PURCHASING POWER IN ROMANIA COMPARED TO OTHER MEMBER STATES OF THE EUROPEAN UNION

Prof. univ. dr. Giani-Ionel GRĂDINARU *(giani.gradinaru@gmail.com)*
Bucharest University of Economic Studies
PhD Student Marius-Cristian RĂDUȚ *(radutmc@gmail.com)*
Bucharest University of Economic Studies

Abstract

In this article, the authors aim to present, through statistical methods, the situation of price level indices for the final consumption of households in the European Union. The authors make a random selection of three groups of four states, trying to highlight the situation in 2021 for the main groups of goods and services. Volume indices of GDP/inhabitant, in 2021, for the 12 analyzed states are also presented. The article carries out an econometric analysis aiming to emphasize the connection between the price level for the group of goods and services, the final consumption of households and other groups of goods and services. The purpose of this article is to highlight the role of purchasing power in order to carry out a comparative study between some member states of the European Union. Of course, Romania is among the EU states subject to statistical-econometric research.

Introduction

In this article, I started by defining the concept of "purchasing power parity" to introduce the reader. Then I presented at length some aspects regarding the European Comparison Program, which take into account the evolution of the Gross Domestic Product over a period of time. We used the data provided by Eurostat and the National Institute of Statistics. The analysis continued with the study of the evolution of consumer prices for the main groups of goods and services in Romania, as well as in the other states considered members of the European Union.

In the final part of this article I used the uni- and multifactorial regression model, taking into account some groups of goods and services, talking about which have a similar trend. To highlight these trends more clearly, we made graphical representations and tabular presentations. Data in tables and graphical expressions were analyzed and commented accordingly.

Literature review

Gilbert, M., Kravis, I. (1954) talked about the purchasing power of money and made a comparison between the national product of the states. Dubos, I. (1971) addressed the topic of links between economic variables. Torrens, I. (1972) discusses the methods and models of factor analysis. Lequiller, F. I., and Zieschang, K. D. (1994) traced developments in producer price indices in former states that belonged to the Soviet Union. Isac-Maniu, Al., Mitruț, C., Voineagu, V., (1995) produced a work that refers to macroeconomics and macroeconomic analysis. Anghelache, C. (1996) publishes an extensive paper that deals with the economic indicators used in measuring economic development. Thomas, R.L. (1997) provide an introduction to modern econometrics. Badia, J., Bastida, R., Hait, J.R. (1997) present a series of ideas about the possibility of approaching statistical analyzes without the help of mathematics. Biji, M., Biji, E.M., Lilea, E., Anghelache, C. (2002) published a treatise on statistics, while Bardsen, G. et al. (2005) published a paper on modelling, econometrics in macroeconomics. Anghelache, C. (2008) published a new treatise on theoretical and economic statistics. Losoncz, M. (2011) addressed the issue of price convergence in the European Union, focused on states in the geographical area of Central, Eastern and South-Eastern Europe. Castles, I. (2014) addressed a topic by which he compared the average levels of income, in different countries, although after the 1990s it represents a complex topic that is no longer approached individually.

Methodological details, data, results and discussion

The Purchasing Power Parity (PPP) represents the prices practiced under internal market conditions of each state and expresses the need for currency units to buy a certain, similar volume of goods and services that can be obtained with the same currency unit in the base country.

The Standard Purchasing Power (PCS) is a conventional currency unit, which does not take into account the level of prices between countries, used at the level of the European Union through which the European Compare Program expresses its results.

The price level index (PIL) is the ratio between the Purchasing Power Parity (PPP) and the official exchange rate that shows us how many currency units we need to buy an identical volume of goods and services in different countries.

