

---

# Analysis Models and Methods of the Life Quality in Romania

**Prof. Constantin ANGHELACHE PhD** (actincon@yahoo.com)  
Bucharest University of Economic Studies / „Artifex” University of Bucharest

---

**Assoc. prof. Mădălina-Gabriela ANGHEL PhD** (madalinagabriela\_anghel@yahoo.com)  
„Artifex” University of Bucharest

---

## ABSTRACT

*The quality of life (welfare) in the economic sense is the value of Gross Domestic Product per capita. The value of deflated Gross Domestic Product is what a nation does in a given timeframe, usually one year. The indicator that best describes the quality of life (welfare) is the Gross Domestic Product per capita, highlighting the concrete result obtained within a national economy, taking into account the two factors that are conducive to economic growth. (Number of employees and labor productivity), but the macroeconomic outcome must ensure an average living standard for the entire population. In this context, the system of national accounts used by the Member States of the European Union and by other states as a form of evidence and macroeconomic analysis contains all the elements necessary for such a study. We find that in the period considered, regardless of the method of calculating GDP, we obtain a precise quantitative quantity that, compared to previous developments, suggests how the quality of life of the population has evolved. In international comparisons, the per capita gross domestic product indicator is used. In analyzing the quality of life, we have to go from the structure of the population (number of employees, other categories expressed by statistical indicators. In statistics, we use the indices of human development, which express some aspects and according to economic growth, express the trend of the quality of life (welfare). A first indicator used is the human development index (HDI) or the human development indicator. This is a representative measure in that it expresses the average achievements of a country in a three-dimensional space, namely the average life expectancy indicator, the education index and the level Of the domestic gross domestic product per capita. These three indicators make sense to the living standard for the considered country. HDI starts from determining one indicator for each of the three dimensions that I mentioned. The indicator is equal to the current value minus the minimum value above the maximum value minus the minimum value where the minimum and maximum values are given by a table set by the authors of this indicator. For example, the minimum life expectancy at birth is 25 years and the maximum is 85. The enrollment rate in the school has a minimum value of 0 and a maximum of 100, and the national per capita product starts from a calculated minimum. Per capita income reflects all other dimensions of human development that have been explicitly introduced in the first two. The calculation relation is:*

*HDI = average life expectancy + school occupancy rate + gross domestic product per capita, reported at 3*

*In concrete studies, a number of other indicators such as HPI-1 (the human poverty index for developing countries), are being calculated, which measures derivatives*

---

(the distance) in the three basic dimensions of human development. Recent quality of life standards reveal access to economic outcomes for the entire population. The HPI-1 formula becomes  $HPI-1 = [1/3(P_1^3 + P_2^3 + P_3^3)]^{1/3}$ . Another indicator is the HPI-2 (The Human Poverty Index for selected OECD Countries), which in turn expresses the removal or closeness to quality of life (decent living standard). Going forward, the Gross Domestic Product Index is calculated based on:

$$\text{dimension index} = \frac{\text{actual value} - \text{minimum value}}{\text{maximum value} - \text{minimum value}}$$

On the basis of those expressed in terms of standard and welfare, Top Priority Countries or High Priority Countries are calculated. For each objective, it is grouped into two groups of countries with a high level of development and welfare and countries with a lower level. This is done by achieving objectives that can be: the low level with a regressive trend, the moderate middle-level layer and the fast level, where a part of the population has the opportunity to achieve great incomes. The progress we are talking about means real progress (RP) based on the formula

$$RP = \frac{(x_{t_1} - x_{t_0})}{(t_1 - t_0)x_{t_0}} \quad \text{and} \quad RP = \frac{(x_{t_1} - x_{t_0})}{(t_1 - t_0)(100 - x_{t_0})} \quad \text{where:}$$

$t_0$  is year 1990 or a near year 1990 for which there are available statistical data,  $t_1$  is the most recent year for which there are statistical data,  $x_{t_1}$ ,  $x_{t_2}$  are the indicator values for those years, taken into account.

From the United Nations point of view, the priority is to pursue an increase in the quality of life (welfare) of the population by achieving a high value of gross domestic product, total and per capita. On the other hand, in this study it is a question of comparing the level of the quality of life (welfare) through the correlation between the growth of gross domestic product per capita on the one hand and the gross average salary, net average wage and final consumption. It is possible to analyze the level of the quality of life (welfare) as compared to the offer of the national banking system. However, the national banking system - and not only in Romania - is the way in which both companies and the public have the prospect of increasing their resources to develop and, at the same time, increase the quality of life (welfare). The issue of a nation's quality of life (well-being) can be interpreted from many points of view, but most often, according to the Handbook on Social Indicators, there are a number of indicators that give substance to the quality of life of the population. Thus, indicators on population structure and change, population distribution, household and household income, health status and health services, education and education, economic activity and active population, social mobility, income, consumption and quality of life, rates Income growth in households, growth rate and household consumption patterns, distribution of income and consumption, welfare distribution, social security and social services, access to culture, public safety, the environment, etc. These indicators can be calculated from statistical data by correlating the indicators that are calculated with the most complex indicator of output, total gross domestic product or per capita. In this paper, the most relevant, in order to establish the quantitative indicators, of the quality measurement of the quality of life of the population, is the correlation of the gross domestic product per capita with the other indicators, even the averages, which have relevance for the stage of population welfare and the trend of

---

evolution future. For quantitative / qualitative expression, we use the econometric models, of which the most common and representative, as the efficiency of the obtained results, is the regression model based on the simple or multidimensional regression functions. By regression functions, we identify the clear possibility to highlight three regressions by the regression coefficients: first, which would be the constant evolutionary standard, if the factors influencing the growth of the gross domestic product would be neutral or would not have an influence. The second is the meaning of each of the factors considered for the growth of gross domestic product or per capita gross domestic product, by the sign of the regression coefficient associated with the factor in question. Third, by the magnitude of the regression parameters, we determine the intensity of interdependence. It is necessary to make a statement that gross domestic product per capita increases from time to time as a result of the influence of the factors I mentioned, but at the same time there is also an increase of gross domestic product Inhabitant due to mortality (birth rate - mortality), which, in the case of Romania, is negative. Thus, gross domestic product relative to a smaller number of inhabitants will give a gross domestic product index per capita. Of course, and from this point of view, it is possible to improve the living standard, to increase the quality of life (welfare) of the population. The analysis can be deepened by analyzing the structure of population consumption, or using incomes for saving or consumption. All these analyzes are concretized by indicators that quantitatively reflect the standard at one point, but by analyzing and interpreting the indicators as a system give the essence of the qualitative analysis of the increase in the quality of life (welfare).

The authors analyze the structure of the banking market, the main indicators aggregated at the level of the banking system and the relationship between them and the way of accessing the banking products by their consumers. Consider gross variables, credits, deposits, etc.

The research methods used are predominantly quantitative, namely: correlation tests, index method, regression models, etc. The objectives of this study are to identify the correlations existing between the macroeconomic indicators at the level of the banking system.

**Keywords:** profitability, correlation, regression, indicators, quality of life

**JEL classification:** M20, M40, G21

---

## INTRODUCTION

The analysis of the quality of life (welfare) of the Romanian population, using econometric models, in particular simple and multiple linear regression, considering variables as follows: Gross Domestic Product per capita showing the value created in a one-year period of one people. This indicator can also be calculated as a ratio between the gross domestic product and the active population or occupied population, of course with other meanings. Of course, this variable, gross domestic product per capita would be the factorial variable. We opted to consider it a factorial variable considering the resulting variables, final consumption per capita, gross average wage in the economy and net average wage economy. In particular, we believe that there is a very

---

close correlation between gross domestic product per capita and all other indicators that reflect the quality of life (well-being) and depends very much on the concrete results achieved over a one-year period. A first interpretation can be made on the evolution of indicators reported to the population or active population, such as final consumption, gross average salary and net average wage per inhabitant. These indicators are primarily influenced by the evolution of gross domestic product. From this point of view, we can use the simple linear regression method by comparing the data series we have and then the graphical representation of the gross domestic product and the other variables (variables) that we mentioned. Here we will introduce a table of all these indicators to be compared in terms of gross domestic product (deflated) per capita and all other indicators that reflect the quality of life, the welfare in the end. Of course, the analysis can be further developed by analyzing the purchasing power parity of income in Romania to reveal the power or, if you want, the material and financial satisfactions of the population by considering the income at one point. The analysis may also be deepened by the fact that it is possible to compare the level of income with that of consumption, clearly making clear that this final consumption is determined by the income that the population obtains from salaries. Of course, in households, the situation is analytical based on the household survey which basically reflects the same trend. We will use the analysis based on some econometric indexes and models, namely the regression model. The analysis is deepened by the use of econometric methods in case of the evolution of the quality of life (welfare) reflected by the gross average salary per employee, the gross income per capita, correlated with the influence of the aggregate indicators of the banking system (interest on loans and deposits in lei or foreign currency).

