CAN A STATISTICAL SOLUTION FOR CALCULATING THE SOCIAL COHESION INDEX BE THE RATIO BETWEEN THE AVERAGE AND THE MINIMUM WAGE IN ROMANIA?

Professor PhD. dr. habil. Gheorghe Săvoiu *(gsavoiu@yahoo.com)*
University of Pitesti

Abstract

A correlation recognized in general economic terms, and outlined as natural economic development, follows the factorial trajectory: investment – productivity – wages. At the same time, social cohesion, alongside the economic growth rate, unemployment rate, inflation rate and trade deficit of the trade balance, are well-established piloting indicators in the macroeconomic policies, as well as the five dimensions of the economy's "magic" pentagon. Each of the two previous statements constitutes a limiting bar of a discussion space, and the article is practically placed between them. One aspect derived from the above considerations is that the paper could be conceived only as placed "between bars", and also titled in the form of a question, as a logical consequence. Actually, in this article the author had to try to find answers not to one, but to several questions derived from a few problematic issues, which represent the final substance of the article: i) What do statistically represent the minimum, average and maximum wage in an economy? ii) Are there similarities in wage evolution or fluctuations relative to average and minimum wages, at global level and in the European Union (EU)? iii) To what extent is the real wage dynamics affected by the differentiated developments in the minimum, maximum and average wages? iv) How reliable can a statistical solution be, devised to calculate the social cohesion index in Romania, quantified by the evolution of the ratio between the maximum or the average wage, and the minimum wage? v) Is the significant degradation of cohesion solely due to the numerator? vi) When can the excessive development of the denominator create problems of exclusion, or even serious inequity? vii) What is the future of the minimum – medium – maximum relationship in the Romanian wage statistics population? The authenticity of the questions inherently implies the originality of the article and its conclusions, always questioning the apparent certainities related to the forecast of the average salary trend compared to the minimum wage.

Key words: *statistical indicator of social cohesion, minimum wage, average maximum, wage earning, salary distribution, coefficient of homogeneity.*

1. Introduction, or searching for an answer to the first question

The relationship that generates economic and social development and welfare can be restricted to an already classic formula, that of an essential macroeconomic correlation: higher investments – higher productivity – higher wages (the clear American provenance of these associations results from the use of the simultaneously graphic and synthetic expression, which characterizes the English used by American pragmatism: *higher investments – higher productivity – higher wages*).

The introductory section of this article can be synthesized in the following question: "What are, from a statistical standpoint, the minimum, average and maximum wages in an economy?" In any descriptive statistics, these three values represent the defining descriptive elements of a wage data distribution, so that the difference between the maximum and minimum values generates the absolute amplitude of the series, or its maximum spreading field, and by comparing this difference to the mean value the relative amplitude expressed per cent is obtained.

Two important aspects can be distinguished here, the first related to the homogeneity signal of the wage distribution that should not theoretically exceed 200% (preferably being placed even below that value), and the second one describes the preference for a certain average value (from the classic set of the central trend indicators: mean, median, and mod, or dominant). All these elements allow the formulation of a conclusion on the homogeneity, symmetry and normality of the statistically analyzed data series, by determining the coefficients of variation and asymmetry, together with the Jarque-Bera test (Săvoiu, 2012, p. 97). In other words, any statistical indicator, including salary, is valid, as long as it remains the product of a statistician's thinking, who carefully analyzed it from the criteria of homogeneity, asymmetry and distribution normality.

2. Are there evolution similarities in the salary fluctuations relative to average and minimum wages, globally and in the European Union?