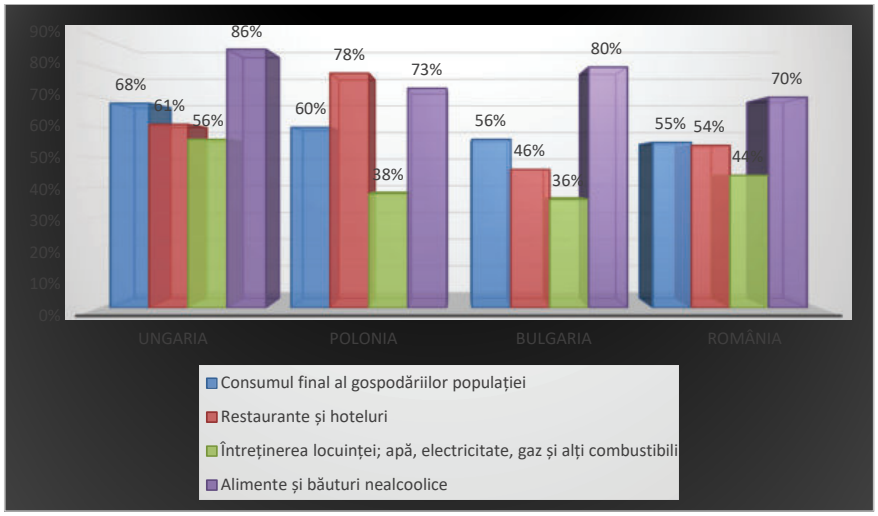
The European Comparison Program (PEC) is a part of the International Comparison Program (PIC), which aims to compare Gross Domestic Product (GDP) according to level and structure. It debuted around the 1970s and was reformed in 1999 to generate annual results for all countries included in the program.

The member states and candidates for joining the European Union and the member countries of the European Free Trade Association (Iceland, Norway and Switzerland) participate in this program.

In the continuation of the article, I used part of the results calculated by Eurostat for the year 2021, making a comparative analysis between several member states of the European Union, the grouping of the states was done according to the level of indices for final consumption, depending on the geographical area to which the states belong or year of accession.

Price level indices for the main groups of goods and services, compared to the European Union average, in Romania, Bulgaria, Poland and Hungary

Graph no. 1



Data source: https://ec.europa.eu/eurostat

According to Eurostat data, in Romania, in 2021, the lowest level of prices for consumer goods and services was recorded in the total final consumption of households. The price level being 45% lower than the European Union average. At the opposite pole is Ireland with a price level 44% higher than the European Union average.

The other states analyzed in graph 1 also register values below the European Union average, we note that the price level for consumer goods and services from the total final consumption of households is the highest in Hungary (being 32% below the European Union average), being followed by

Poland (being 40% below the European Union average), and in Bulgaria the difference compared to the accession partner from 2007 is only one percentage point (being 44% below the European Union average).

The lowest level of prices for goods from the Food and non-alcoholic beverages group was also recorded in Romania, 30% lower than the European Union average, in contrast to Luxembourg, which has the highest price of this group of goods (by 25% above the European Union average).

In this group of four states, Romania is followed by Poland (the price level being 27% below the European Union average) and Bulgaria (with a price level 20% below the European Union average). In the Food and non-alcoholic beverages group, the highest price level is recorded in Hungary, being below the European Union average by 14%.

The level of prices in the HoReCa industry is the most attractive in Bulgaria, where a level of 54% below the European Union average is recorded, followed by Romania with a level of 46% below the European average. At the opposite pole, the most expensive country for the group of goods and services Restaurants and hotels is Denmark with a price level 54% above the European Union average.

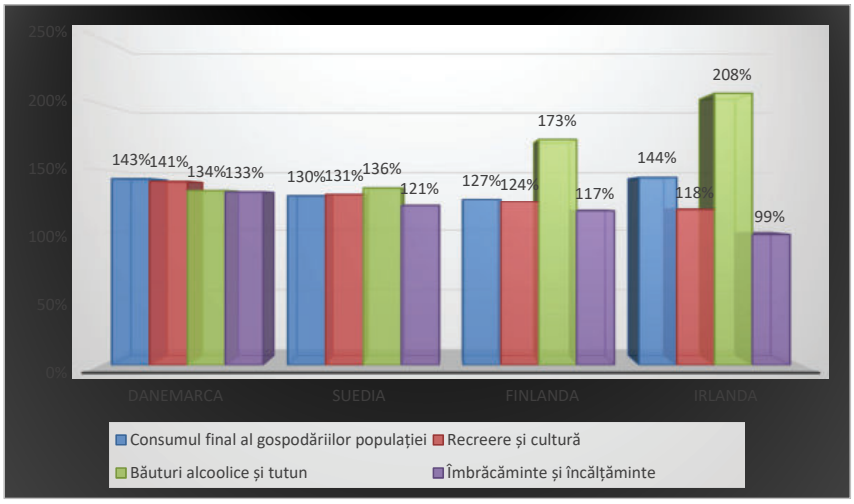
At the European level, Hungary occupies the third position in terms of prices for the group of goods and services Restaurants and hotels, with 39% below the European Union average. The price level is the highest in Poland, among the four states analyzed in graph no. 1, representing 78% of the European Union average.