## LITERATURE REVIEW

Anghelache, Anghel and Popovici (2015) apply the multiple regression method in analyzing macroeconomic indicators describing final consumption. Anghelache and Sacală (2016) has deepened the applicability of multiple linear regression in the study of the dynamics of Gross Domestic Product. The authors consider that the results and conclusions drawn from the studies have general applicability, proven by the statistical tests associated with the estimated models. Anghelache, Anghel, Prodan, Sacală and Popovici (2015) are concerned with the use of models based on the multiple regression method in economic analyzes. An extensive academic literature discusses the connection between competition and fragility (Carletti and Hartmann (2003). The manifested interest was triggered by Keeley's article (1990), whereby

---

the author demonstrated the impact of increased competition in the 1980s in bankruptcy bankruptcy in the US. Hellmann, Murdock, and Stiglitz (2000) have demonstrated that high competition in the bank deposit market may affect prudence in banking behavior. The practice of providing excellent quality services has shown that customer satisfaction leads significantly to their loyalty (Caruana et.al 2000, Caruana, 2002). Satisfaction of the client is one of the most important results of marketing activity (Oliver, 1980; Churchill and Surprenant, 1982; Spreng et al., 1996, Fournier and Mick, 1999). Kumar et al (2009) has demonstrated that a high level of quality of service will lead to greater customer satisfaction. Ciocoiu (2007) is concerned with the concepts and tools dedicated to risk management. Through loans granted to support the production of goods and services, banks have an influential position, so that any inefficiency in credit allocation is felt throughout the economy (Shaffer, 2004). Arbore and Busacca (2009) conducted a comprehensive study on the determinants of the satisfaction of customers of commercial banks. The customer is the „king” mentioned by Prabhakaran and Satya (2003), Heskett et al. (1997) argued that profitability and economic growth are interdependent. Tariq and Moussaoui (2009) and Ehigie (2006) found that loyalty is the result of satisfaction. Banks act to improve financial performance (Ravesteyn, 2005). Issues related to customer satisfaction are important at the level of modern organizations (Arokiasamy, 2013).

In the literature, the analysis of the role of the banking sector is a major concern, (Beck et al, 2006, Schaeck et al, 2009, Wagner, 2010). Competition in the banking sector can generate benefits such as lower prices and higher quality of products and banking services offered (Boyd and Nicol’o, 2005). De Guevara and Maudos (2007) draw attention to the fact that, from the point of view of the regulator, knowledge and understanding of banking competition may be limited. The factors that affect the intensity of competition are quite limited draw attention (Demirguc-Kunt et al., 2004), Claessens and Laeven, 2004, by Guevara and Maudos, 2007). The ability to satisfy customers is essential, (Peppers et al., 2004), Peppard (2000). Stone (2009), show that some banks have suggested to clients to tell them exactly how I think their needs have to be met. Customer satisfaction is understood as a reaction, related to specific transactions, being strongly associated with the corroboration of past expectations (Oliver, 1997). There is sufficient evidence to suggest that customer satisfaction can be seen as an attitude to the supply of banking products and services (Levesque and McDougall, 1996). Researchers such as Reichheld and Sasser (1990), Gummesson (1993), Heskett et al. (1994), Storbacka, Strandvik and Grönroos (1994), Stuart and Tax (2004) show that satisfaction affects customer loyalty, which in turn affects the value of the

company's profit. Madill et al. (2002) argue that relations between banks and customers are beneficial on both sides.

## RESEARCH METHODOLOGY, DATA, RESULTS AND DISCUSSIONS

Methods and models of life quality analysis in terms of the correlation between gross average wage, loan volume, active population deposits and average interest rates

In the sensitivity analysis, an assessment was made of the quality of life (welfare) of the active population by means of an empirical (minimal) calculation for the same period of analysis, with input variables: gross average wage, gain gained by placing savings in deposits, the price paid for accessed credits (Table 1), and other expenses.

### Evolution of gross average wage, loans, deposits of the working population and average interest rates

*Table 1*

December	Active population	Gross average wage	Loans				
			Lei		Foreign currency		
			Average loan per person	Interest rate average	Average loan per person	Interest rate average EUR	Interest rate average USD
2016	9,056,000	2,681	7,298	6.88	5,199	4.45	6.97
2015	9,159,000	2,415	5,742	8.24	6,059	4.97	6.88
2014	9,243,000	2,298	4,339	10.28	6,721	5.31	7.52
2013	9,977,000	2,223	3,467	12.56	6,910	5.44	7.93
2012	9,964,000	2,117	3,444	13.30	7,066	6.31	8.10
2011	9,868,000	2,022	3,550	14.09	7,042	7.11	7.92
2010	9,965,000	1,836	3,604	15.81	6,668	7.28	8.39
2009	9,924,000	1,693	3,911	17.22	6,220	8.09	9.02
2008	9,944,000	1,550	4,117	15.18	5,891	8.63	10.31
2007	9,994,000	1,270	3,359	14.53	3,815	8.97	11.25

December	Deposits				
	Lei		Foreign currency		
	Average deposit per person	Interest rate average	Average deposit per person	Interest rate average EUR	Interest rate average USD
2016	7,445	1.29	4,530	0.55	0.64
2015	7,211	2.13	4,525	1.15	1.11
2014	7,071	3.32	4,565	1.90	1.57
2013	6,382	4.76	4,193	2.68	2.05
2012	6,062	5.67	4,007	3.30	2.30
2011	5,835	6.58	3,527	3.17	2.16
2010	5,018	7.70	3,366	3.09	2.11
2009	4,321	11.98	3,039	4.95	2.73
2008	2,770	8.99	1,947	4.31	3.21
2007	2,447	6.73	1,734	3.41	3.79

Source: Authors processing based on data published by INS (active population, gross average salary) and NBR (volume of loans / deposits / interest rates)

---

Relevant to the way in which the income of the population under the influence of the Romanian banking system has evolved over the last ten years is an analysis of the main aggregates that give significance to this evolution. Of course, the number of active population is an indicator, which from 2007 to 2016 had a decreasing trend, as well as the total number of the Romanian population that registered the same way of evolution. There are not many explanations given here, except that, in the meantime, mortality has had a rising index which has led to a decrease in Romania's total population. Considering the gross average salary in the economy, and finding that it had an upward trend in the sense that from 1270 lei / employee (person) on 30.12.2016 to 2681 lei, interesting is how the population used to access the credits banking. Bank credits were granted in RON, in euros or sometimes in dollars. Those who approached the loans took into account the interest rate applied to each of the three currencies and, as a rule, without taking into account the effect of the exchange rate between the leu (the currency in which the Romanian wage earners earn domestically) and the euro or the dollar, many of the creditors' calculations have led to losses for people who have recourse to this source to increase their earnings. We find that in line with the increase in the average gross salary the average credit per person also increased from December 2007 when it was 3359 lei / person up to 7298 lei in 2016. The credits in lei were certain syncope in the sense that this growth was not uniform, especially in the last three years, 2014-2016. The interest rate on the lei-denominated bank system on average followed a declining trend, from 14.53% in December 2007 to 6.88% in December 2016. Of course, at a time when the effects of the economic crisis were The interest rate has risen from 2008 to 2011, reaching 15.18% in 2008, 17.22% in 2009, 15.81% in 2010 and then 14.9% in 2011. The situation was Somewhat the same in terms of the interest rate applied by the banking system to loans in other currencies. However, the volume of these loans was lower, but it increased over time, so in December 2007 it was 3,815 euros or dollars per person, reaching higher levels after the recession, gradually increasing and reaching a peak Of 7.066 euro per person in December 2012, and in December 2016 by successive decreases, the average foreign currency loan was 5,159 euros per person. Interest rates followed the same course, starting at 6.97% for the euro and 11.25% for the US dollar in December 2007, reaching oscillating down to 4.45% on the euro and 6.97% on the dollar in December 2016. O situation that influenced both the volume of credits extended to the population and the banking policy in the field of deposits extended to the population. The deposits in lei increased gradually with the inc rease of the average gross salary from 2.447 lei / person in 2007 to 7.445 lei / person in 2016. The average interest rate on deposits deposited by