In an attempt to highlight the important role of economic research evaluator, Joseph Alois Schumpeter (1951) exaggerated the usefulness of statistical approaches by a famous saying that the economy or the phenomena it is studying were "the most quantitative of all sciences", because the facts that this science "observes are transformed into numbers by life itself", where he also, and naturally, included the compensation of the labour force by the individual salary for the economic activity performed. (Dinu, Savoiu, Dabija, 2017)

From a historical point of view, the myth that the ascending change in the minimum wage remains the one that drives up the average and maximum

wages on the market, has seen nearly eight decades of existence, and originated in the American economy, too. Thus, in 1938, when the average hourly wage paid in the American industry was about 63 cents, the US Congress adopted a law that set the minimum wage to 25 cents, thus setting the first international ratio between the average and minimum hourly wages at 2.5, a ratio that they maintained later, even in critical situations, such as the early post-war era, when (in 1945) the average hourly wage of US factory workers reached $1.02, which led to a 40 cent increase in minimum wages. The ratio then gradually diminished in the US economy as well, so that in 1961, when the average hourly wage was at $2.30, the minimum wage was raised to $1.15 (the ratio was practically 2.0).

The first conclusion, derived from the above onsiderations, might be that, as the average hourly wage increases (and not vice-versa), the minimum wage must be increased at least to the same extent (but kept as a multiplier within the range of 2.0 – 2.5 for an average level of development of a state, assimilating the nearly half-a-century technological and managerial gaps between the level of the US economy and that of the Romanian economy). Of course, things are even more intricate when one considers, the real evolution of the ratio, rather than the nominal one, because the former is focused on the purchasing power of the minimum and average wage: covering the minimum spending for the survival of a household in the US and Romania is significantly different in both content and structure, if one starts from a traditional make-up of the minimum wage, for an obviously different basket of products and services). Another issue, which generates a third way of investigation and evaluation, is the oscillating intensity of the correlation between real wage and real GDP indices. The evolution of real wage indices in Romania has always been offset against the dynamics of real GDP indices. Thus, in a comparable view, while it was as late as 2004 that Romania's GDP reached the 1990 level, the real wage index in the same year was only 78.3% of the 1990 one (the magnitude of that real wage index increasingly approached 100% in 2017, starting from the already existing limits, i.e. from the lowest one in 1997, of 56.2%, to the maximum one, of 144.6% in 2015).

There is, at least after 2000 and even in the last decade (that is, since 2007, when Romania joined the EU), no European consensus on minimum wages and the link between it and the average wages or maximum wages. If in Romania the legal appearance of a minimum wage coincides with October 1st 1993, in 2006 such a limiting economic concept of employee compensation was not imposed by law in Austria, Cyprus, Denmark, Finland, Germany, Italy, Sweden (as an illustration of the diversity of the various approaches, in Germany the minimum wage law only appeared on July 3rd 2014, when

its level was set at €8.50 per hour). The solutions for raising the minimum wage, and its correlations with the average wages and the maximum wages, are completely different in the EU member countries. Compared to 2000, for example, the upward trend in the minimum wage was high for the newly-joined EU member states (in Slovakia the minimum wage increased by 230%, in Hungary by 200%, in the Czech Republic by 190%, in Slovenia by 100 %, etc.). Confronting the actual minimum wage level makes analyzing it even more difficult and complicated (for example, in 2010 Bulgaria had the lowest wage level, i.e. 292 US dollars, followed by Romania with 320 US dollars, while the maximum level was in Luxembourg, where 1,687 US dollars was given as a minimum monthly wage.

Likewise, the ratio between the minimum wage and the average wage fails to have similar levels or relatively narrow bands, too, even in the case of the new EU member states (in the year 2016 the ratio was 0.34 in the Czech Republic, 0.39 in Hungary, 0, 41 in Romania, 0.43 in Poland, etc.)

Unfortunately, neither globally nor in the European level are there similar salary evolutions starting from the topic of the average and minimum wages, visible especially according to the ratio between the maximum and minimum wages, in a well-defined geographic area (in 2010, the overall ratio reached 281, and 5.78 in the European Union).

3. To what extent is the real wage dynamics affected by the differentiated developments in the minimum, maximum and average wages?