In the context of the Russian-Ukrainian conflict, special concern and attention is given to the group of goods and services Home maintenance; water, electricity, gas and other fuels, where Bulgaria and Poland are best positioned, with a price level for this group of 64% and 62% respectively below the European Union average. Romania shares the third position with Croatia registering only 44% of the European Union average price level.

Hungary registers a price level 34% below the European Union average, in this last analyzed group.

Price level indices for the main groups of goods and services, compared to the European Union average, in the Nordic countries and Ireland

Graph no. 2



Data source: https://ec.europa.eu/eurostat

In chart no. 2, we analyzed some of the states with the highest price levels in the European Union, probably also among those with the highest living standards.

According to Eurostat data, Ireland recorded the highest level of prices for consumer goods and services from the total final consumption of households, being 44% above the European Union average. Among the countries analyzed, Denmark ranks second with a price level 43% above the European Union average, followed by Sweden 30% above the European Union average and Finland with a price level 27% higher than the European Union average.

In the group of products and services Alcoholic drinks and tobacco we note that in Ireland and Finland some price levels are practiced which tend to discourage the consumption of these vices. Thus, in Ireland the price level is 108% higher than the European Union average (being the highest level among the member states), and in Finland 73% higher than the European Union average (occupying the second position in Europe). In Sweden, the prices charged are 36% above the European Union average, and Denmark has the lowest price level, among the four countries analyzed, representing 134% of the European Union average.

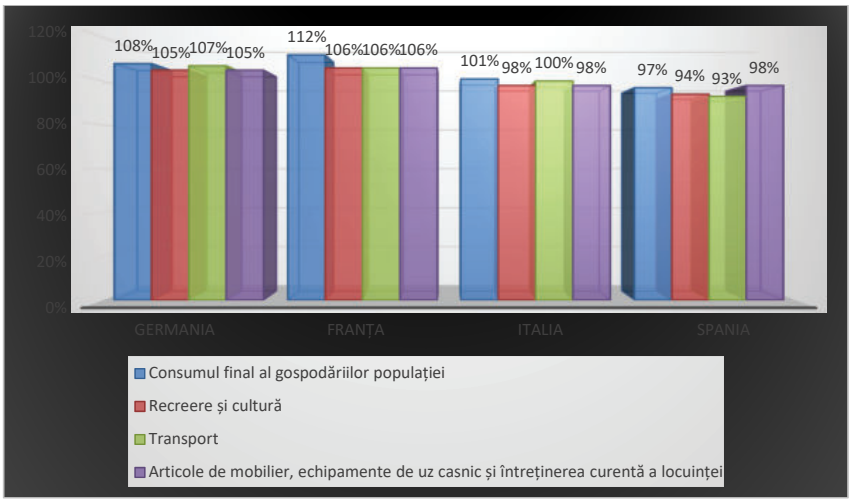
In the group of goods and services Clothing and footwear, at the level of the four states we register the first value below the European Union

average. Thus in Ireland, prices for Clothing and footwear are 1% lower than the European Union average. In this group, the first three positions are occupied by Denmark, Sweden and Finland with a price level 33%, 21% and 17% respectively higher than the European Union average.

For Recreation and culture, the Danes register a price level 41% higher than the European Union average, followed by the Swedes with a price level 31% higher than the European Union average, the podium being completed by the Finns who register a level of prices by 24% above the European Union average. The Irish with the 18% above the European Union average occupy the fifth position after Luxembourg with a price level 19% higher than the European Union average.

Price level indices for the main groups of goods and services, compared to the European Union average, in Germany, France, Italy and Spain

Graph no. 3



Data source: https://ec.europa.eu/eurostat

According to the data presented in the previous graph, the largest economies in the European Union often present price levels close to the European average. A level of prices for consumer goods and services from the total final consumption of households can be observed by 8% above the European Union average in Germany, a level of prices for consumer goods and services from the total final consumption of households by 12% above the European Union average in France and a level of prices for consumer goods and services in the total final consumption of households by 1% above the

average in Italy. The price level for consumer goods and services in the total final consumption of Spanish households is 3% below the European average.

In the Recreation and culture group of goods and services, we have grouped two countries each, while in France and Germany the price level is 6% and 5% above the European Union average, in Italy and Spain, the price levels are below the European Union average with 2% and 6% respectively.

