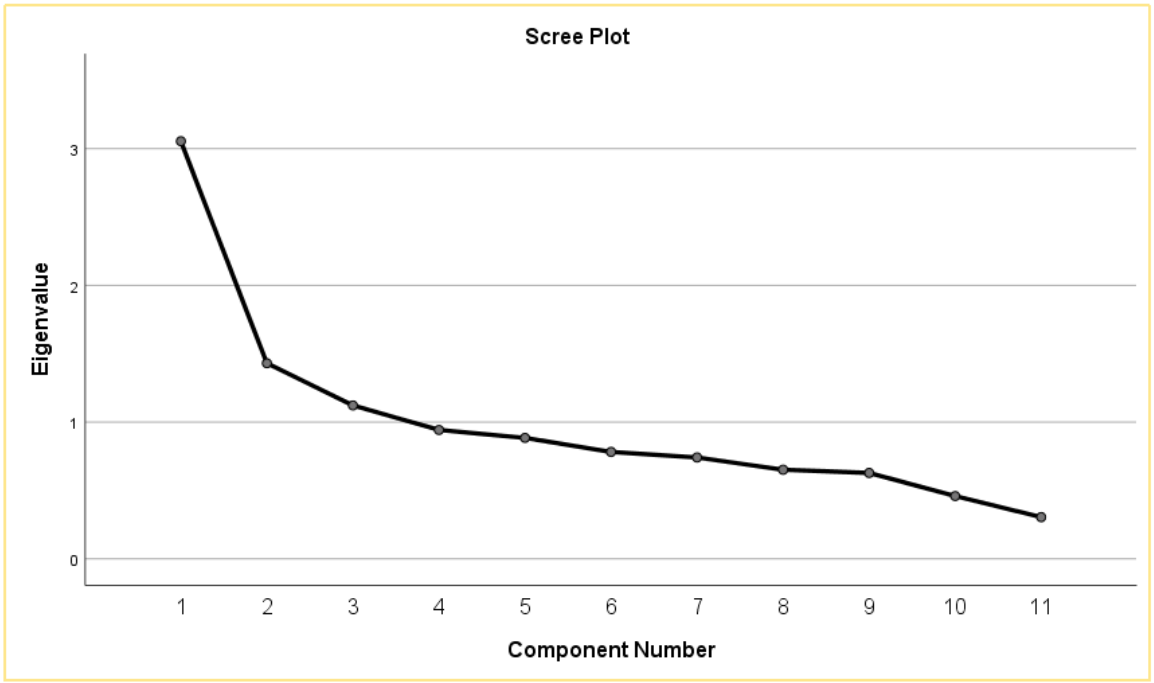
a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.

Source: SPSS

Regarding the Total Explained Variation, 11 main components were identified. Of these, the first 3 meet the selection criteria (Total Initial Eigen Values> = 1). The variation explained by each factor is distributed as follows: 27,765% for the first factor, 13,006% for the second factor and, respectively, 10,201% for the third factor. Thus, the cumulative variation explained by the 3 factors is 50,972%.

Through the rotation method, the first factor loses its saturation level in favor of the other two.

Figure no. 4. Scree Plot



Source: SPSS

The eigenvalues for all 11 main components are represented graphically in a sequence of main factors. An important observation is that, although the total variation indicated the existence of 3 main factors, the graph shows a sharp decrease between the first two, followed by a linear decrease. This aspect recommends the use of only two factors instead of three.

Following this hypothesis, a parallel analysis was performed by using the Monte Carlo PCA program, which allowed the replication of the 3784 (344 respondents * 11 variables) by generating 100 sets of random data.

The parallel analysis generated the below results:

Figure no. 5. Monte Carlo PCA results for 100 replications of the 11 variables

```
5/16/2020   6:01:32 PM
Number of variables:     11
Number of subjects:     344
Number of replications: 100

++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Eigenvalue #     Random Eigenvalue     Standard Dev
++++++++++++++++++++++++++++++++++++++++++++++++++++++++
      1                1.2868               .0476
      2                1.2041               .0307
      3                1.1481               .0282
      4                1.0949               .0282
      5                1.0424               .0234
      6                0.9976               .0210
      7                0.9465               .0246
      8                0.8975               .0248
      9                0.8529               .0260
     10                0.7949               .0338
     11                0.7341               .0362
++++++++++++++++++++++++++++++++++++++++++++++++++++++++
5/16/2020   6:01:33 PM

Monte Carlo PCA for Parallel Analysis
©2000 by Marley W. Watkins. All rights reserved.
********************************************************
```

Source: Monte Carlo PCA

In order to perform a rigorous analysis, the main factors will be considered those whose own value is greater than the results of the parallel analysis.