---

the population declined gradually from 6.73% in December 2007, with slight fluctuations during the economic and financial crisis 2008-2010, at 1.29 on 30 December 2016. Deposits in foreign currency Of population rose from € 1,734 / person in December 2007 gradually reaching € 4,565 / person on December 30, 2016. Although interest rates on deposits fell particularly from 3.41% in December 2007 to 0.55% in 2016 per euro and from 3.79% in December 2007 to 0.64% on the dollar on 30 December 2016. In fact, if we discussed, we could clearly state that the population is still appealing to banks due to the legislative system In our country as well as due to the efficiency of payments, the system of card use, etc., because the savings saved in the banks do not bring profit but on the contrary they record bank costs for the population. In this direction we can also compare the interest rates applied by the Romanian banking system to all three types of loans, to the national currency (leu) or to another currency (euro, dollars) which is quite high compared to the interest rate applied by the banks To population deposits, in term or in sight, which, at least since 2016, is a saving possibility. If we take into account the cost of banking products, we find that the attraction for the population of bank loans is particularly low. Here, we must also bear in mind that a possible interpretation of the share of consumer credit, which, although granted under conditions particularly favorable to the banking system, is slightly increasing precisely because of the inability of individuals with very low incomes, and provide the financial resources needed for life. All of the data presented in Table 1 graphically will show the same evolution. The active population, only a fraction of the population, has a downward trend, so it can not be a significant indicator, expressing a growth factor in average wages, loans or interest rates. Suggestively, however, is the possibility of graphical representation of the gross average salary in correlation with the volume of credits in lei or foreign currency and with deposits made by the population at banks. Even more suggestive is to establish the interdependence that exists between the average gross salary of the population over the ten years considered and the evolution of credits in lei or foreign currency, as well as between the gross average salary and the volume of deposits constituted by the lei population or the two considered currencies. In other news, also based on statistical analysis, we can determine the correlation between the volume of loans and the volume of interest. But most suggestive is the formation of a regression model based on the straight line function of the form  $Y = a + b x_i + \varepsilon$  which will be used in this article among the main variables we have explained. Even more suggestive would be based on simple linear regression functions to try a complex analysis based on the multiple direct regression in which the gross average salary is decisive for the increase of the credits, and a credit analysis compared to



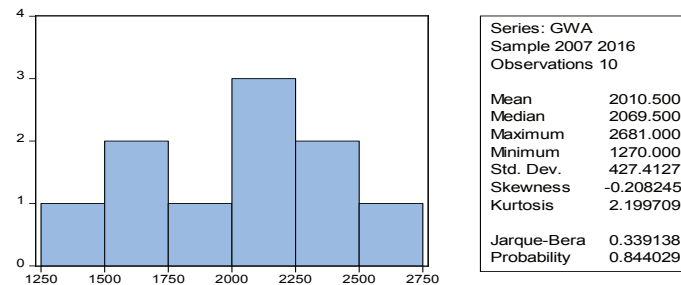
the interest can give significance to the analysis undertaken. Regression coefficients have been established on the basis of the simple or multiple linear regression model, which through modular value, sign and value expresses the existence, direction and intensity of the correlation established between the variables considered in these analyzes. A first correlation exists between loans and gross average salary. Starting from the regression model, based on the simple linear regression function, having the calculation relation of the form  $Y = a + b x_i + \varepsilon$  the econometric model becomes  $C = a + b \text{GWA} + \varepsilon$  where:

C = the credit;

GWA = gross average wage;

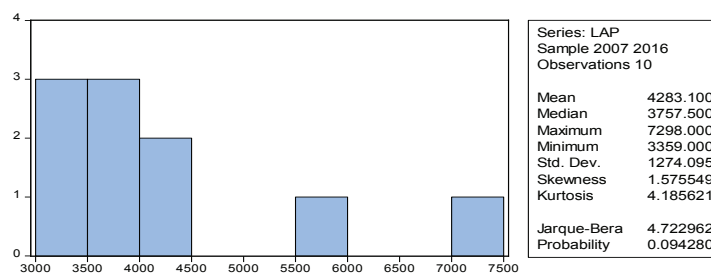
a, b = the regression parameters.

**Statistics of the gross average wage – GWA**



*Figure 1*

**Statistics of the average loan per person in lei - LAP**

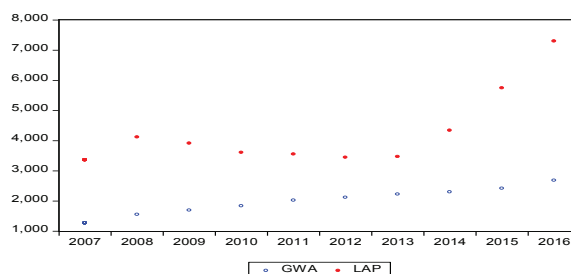


*Figure 2*

From the graphical representation of the gross average wage and loans, we find their individual evolution. The graphical representation of the values in the data series of the two indicators presented in the following graph reveals the correlation between the two variables (indicators) considered. Gross average wage grew slower, personal loans evolved more oscillating, with a delay in 2008-2013, due to the effects of the economic crisis.

### Corelogram average loan per person\_gross average wage

Figure 3



### Parameter estimation regression model LAP\_GWA

Table 2

Dependent Variable: LAP  
 Method: Least Squares (Gauss-Newton / Marquardt steps)  
 Date: 04/19/17 Time: 18:27  
 Sample: 2007 2016  
 Included observations: 10  
 LAP = C(1)+C(2)\*GWA

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	181.8437	1576.187	0.115369	0.9110
C(2)	2.039919	0.768504	2.654403	0.0291

R-squared	0.468292	Mean dependent var	4283.100
Adjusted R-squared	0.401829	S.D. dependent var	1274.095
S.E. of regression	985.4048	Akaike info criterion	16.80084
Sum squared resid	7768181.	Schwarz criterion	16.86136
Log likelihood	-82.00419	Hannan-Quinn criter.	16.73445
F-statistic	7.045854	Durbin-Watson stat	0.496347
Prob(F-statistic)	0.029057		

The regression model considered becomes:

$$C = 181,8437 + 2,039919 \text{ SMB} + \varepsilon$$

By interpreting the data in the correlation table, we will see: the value of the R-squared coefficient, as well as the Adjusted R-squared, does not exceed 50%. Thus, we can say that the average credit spread is explained less than 50% by the evolution of the gross average wage and that, with a variation of 1 leu of the average wage, more than double the average loan growth is expected. The free term has a significant value, almost 100 times higher than the C (2) coefficient, indicating the presence of additional factors that influence the loan level in addition to the gross average wage.

Based on the presented model, we analyzed the correlation between the average credit per person as a resolvable variable and the average interest rate in lei or foreign currency as factorial variables using the econometric linear regression model simple:

$C = a + b \text{ IRA} + \varepsilon$  where:

$C$  = the average loan per person in lei;

$\text{IRA}$  = the interest rate average on RON loans.

Similar is the model used when considering the value of the indicators expressed in euro or US dollar. The data series on the average credit per person in lei and the average interest rate are presented in Annex 1.

**Parameter estimation regression model average loan per person\_ interest rate average**

*Table 3*

Dependent Variable: LAP				
Method: Least Squares (Gauss-Newton / Marquardt steps)				
Date: 04/19/17 Time: 18:38				
Sample: 2007 2016				
Included observations: 10				
LAP = C(1)+C(2)*IRA				
	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	8260.856	1018.358	8.111934	0.0000
C(2)	-310.5438	77.15456	-4.024957	0.0038
R-squared	0.669425	Mean dependent var		4283.100
Adjusted R-squared	0.628104	S.D. dependent var		1274.095
S.E. of regression	776.9854	Akaike info criterion		16.32558
Sum squared resid	4829651.	Schwarz criterion		16.38609
Log likelihood	-79.62788	Hannan-Quinn criter.		16.25919
F-statistic	16.20028	Durbin-Watson stat		0.843787
Prob(F-statistic)	0.003815			

The resulting regression function can be written:

$$C = 8260,856 - 310,5438 \text{ IRA} + \varepsilon$$

From the estimation made using the specialized software system, it is noticed that the R-squared and Adjusted R-squared coefficients are greater than 62%, which is a significant level of confidence that can be given to the model. At the same time, the relationship of inverse proportionality between the main indicator and the independent variable, respectively the increase with a unit (percentage point) of the interest rate will result in a decrease by 310 lei of the average credit value.

The same correlation also arises if we consider the same model, but taking into account the indicators expressed in another currency. The model is of the form  $C_v = a + b \text{ EIRA} + \varepsilon$ , where:

$C_v$  = foreign currency credit per person;

$\text{EIRA}$  = average interest rate on foreign currency loans;

$a, b$  = correlation parameters.

The data series on average credit per person in foreign currency and the average interest rate on foreign currency loans as well as the graphical representation of these data are presented in Annex 2.