Similarly, in the group of goods and services Furniture items, household equipment and current home maintenance, the price level in France and Germany are 6% and 5% respectively above the European Union average. The difference compared to the previous group consists in a price level 2% below the European Union average in the other two analyzed states.

The Transport goods and services group is the last to be addressed, we note that in Italy the price level is similar to the European average, Spain records a price level 7% below the European Union average, while in France, the price level is 6% above the of Italy. Germany registers a price level for this group that is 7% above the European Union average.

Starting from the level of price indices from 27 member states of the European Union, we formulated two equations, a unifactorial model and a multifactorial one, intended to show us the connection between the price level for the goods group Final consumption of households and the group of goods Food and beverages non-alcoholic, respectively between the price level for the goods group Final consumption of households and the groups Restaurants and hotels, respectively Home maintenance, water, electricity, gas and other fuels.

The equation of the unifactorial model, then written in matrix mathematical form, has the following form:

$$C_i = f(H_i) + \varepsilon_i$$

$$C_i = b_0 + b_1 \times H_i + \varepsilon_i$$

$$\begin{pmatrix} C_1 \\ C_2 \\ \vdots \\ C_n \end{pmatrix} = \begin{pmatrix} 1 & H_1 \\ 1 & H_2 \\ \vdots & \vdots \\ 1 & H_n \end{pmatrix} \times \begin{pmatrix} b_0 \\ b_1 \\ \vdots \\ b_n \end{pmatrix} + \begin{pmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \vdots \\ \varepsilon_n \end{pmatrix}$$

where: C_i = The price level for the group "Final consumption of households"/ dependent variable;

H_i = Price level for the group "Home maintenance, water, electricity, gas and other fuels"/ independent variable;

ε_i = random variable/residual.

Results of the unifactorial model obtained with the Eviews program

Table no. 1

Dependent Variable: C_i
Method: Least Squares
Sample: 1 27
Included observations: 27

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ε_i	0.549739	0.029946	18.35753	0.0000
H_i	44.33212	3.125372	14.18459	0.0000

R-squared	0.930939	Mean dependent var	96.33333
Adjusted R-squared	0.928177	S.D. dependent var	25.60349
S.E. of regression	6.861705	Akaike info criterion	6.760976
Sum squared resid	1177.075	Schwarz criterion	6.856964
Log likelihood	-89.27318	Hannan-Quinn criter.	6.789518
F-statistic	336.9990	Durbin-Watson stat	1.554897
Prob(F-statistic)	0.000000		

Source: Eviews program processing

The regression equation of the unifactorial model has the following form:

$$C_i = 0.549739 + 44.33212 \times H_i$$

The values of the tests R^2 and R^2 – adjusted respectively show us that the model is representative in a proportion of over 93%, show the positive direct link between the price level for the group "House maintenance, water, electricity, gas and other fuels" and the price level for the group "Final consumption of households", in the sense that with the increase of the independent variable, the dependent variable increases. The parameter suggests to us that in the absence of the independent variable the value of the dependent variable is equal to 0.55%. The values recorded by the F-statistic test and the Prob(F-statistic) test suggest that the econometric model using the dependent variable Price level for the group "Final consumption of households" and the factorial variable The price level for the group "House maintenance, water, electricity, gas and other fuels" is correct.

The equation of the multifactorial model, then written in matrix mathematical form, takes the following form:

$$C_i = f(T_i, H_i) + \varepsilon_i$$

$$C_i = b_0 + b_1 \times T_i + b_2 \times H_i + \varepsilon_i$$

$$\begin{pmatrix} C_1 \\ C_2 \\ \vdots \\ C_n \end{pmatrix} = \begin{pmatrix} 1 & T_1 & H_1 \\ 1 & T_2 & H_2 \\ \vdots & \vdots & \vdots \\ 1 & T_n & H_n \end{pmatrix} \times \begin{pmatrix} b_0 \\ b_1 \\ \vdots \\ b_n \end{pmatrix} + \begin{pmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \vdots \\ \varepsilon_n \end{pmatrix}$$

where: C_i = The price level for the group "Final consumption of households"/ dependent variable;

T_i = The price level for the "Restaurants and hotels" group/ independent variable;

H_i = Price level for the group "Home maintenance, water, electricity, gas and other fuels"/ independent variable;

ε_i = random variable/residual.