In order to answer the above question, a recent statistical study of the homogeneity, asymmetry and normality of the wage population in Romania is required. According to the data available on variation ranges in the Romanian Statistical Yearbook (2016), in 2015 the minimum wage level was about 2,500 lei, and a descriptive statistic could be generated with an acceptable level of error below 5% by the processing the data presented by Table no. 1

Distribution of wage population by variation ranges, according to the wage survey conduted in October 2015 (wage survey S3)

Table 1

Share	Range or interval of variation	Centre of interval (minimum and maximum separately)	Contribution to average wage and its final calculation
0,16	1050	1050	168
0,27	1050- 1500	1275	344,25
0,16	1500 -2000	1750	280
0,19	2000-3000	2500	475
0,09	3000-4000	3500	315
0,05	4000-5000	4500	225
0,025	5000-6000	5500	137,5
0,015	6000-7000	6500	97,5
0,01	7000-8000	7500	75
0,007	8000-9000	8500	59,5
0,023	12000	12000	276
TOTAL			2452,75

Data source: Author's calculation, based on *Romania's Statistical Yearbook*, 2016.

The value of the average square deviation or the standard deviation (Trebici, 1985), from the previous data, is 1,512.8 lei, which leads, in classic calculation, to a 60.5% coefficient of homogeneity or variation (Table 2):

Calculation elements for the homogeneity of the population from which the average wage was quantified

Table 2

Deviation of interval	(Deviation of interval)^2	Share of interval	Total	Share of interval in total variation
1450	2102500	0,16	336400	10%
1225	1500625	0,27	405168,75	
750	562500	0,16	90000	
0	0	0,19	0	
1000	1000000	0,09	90000	
2000	4000000	0,05	200000	
3000	9000000	0,025	225000	
4000	16000000	0,015	240000	
5000	25000000	0,01	250000	
6000	36000000	0,007	252000	
9500	90250000	0,023	20757505	90 %
TOTAL			22846073,75	100%

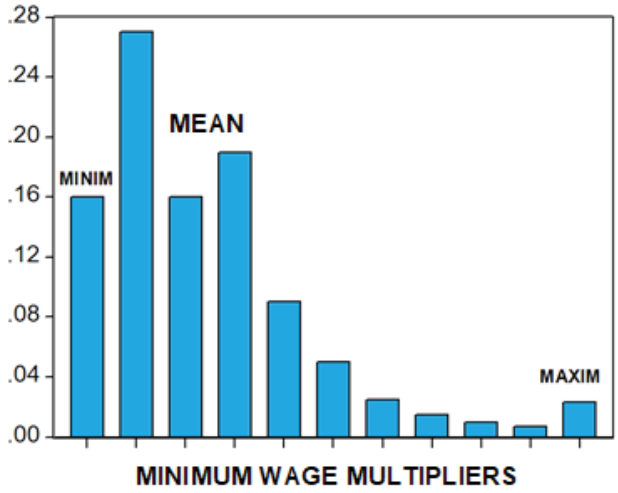
Data source: Author's calculation based on *Romania's Statistical Yearbook*, 2016.

The first statistically significant finding shows that the wage population in Romania is heterogeneous and it is not recommended to use the average wage in subsequent statistical constructions (e.g. a social cohesion index centered on this unrepresentative average), but only the partial averages specific to certain homogeneous subpopulations determined by economic activities. The second useful conclusion resulting from this calculation shows

that the distribution is asymmetric (Săvoiu, 2012, 2013), and even visibly abnormal (Figure no. 1)