**Parameter estimation regression model average loan per person in foreign currency and average interest rate in foreign currency**

*Table 4*

Dependent Variable: ELAP  
 Method: Least Squares (Gauss-Newton / Marquardt steps)  
 Date: 04/19/17 Time: 18:47  
 Sample: 2007 2016  
 Included observations: 10  
 ELAP = C(1) + C(2) \* EIRA

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	7559.617	1442.522	5.240554	0.0008
C(2)	-210.4142	211.3043	-0.995787	0.3485
R-squared	0.110280	Mean dependent var		6159.100
Adjusted R-squared	-0.000935	S.D. dependent var		1013.396
S.E. of regression	1013.870	Akaike info criterion		16.85779
Sum squared resid	8223455.	Schwarz criterion		16.91831
Log likelihood	-82.28896	Hannan-Quinn criter.		16.79141
F-statistic	0.991593	Durbin-Watson stat		0.719422
Prob(F-statistic)	0.348515			

The regression function can be written:  $C_v = 7559,617 - 210,4142 \text{ EIRA}$

The values of the determinant coefficients are quite low, reflecting a poor correlation between the two variables. We note the reverse link between the independent variable and the factorial variable, as well as its magnitude. We also consider that the free term, in conjunction with the R-squared and Adjusted R-squared coefficients, determines the need to perform additional analyzes to delineate significant influences on the average value of credits expressed in foreign currency.

The correlation between the average deposit per person in lei and the gross average salary in lei is as follows:

$$D = a + b \text{ GWA} + \epsilon, \text{ where:}$$

D = average deposit per person in lei;

GWA = gross average wage in lei.

The data series of the two variables and the graphic representation are contained in Annex 3.

**Parameter estimation regression model average deposit per person in lei\_ gross average wage in lei**

*Table 5*

Dependent Variable: DAP  
 Method: Least Squares (Gauss-Newton / Marquardt steps)  
 Date: 04/19/17 Time: 18:55  
 Sample: 2007 2016  
 Included observations: 10  
 DAP = C(1) + C(2)\*GWA

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-2706.652	728.3443	-3.716171	0.0059
C(2)	4.060111	0.355120	11.43307	0.0000
R-squared	0.942328	Mean dependent var		5456.200
Adjusted R-squared	0.935119	S.D. dependent var		1787.657
S.E. of regression	455.3483	Akaike info criterion		15.25686
Sum squared resid	1658737.	Schwarz criterion		15.31738
Log likelihood	-74.28429	Hannan-Quinn criter.		15.19047
F-statistic	130.7150	Durbin-Watson stat		1.588273
Prob(F-statistic)	0.000003			

---


$$\text{Correlation function: } D = 2706,652 + 4,060111 \text{ GWA} + \varepsilon$$

The values of the statistical tests applied on the model confirm a close correlation between the evolution of the Average / Pers salary indicator and the Gross Average Salary indicator. The model is sufficiently representative for over 93% of situations or, in other words, the average deposit dynamics is influenced by over 93% of average wage developments. Increase with a unit of wages is expected to result in increases of over 4.06 on the average deposit. At the same time, the significant level of the C (1) coefficient indicates the presence of additional factors, which have not been considered in the construction of this model and which have an overall negative influence.

The correlation between the average deposit per person in lei and the average interest rate in lei is as follows:  $D = a + b \text{ DIRA} + \varepsilon$ .

The average deposit data series per person in lei and the average interest rate on RON deposits are presented in Annex 4.

**Parameter estimation regression model average deposit per person\_ interest rate average, expressed in RON**

*Table 6*

Dependent Variable: DAP  
 Method: Least Squares (Gauss-Newton / Marquardt steps)  
 Date: 04/19/17 Time: 19:02  
 Sample: 2007 2016  
 Included observations: 10  
 DAP = C(1) + C(2) \* DIRA

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	7924.051	851.8617	9.302040	0.0000
C(2)	-417.2192	127.8073	-3.264440	0.0115
R-squared	0.571197	Mean dependent var		5456.200
Adjusted R-squared	0.517596	S.D. dependent var		1787.657
S.E. of regression	1241.623	Akaike info criterion		17.26308
Sum squared resid	12333015	Schwarz criterion		17.32360
Log likelihood	-84.31541	Hannan-Quinn criter.		17.19670
F-statistic	10.65657	Durbin-Watson stat		0.885179
Prob(F-statistic)	0.011451			

The regression function is:  $D = 7924,051 - 417,2192 \text{ DIRA} + \varepsilon$ .

After estimating the regression model, it is found that the model is applicable in proportion of over 51%. The value of the regression coefficient is negative, which implies high volatility and, of course, the inversely proportional level of deposits compared to the interest rate over the period under review. Although such an assertion is not generally valid, we note that for the 10 observations subjected to the estimation exercise, the free-term level means the presence of additional factors with positive influence, which would lead to the theoretical conclusion of the direct proportionality between the interest rate on deposits And average deposits.

The correlation between the average deposit per person in foreign currency and the average interest rate on foreign currency deposits is as follows:  $D_v = a + b \text{ EDIRA} + \varepsilon$ , where:

$D_v$  = average deposit / person in foreign currency;

EDIRA = average interest rate on foreign currency deposits.

The graphical representation of the two series of data on the considered indicators and the repeat data are contained in Annex 5.

**Parameter estimation regression model average deposits per person in foreign currency\_ average interest rate in foreign currency**

*Table 7*

Dependent Variable: EDAP				
Method: Least Squares (Gauss-Newton / Marquardt steps)				
Date: 04/19/17 Time: 19:09				
Sample: 2007 2016				
Included observations: 10				
EDAP = C(1) + C(2) * EDIRA				
	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	5160.290	578.1510	8.925506	0.0000
C(2)	-567.1659	185.0511	-3.064915	0.0155
R-squared	0.540063	Mean dependent var		3543.300
Adjusted R-squared	0.482571	S.D. dependent var		1039.555
S.E. of regression	747.7779	Akaike info criterion		16.24895
Sum squared resid	4473375.	Schwarz criterion		16.30946
Log likelihood	-79.24473	Hannan-Quinn criter.		16.18256
F-statistic	9.393705	Durbin-Watson stat		0.867543
Prob(F-statistic)	0.015467			

The regression function is written:  $D_v = 5160,290 - 567,1659 \text{ EDIRA} + \varepsilon$

The parameters of the estimated model for the foreign currency-denominated variables lead to the same general conclusions as in the previous model, constructed with the variables measured in RON. The regression coefficient expresses an inverse link between the independent and the dependent variable, while the value of the free term is sufficiently significant to consider the existence of additional influence factors, which overall have a positive influence on the main indicator.

Finally, we also use multiple linear regressions in which we consider credits and deposits according to the average gross salary and the average interest rate on loans or deposits. The model will be in the form of:

$$C = a_0 + a_1 + a_2 \text{ IRA} + \varepsilon$$

The value of the regression parameters will be similar to those obtained by simple linear regressions.

## USING THE REGRESSION MODEL IN THE ANALYSIS OF THE QUALITY OF LIFE BASED ON MACROECONOMIC INDICATORS

### Evolution of GDP / capita, gross average wage, net average wage and final consumption

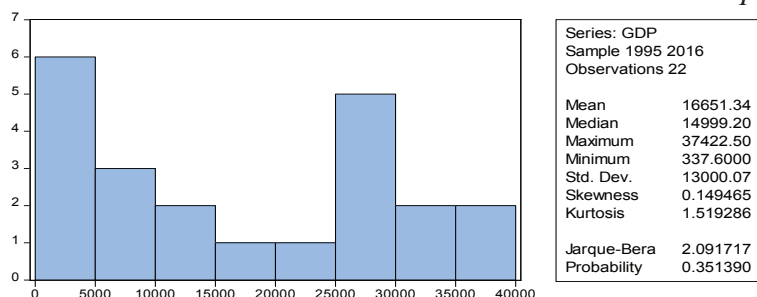
*Tabel 8*

Year	GDP	AGW	ANW	FC
1995	337,6	95	92,5	4718,166
1996	507,1	127	116	6631,7
1997	1139,4	169	146	9321,3
1998	1655,7	224	184	22792,1
1999	2470,4	299	231	32793
2000	3622,7	398	291	49645,9
2001	5280,5	530	366	74047,1
2002	7041,5	652	453	104811
2003	9212,8	807	566	137742,8
2004	11595,6	973	688	185825,4
2005	13625,4	1121	848	229312,7
2006	16373	1481	1099	273763,8
2007	20028,7	1730	1266	327701,7
2008	25532,8	2023	1489	371676,8
2009	25065,6	2023	1477	388005
2010	26368,7	2067	1496	403259,5
2011	28047,8	2209	1604	426606,9
2012	29679,1	2343	1697	443897,5
2013	31890,8	2430	1760	463774,9
2014	33552,8	2582	1866	498427
2015	35879	2930	2114	530791,9
2016	37422,5	3257	2354	575123,1

GDP = PIB/capita; AGW = gross average wage; ANW = net average wage; FC = Final consumption.