Results of the multifactorial model obtained with the Eviews program

Table no. 2

Dependent Variable: C_i
Method: Least Squares
Sample: 1 27
Included observations: 27

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ε_i	24.95185	3.505900	7.117102	0.0000
T_i	0.412725	0.062689	6.583691	0.0000
H_i	0.334462	0.037445	8.932187	0.0000

R-squared	0.975388	Mean dependent var	96.33333
Adjusted R-squared	0.973338	S.D. dependent var	25.60349
S.E. of regression	4.180704	Akaike info criterion	5.803275
Sum squared resid	419.4788	Schwarz criterion	5.947257
Log likelihood	-75.34422	Hannan-Quinn criter.	5.846089
F-statistic	475.5765	Durbin-Watson stat	1.642007
Prob(F-statistic)	0.000000		

Source: Eviews program processing

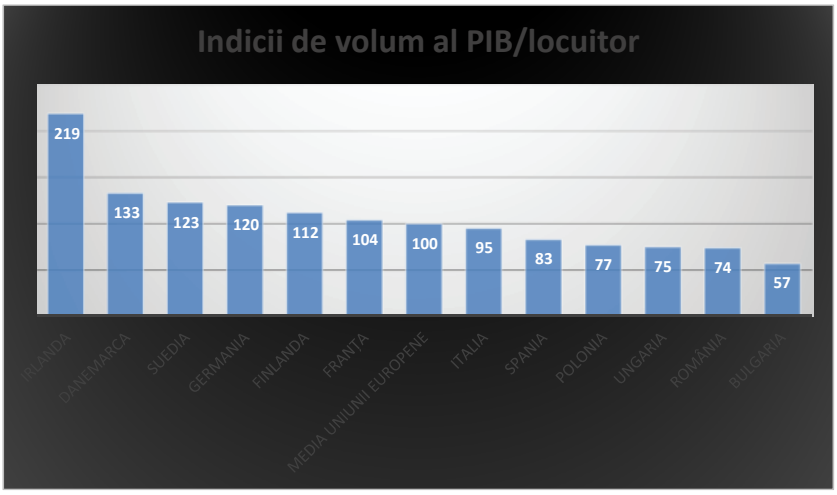
The regression equation of the multifactorial model has the following form:

$$C_i = 24.95185 + 0.412725 \times T_i + 0.334462 \times H_i$$

The test values R^2 and R^2 – adjusted show us that the model is more than 97% representative, showing the direct positive link between the price level for the group "House maintenance, water, electricity, gas and other fuels", respectively the price level for the group "Restaurants and Hotels" and the price level for the group "Final consumption of households", in the sense that with the increase of independent variables, the dependent variable would increase accordingly. The parameter suggests that in the absence of independent variables the value of the dependent variable is equal to 24.95%. The values recorded by the F-statistic test and the Prob(F-statistic) test suggest that the econometric model using the dependent variable the price level for the group "Final consumption of households" and the factor variable the price level for the group "House maintenance, water, electricity, gas and other fuels", respectively the factorial variable, the price level for the group "Restaurants and Hotels" is correct.

GDP/capita volume indices in 2021

Graph no. 4



Data source: https://ec.europa.eu/eurostat

In the previous graph, we note that the random selection of the analyzed member states coincided with the division into two equal parts of states with GDP/capita volume indices above and below the European Union average. Bulgaria is the country that registers the lowest level of this indicator, with 43% below the European Union average. At the opposite pole is Luxembourg with a GDP/capita higher than the European average by approximately 168%.

Conclusions

At the European level there are three levels of purchasing power and citizens' well-being, it can be observed that the area of the Nordic countries, Iceland, Ireland, Luxembourg and Switzerland are part of the upper area of the population's well-being. The second level consists of the Central European states that represent the great economic powers of the European Union, with Germany, France, Italy and Spain approaching the European average. The last level is made up of Eastern European countries and the central area (Hungary, Poland, Bulgaria and Romania), where purchasing power is at the lowest level.

At the present moment, a policy is needed to reduce the gaps between Western and Eastern European states, affected by the pandemic, economic-financial, energy and agri-food crisis.

The conflict in Ukraine will have an important effect on the macroeconomic destabilization of most states of the world. It is important to analyze the way in which the member states of the European Union suffer, as a result of the action of the mentioned crises and above all, of the economic sanctions imposed on the Russian Federation, especially in the context in which the military conflict (war) will be prolonged and foreshadowed a new pole of power worldwide, as a result of Russian-Chinese cooperation.

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