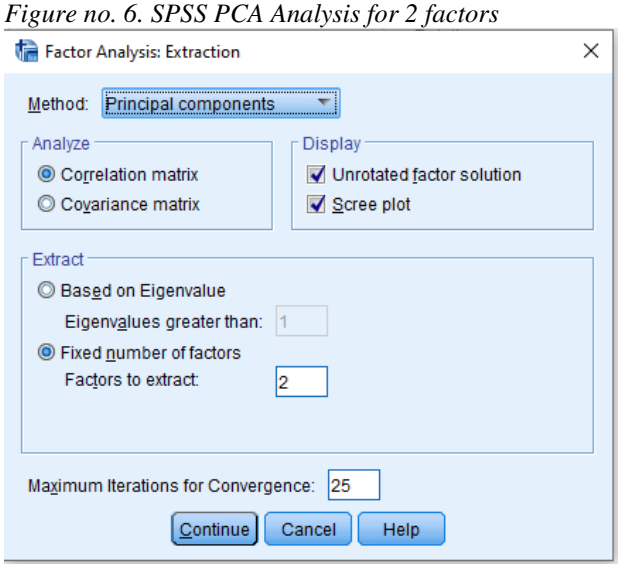
Table no. 2 Comparations between the Eigenvalues results between SPSS and Monte Carlo PCA

Factor	SPSS	Monte Carlo PCA
1*	3.054	1.2868
2*	1.431	1.2041
3*	1.122	1.1481
4	0.943	1.0949
5	0.884	1.0424
6	0.782	0.9976
7	0.741	0.9465
8	0.652	0.8975
9	0.628	0.8529
10	0.459	0.7949
11	0.305	0.7341

Source: own analysis

Taking into account the table above, as well as the graph of eigenvalues, the analysis will be redone by limiting the main factors taken into account by SPSS to two.

Figure no. 6. SPSS PCA Analysis for 2 factors



Source: SPSS

The results of KMO and Sig have not changed, and the table of Total Explained Variation takes the following form:

Figure no. 7. Total Variance Explained for the 2 factors analysis

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings[a]
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	3.054	27.765	27.765	3.054	27.765	27.765	2.999
2	1.431	13.006	40.771	1.431	13.006	40.771	1.576
3	1.122	10.201	50.972				
4	.943	8.569	59.542				
5	.884	8.040	67.581				
6	.782	7.106	74.687				
7	.741	6.737	81.424				
8	.652	5.923	87.347				
9	.628	5.711	93.058				
10	.459	4.172	97.230				
11	.305	2.770	100.000				

Extraction Method: Principal Component Analysis.

a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.

Source: SPSS

The highest eigenvalue (3,054) corresponds to the first factorial axis, which explains 27.765% of the initial inertia of the point cloud. The first two factorial axes explain 40,771% of the total inertia.

Figure no. 8. Component Correlation Matrix

Component Correlation Matrix

Component	1	2
1	1.000	.118
2	.118	1.000

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.

Source: SPSS

Component Correlation Matrix analysis indicates a low value between the two factors analyzed (0.118 <0.3), which means that there is no strong link between the two factors.

Figure no. 9. Pattern Matrix

Pattern Matrix[a]

	Component	
	1	2
codq5	.843	
codq7	.822	
codq3	.734	
codvenit	.545	.308
codq4	.532	
codq8	-.477	
codq6	-.434	
codq2		.722
codvarsta		.613
codq1		-.462
codregiune		.462

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.

a. Rotation converged in 4 iterations.

Source: SPSS

The Patterns Matrix contains the data obtained after applying the rotation of the factors and allows the construction of the structure of the two factors:

- Factor 1 consists of codq5 (Think about the current situation of your household, how do you appreciate the income at the moment? - 0.843), codq7 (Please appreciate, using the answer below, to what extent do you face the expenses from the household (please think, compared to other acquaintances / friends of yours)? - 0.822) and, respectively, codq3 (Please appreciate how was the level of income in your household in the previous year, compared to that of acquaintances / friends? - 0.734)
- Factor 2 consists of codq2 (What is the last level of education completed? - 0.722)

5. Conclusions

The results obtained are useful in identifying those factors that significantly influence the standard of living. The importance of knowing how each factor influences the standard of living derives primarily from the fluctuating nature of these indicators. Highlighting the values of each of these indicators is useful both politically, economically and socially. Increasing the value of one indicator can lead to an increase or decrease in the other. With the evolution registered both at scientific and technical level, there are changes in different fields, thus contributing to significant increases in living conditions. But, equally, these developments would not be possible without a good understanding of the importance of each aspect of quality of life.

6. References

- Carbureanu, M., 2010, A Factor Analysis Method Applied in Development Field, *The Annals og "Constantin Brâncuşi" University of Târgu Jiu, Economy Series*, No. 1/2010, pp 187-194
- Marginean I., Balasa A., 2002. *Quality of life in Romania.* Bucharest: Expert Publishing House
- Andrei T. 2001. Tehnici nealeatoare de esantionare utilizate in practica statistica. *Economics Informatics*, No. 2 (18), pp. 82-89
- Burlacu M.I., 2016, Income, Occupational Structure and Standard of Living in Romania's Rural Areas Compared to Urban Areas, *Vision 2020: Innovation Management, Development Sustainability, And Competitive Economic Growth, 2016, Vols I – VII*, pp 3187-3195