In order to quantify the evolution of the quality of life (welfare) we will expand the analysis by using the regression model applied to macroeconomic indicators such as gross domestic product per capita, gross average wage, net average wage or final consumption.

### Statistics of the Gross Domestic Product per capita



*Figure 4*

### Statistics of the average gross wage

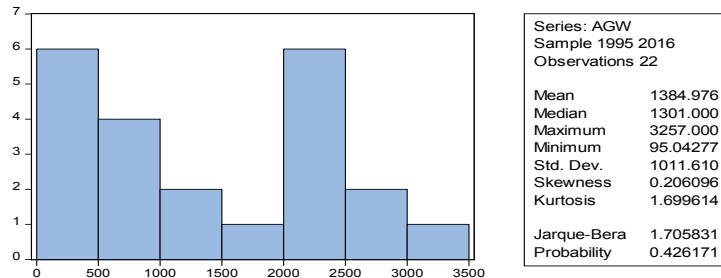


Figure 5

The presentation of the data series suffers the same trend of the two indicators. The same conclusion is drawn from the graphical representation of the two series of data.

### Corelogram GDP per capita\_ average gross wage

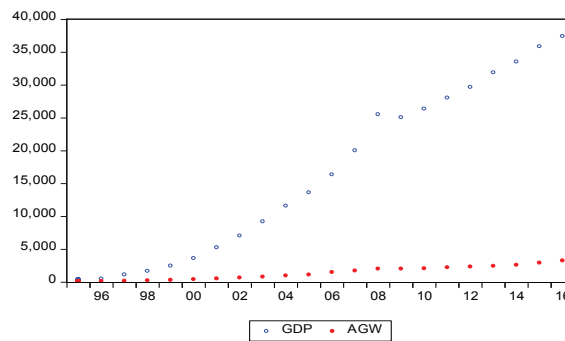


Figure 6

### Parameter estimation regression model GDP per capita\_ average gross wage

Table 9

Dependent Variable: AGW  
 Method: Least Squares (Gauss-Newton / Marquardt steps)  
 Date: 04/21/17 Time: 13:05  
 Sample: 1995 2016  
 Included observations: 22  
 $AGW = C(1) + C(2) \cdot GDP$

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	93.51080	29.56207	3.163203	0.0049
C(2)	0.077559	0.001412	54.94479	0.0000
R-squared	0.993419	Mean dependent var		1384.976
Adjusted R-squared	0.993090	S.D. dependent var		1011.610
S.E. of regression	84.09347	Akaike info criterion		11.78824
Sum squared resid	141434.2	Schwarz criterion		11.88743
Log likelihood	-127.6707	Hannan-Quinn criter.		11.81161
F-statistic	3018.930	Durbin-Watson stat		0.890184
Prob(F-statistic)	0.000000			



The regression function:  $AGW = a + b \text{ GDP} + \varepsilon$ , becomes:  
 $AGW = 93,51080 + 0,077559 \text{ GDP} + \varepsilon$

Estimated regression model parameters indicate a high level of precision associated with the resulting equation, deduced from R-squared and Adjusted R-squared coefficient values. Thus, the evolution of the gross average salary can be explained by more than 99% by the GDP per capita, as follows: the increase by one unit of GDP per capita determines the increase by over 0.77 monetary units of the gross average salary. The value of the free parameter is significant and demonstrates the existence of additional factors that influence the independent variable and whose cumulative impact is positive.

The graphical representation of the two series of data on the considered indicators and the repeat data are contained in Annex 6.

**Parameter estimation regression model average net wage\_gross domestic product per capita**

*Table 10*

Dependent Variable: ANW  
 Method: Least Squares (Gauss-Newton / Marquardt steps)  
 Date: 04/21/17 Time: 13:08  
 Sample: 1995 2016  
 Included observations: 22  
 ANW = C(1) + C(2) \* GDP

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	79.40148	22.03077	3.604118	0.0018
C(2)	0.055845	0.001052	53.08589	0.0000
R-squared	0.992953	Mean dependent var		1009.288
Adjusted R-squared	0.992601	S.D. dependent var		728.5547
S.E. of regression	62.66962	Akaike info criterion		11.20014
Sum squared resid	78549.63	Schwarz criterion		11.29932
Log likelihood	-121.2015	Hannan-Quinn criter.		11.22350
F-statistic	2818.112	Durbin-Watson stat		0.838889
Prob(F-statistic)	0.000000			

The regression function:  $ANW = a + b \text{ GDP} + \varepsilon$ , becomes:  
 $ANW = 79,40148 + 0,055845 \text{ GDP} + \varepsilon$

Similar to the estimated gross average wage, we note the major influence of gross domestic product per capita, which explains the evolution of the independent variable for over 99% of cases. The change by one lion of GDP per capita determines, according to the estimation of the regression model, the 5.58-fold change in net average wage. It is also noticed the high level of free expression of additional factors not included in this model, whose combined influence is positive.

The graphical representation of the two series of data on the considered indicators and the repeat data are contained in Annex 7.

## Parameter estimation regression model final consumption\_ GDP per capita

Table 11

Dependent Variable: FC  
Method: Least Squares (Gauss-Newton / Marquardt steps)  
Date: 04/21/17 Time: 13:09  
Sample: 1995 2016  
Included observations: 22  
FC = C(1)+C(2)\*GDP

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	1681.211	4351.897	0.386317	0.7033
C(2)	15.07845	0.207802	72.56148	0.0000

R-squared	0.996216	Mean dependent var	252757.7
Adjusted R-squared	0.996027	S.D. dependent var	196393.0
S.E. of regression	12379.59	Akaike info criterion	21.77199
Sum squared resid	3.07E+09	Schwarz criterion	21.87118
Log likelihood	-237.4919	Hannan-Quinn criter.	21.79536
F-statistic	5265.168	Durbin-Watson stat	1.075636
Prob(F-statistic)	0.000000		

The regression function:  $FC = a + b \text{ GDP} + \varepsilon$ , becomes:

$$FC = 1681,211 + 15,07845 \text{ GDP} + \varepsilon$$

The values of R-squared and Adjusted R-squared coefficients confirm that the model explains the change in final consumption by GDP / capita over 99.6%. The increase by one unit of GDP per capita leads to an increase of approximately 15.07 lei of final consumption. However, the free C(1) coefficient is more than 100 times higher than the regression coefficient C(2), so we observe the presence of factors that are not part of the estimated regression model and whose influence, overall, is positive.

## CONCLUSION

In this research, the authors sought to highlight how the quality of life (welfare) of the population has evolved from the macroeconomic results and the evolution of the population's incomes. It is, of course, questionable that it is more relevant to consider the total population or the active population, the employed population or employees, on the basis of their income and social and economic conditions in the internal market. It was revealed the possibility of using econometric models, in the present case using primarily the simple linear regression model on the basis of which the regression parameters with the meanings mentioned in each case were calculated. Starting from the fact that it is the banking system that offers the possibility to increase the financial resources available to the population, the study also pointed out, based on the aggregate indicators of the banking system, how this banking system contributed to the increase of the Life (welfare). We point out that the banking system offers these possibilities, but the number of individuals who use natural

---

resources to fill their own resources through bank resources is not that big. A coefficient of covariance was used in this respect, and then the simple linear regression model was used, based on which the regression parameters were calculated, reflecting how the banking system is useful for all the citizens of the country. The study reflects that aggregate indicators can be a source of analysis and interpretation of how the quality of life (welfare) has evolved, and if it is necessary to analyze it, it can also be extended by international comparisons using the indicators reported to a person. Only in this way are the results achieved enlightening.

The results of this research revealed a positive correlation between the volume of the credits of the population and the volume of the population's available, which demonstrates the final consumer's interest in the products offered by the Romanian banking institutions.

Also, there was a lack of correlation between credit volume and return on assets (ROA), indicating that consumers' behavior or appetite for accessing banking products (in this case credit) is not influenced by the profitability of the supplier banking institutions. The results of the study indicate that the „well-being” of consumers of banking products is influenced by the level of earnings gained from labor remuneration, being influenced to a small extent by the saving component. This is manifested in the context of a decreasing trend of the interest rates on the deposits attracted by banking institutions, reaching up to zero.

The authors appreciate that even if there is no direct influence between the profitability of banks and the quality of life (welfare) of the consumers of banking products, they will continue to take steps to strengthen the trust of beneficiaries by reducing the „burden” of loans granted through optimal solutions offered to consumers. In difficult payment situations, through information and financial education on the cost of products and services offered, and by constantly reducing interest rates on loans granted.

The authors believe that consumers need to be cautious about exposure to the risks arising from the consumption of banking products, so as to avoid the occurrence of inability to repay debts. The authors also appreciate that this study is a basis for future researches that can be done in this area, an important step being the influence of the fiscal burden, coupled with an analysis of the degree of influence of bank disputes, their alternative solution and Finally, an in-depth analysis of the quality of life (welfare) of the consumers of banking products.

The analysis was also made using econometric models based on other macroeconomic indicators such as gross domestic product per capita, gross average wage, net average wage or final consumption of the population.

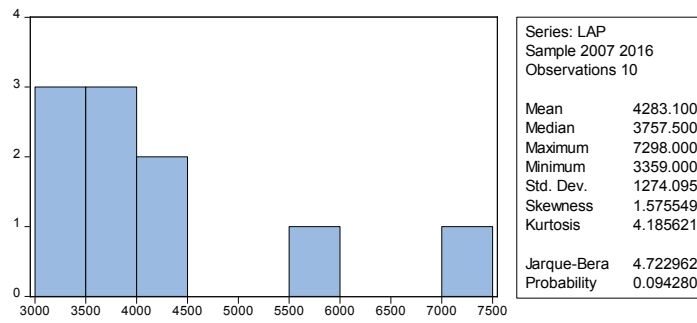
---

#### References

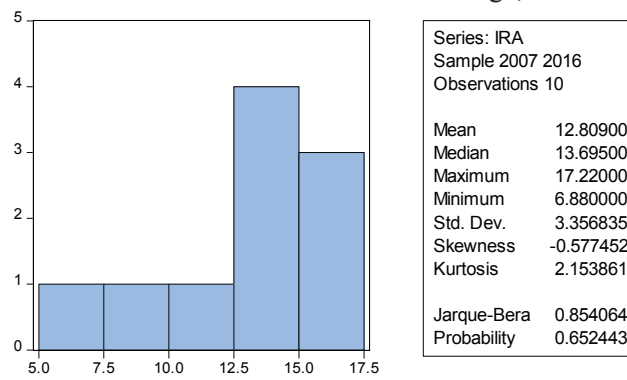
1. **Anghelache, C., Anghel, M.-G., Popovici, M.**, 2015, *Multiple Regressions Used in Analysis of Private Consumption and Public Final Consumption Evolution*, International Journal of Academic Research in Accounting, Finance and Management Sciences, 5(4), 69-73.
2. **Anghelache, C., Anghel, M.-G., Prodan, L., Sacală, C., Popovici, M.**, 2015, *Elements concerning the Use of Multiple Regression Models*, Romanian Statistical Review – Supplement, 4, 27-29.
3. **Anghelache, C., Sacală, C.**, 2016, *Multiple linear regression used to analyse the correlation between GDP and some variables*, Romanian Statistical Review, Supplement, 9, 94-99.
4. **Arbore, A. & Busacca, B.**, 2009, *Customer satisfaction and dissatisfaction in retail banking: exploring the asymmetric impact of attribute performance*. Journal of Retailing and Consumer Services, 16, 271–280.
5. **Arokiasamy, A. A.**, 2013, *The impact of customer satisfaction on customer loyalty and intentions to switch in the banking sector in Malaysia*. Journal of Commerce, 5(1), 14-21.
6. **Beck, T., Demirguc-Kunt, A. & Levine, R.**, 2006, *Bank concentration, competition and crisis: First results*. Journal of Banking & Finance, 30, 1581–1603.
7. **Boyd, J. H. & De Nicol'o, G.**, 2005, *The theory of bank risk taking and competition revisited*. The Journal of Finance, 60(3), 1329–1343.
8. **Carletti, E. & Hartmann, P.**, 2003, *Competition and Financial Stability: What's Special about Banking?*. In Monetary History, Exchange Rates and Financial Markets: Essays in Honour of Charles Goodhart, Vol. 2, edited by P. Mizen, Cheltenham, UK: Edward Elgar.
9. **Caruana, A.**, 2002, *Service loyalty. The effects of service quality and the mediating role of customer satisfaction*. European Journal of Marketing, 36(7/8), 811-828.
10. **Caruana, A., Money, A.H. & Berthon, P.R.**, 2000, *Service quality and satisfaction-the moderating role of value*. European Journal of Marketing, 34(11/12), 1338-1352.
11. **Churchill, G.A. Jr. & Surprenant, C.**, 1982, *An Investigation into the Determinants of Customer Satisfaction*, Journal of Marketing Research, 19 (November), 491 -504.
12. **Ciocioiu, N.**, 2007, *Managementul riscului*, vol 2, 48-49.
13. **Claessens S. & Laeven L.**, 2004, *What drives bank competition? Some international evidence*. Journal of Money, Credit and Banking, 36 (3), 563–583.
14. **De Guevara, J.F. & Maudos, J.**, 2007, *Explanatory factors of market power in the banking*, Manchester School, 75 (3), 275–296
15. **Demirguc-Kunt A. et al.**, 2004, *Regulations, market structure, institutions, and the cost of financial intermediation*, Journal of Money, Credit and Banking, 36, 593-622.
16. **Ehigie, B. O.**, 2006, *Correlates of customer loyalty to their bank: a case study in Nigeria*. International Journal of Bank Marketing, 24(7), 494-508.
17. **Fournier, S. & Mick, D.G.**, 1999, *Rediscovering Satisfaction*, Journal of Marketing, 63(October), 5-23.
18. **Gummesson, E.**, 1993, *Quality management in service organizations: an interpretation of the service quality phenomenon and a synthesis of international research*, International Service Quality Association, Karlstad, Sweden.
19. **Hellmann, T.F., Murdock, K. & Stiglitz, J.**, 2000, *Liberalization, moral hazard in banking and prudential regulation: are capital requirements enough?*. American Economic Review, 90, 147-165.
20. **Heskett, J. L., Sasser, W. E. & Schlesinger, L. A.**, 1997, *The Service Profit Chain*. New York: The Free Press.
21. **Heskett, J., Jones, T., Loveman, G., Sasser, W. & Schlesinger, L.**, 1994, *Putting the service profit chain to work*. Harvard Business Review, 2, 164–174.

- 
22. **Keeley, M.**, 1990. *Deposit Insurance, Risk and Market Power in Banking*, American Economic Review, December, 1183-1200.
  23. **Kumar, M., Kee, F. T. & Manshor, A. T.**, 2009, *Determining the relative importance of critical factors in delivering service quality of banks: an application of dominance analysis in SERVQUAL model*. *Managing Service Quality*, 19(2), 211-228.
  24. **Levesque, T. & McDougall, G.**, 1996, *Determinants of customer satisfaction in retail banking*. *International Journal of Bank Marketing*, 14 (7), 12-20.
  25. **Madill, J., Feeney, L., Riding, A. & Haines Jr., G.**, 2002, *Determinants of SME owners' satisfaction with their banking relationships: a Canadian study*. *International Journal of Bank Marketing*, 20 (2), 86-98.
  26. **Oliver, R. L.**, 1997. *Satisfaction: a behavioral perspective on the consumer*. New York, NY: McGraw Hill.
  27. **Oliver, R.L.**, 1980, *A Cognitive Model of the Antecedents and Consequences of Satisfaction Decisions*. *Journal of Marketing Research*, 17 (November), 460-469.
  28. **Peppard, J.**, 2000, *Customer Relationship Management (CRM) in Financial Services*. *European Management Journal*, 18 (3), pp. 312-327.
  29. **Peppers, D., Rogers, M. & Homby, R.**, 2004, *Customer Intimacy in Financial Services*. Retrieved on February 16, 2017, from [http://www.sas.com/news/sascom/2004q2/column\\_1to1.html](http://www.sas.com/news/sascom/2004q2/column_1to1.html).
  30. **Prabhakaran, S., & Satya, S.**, 2003, *An insight into Service Attributes in Banking Sector*. *Journal of Services*, 3(1), 157-169.
  31. **Ravesteyn, J.V.**, 2005, *The Effect of Relationship Banking on Customer Loyalty in the Retail Business Banking Industry*, Thesis, Graduate School of Business Leadership, University of South Africa.
  32. **Reichheld, F. & Sasser Jr., E.**, 1990. *Zero defections: quality comes to service*. *Harvard Business Review*, 68(5), 105-111.
  33. **Ritter, L.S., Silber, W.L. & Udell, G.F.**, 2014,. *Principles of Money, Banking & Financial Markets*, Pearson.
  34. **Schaeck, K., Cihak, M. & Wolfe, S.**, 2009, *Are more competitive banking systems more stable?* *Journal of Money, Credit and Banking*, 41(4), 711-734.
  35. **Shaffer, S.**, 2004, Comment on "What Drives Bank Competition? Some International Evidence" by Claessens, S. and Laeven, L. *Journal of Money, Credit and Banking*, 36 (3), 585-592.
  36. **Spreng, R. A., Mackenzie, S. B., & Olshavsky, R. W.**, 1996, *A reexamination of the determinants of consumer satisfaction*. *Journal of Marketing*, 60, 15-32.
  37. **Stone, M.**, 2009, *Staying Customer-Focused and Trusted: Web 2.0 and Customer 2.0 in Financial Services*. *Database marketing & Customer Strategy Management*, 16 (2), 101-131.
  38. **Storbacka, K., Strandvik, T. & Grönroos, C.**, 1994, *Managing customer relationships for profit: the dynamics of relationship quality*. *International Journal of Service Industry Management*, 5(5), 21-38.
  39. **Stuart, F.I. & Tax, S.**, 2004, *Toward an integrative approach to designing service experiences: lessons learned from the theatre*. *Journal of Operations Management*, 22, 609- 627.
  40. **Tariq, A. N. & Moussaoui, N.**, 2009, *The main antecedents of customer loyalty in Moroccan banking industry*, *International Journal of Business and Management Science* 2(2), 101-115.
  41. **Wagner, W.**, 2010, *Loan market competition and bank risk-taking*. *Journal of Financial Services Research*, 37(1), 71-81.

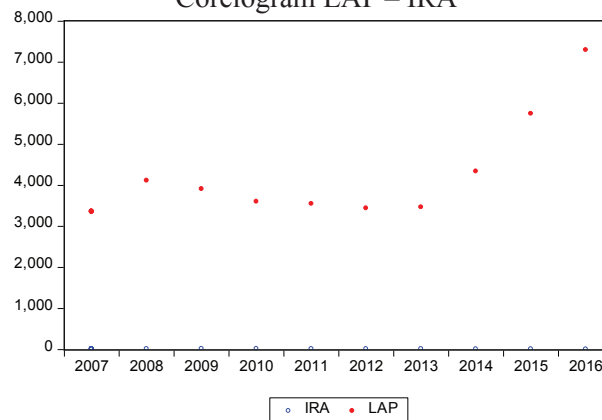
Statistics of the average loan per person, in lei, LAP



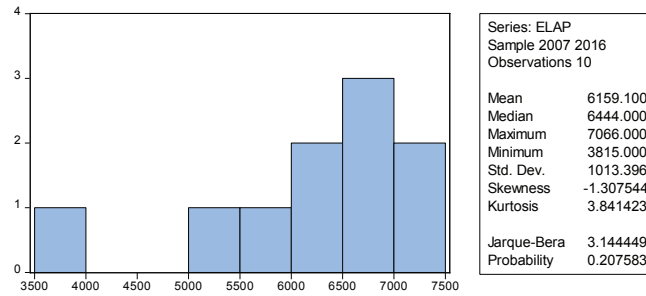
Statistics of the interest rate average, lei



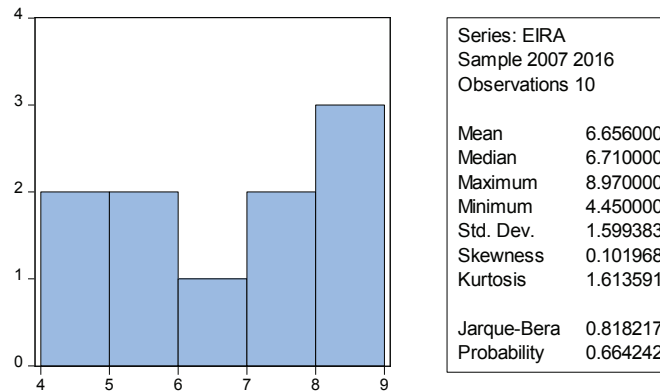
Corelogram LAP – IRA



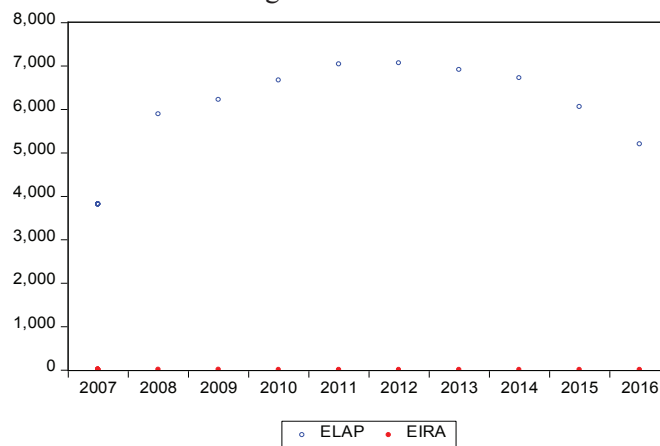
Statistics of the average loan per person, in foreign currency, ELAP



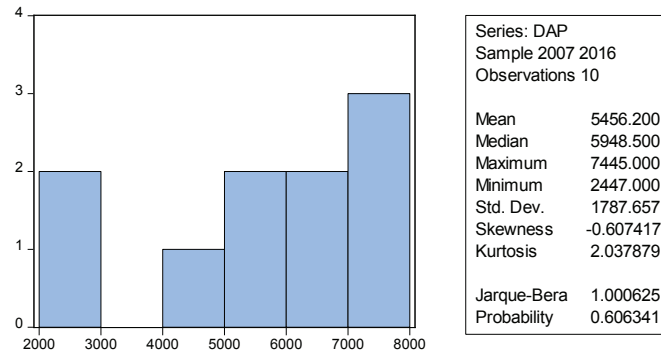
Statistics of the interest rate average, currency, EIRA



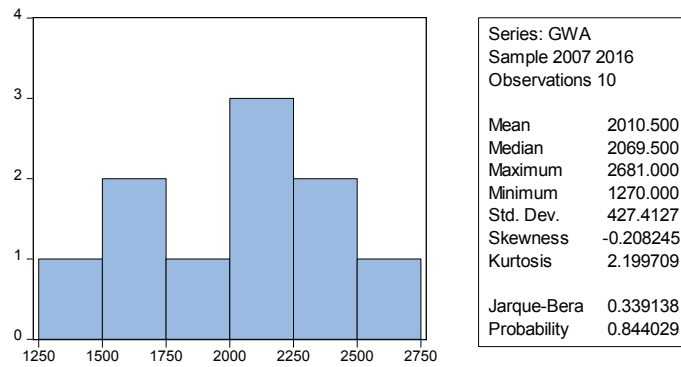
Corelogram ELAP – EIRA



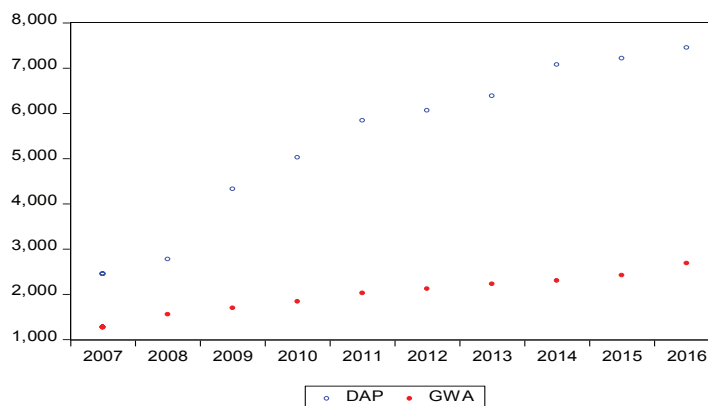
Statistics of the average deposit / person, in lei, DAP



Statistics of the gross average wage, GWA

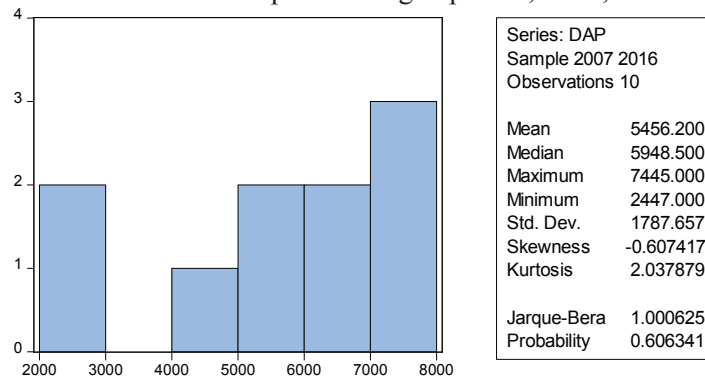


Corelogram DAP – GWA

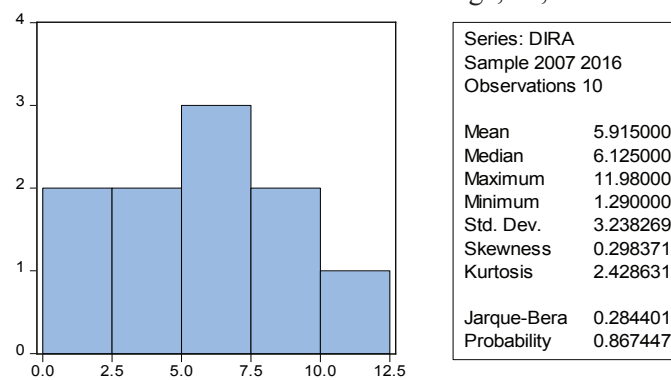




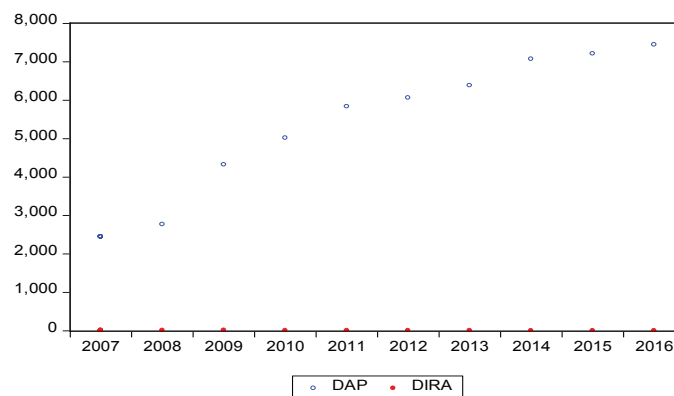
Statistics of the deposit average / person, in lei, DAP



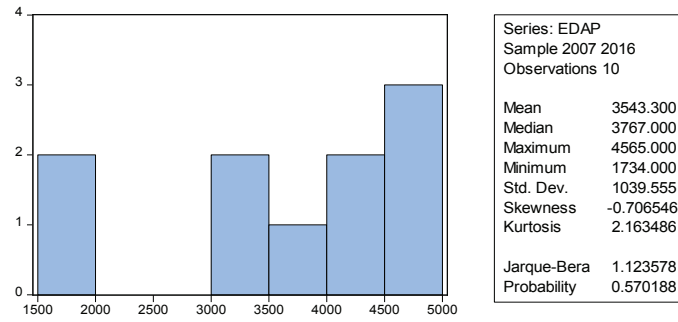
Statistics of the interest rate average, lei, DIRA



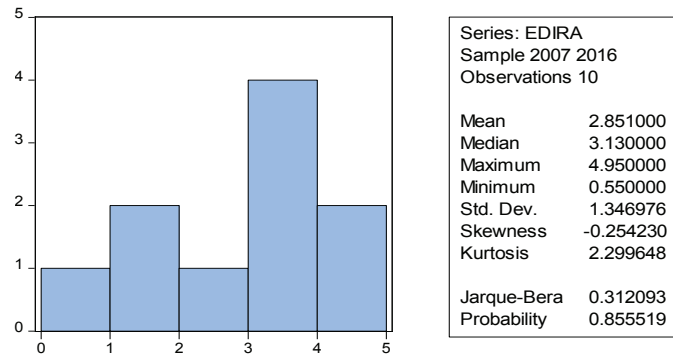
Corelogram DAP – DIRA



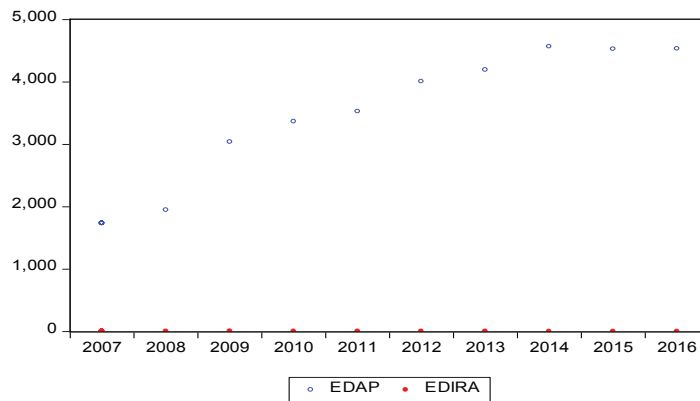
Statistics of the average deposit / person, in foreign currency, EDAP



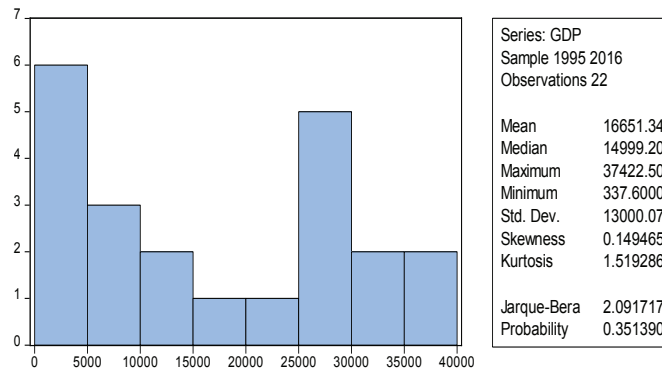
Statistics of the Average interest rate, currency, EDIRA



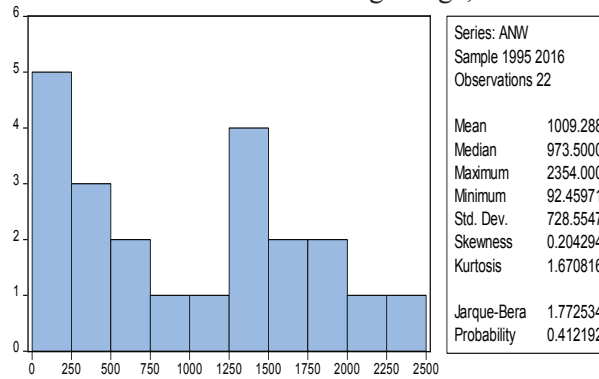
Corelogram EDAP – EDIRA



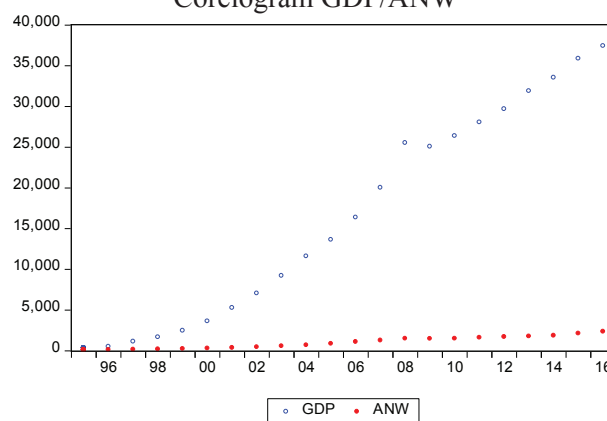
Statistics of the GDP (GDP / Capita)



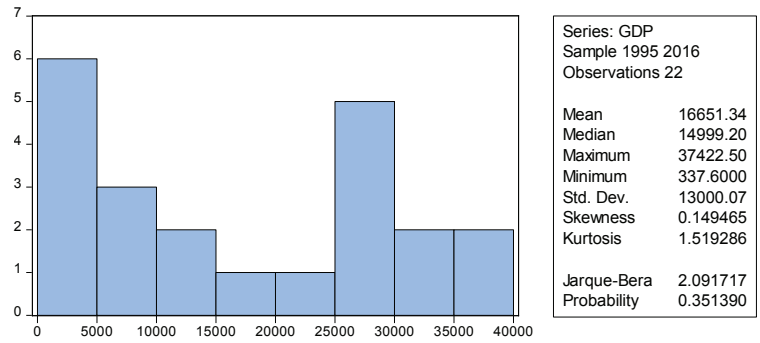
Statistics of the net average wage, ANW



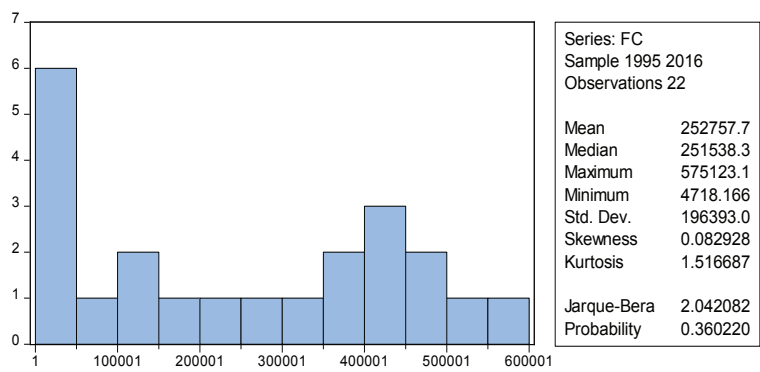
Corelogram GDP/ANW



Statistics of the GDP (GDP / Capita)



Statistics of the final consumption, FC



Corelogram GDP – FC