Distribution of the wage population according to the variation intervals

Figure no. 1

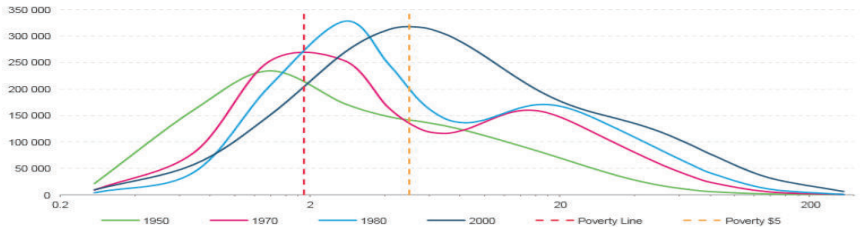


Software used: EViews

The third conclusion is perhaps the most important, namely that 90% of the total variation and the dispersion substance belongs to the last interval or, in other words, it is determined by the maximum wage, which translates excessive polarization, parallel to the heterogeneity, asymmetry and distributional abnormality. What might result from those premises might be a false generalization of global or European wage distribution. In order to clearly understand that the abnormality is clearly and exclusively related to the behaviour of the Romanian economy, its wage distribution in Figure no. 1 should be compared with its global distribution that it resembles, in the beginning of the graphic analysis in the 1960s, but normalizing over the next four decades until 2000, according to a study conducted in 2014 by van Zanden and his team of coauthors (Figure no. 2):

The overall distribution of income between 1960 and 2000

Figure no. 2

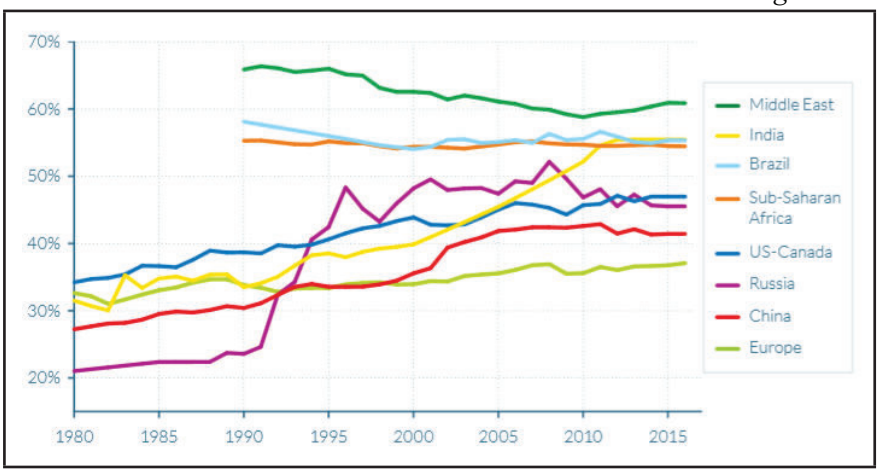


Sources: van Zanden et al. 2014; Gapminder and OECD, 2014.

What is happening in practice with salary incomes in Romania seems to be increasingly difficult to understand, beyond wage data and the erosion of employees' honesty (Săvoiu, 2013a), derived from the high percentages of underground GDP (which, even in the post-accession period, reached values above 30%). All these points show an erosion of wage distribution in Romania, which has a similar global precedent in the distant past of the international economy, that is, half a century ago. This alteration in the wage distribution normality can be complemented by the upward trends of overall income inequality according to WIR 2017 (Pickety, 2017), which highlight European upward trends of inequality (Figure no. 3):

Upward trends in overall revenue inequality, according to WIR 2017

Figure no. 3



Source: World inequality report, 2017. [online]
Available at: http://wir2018.wid.world/[Accessed 23 January, 2017]

4. Three instrumental statistical questions related thematically

How verisimilar and reliable can a statistical solution be for the calculation of the social cohesion index in Romania, quantified by the evolution of the ratio between the maximum wage, or the average and the minimum wages?

The simplest conjunctural statistical presentation (Săvoiu, 2012; 2013b) of the economy in a synthetic manner are considered: i) "the quadrangle of the economic strategy", which includes the economic growth rate, the inflation rate, the unemployment rate, and the trade balance; ii) the "magic pentagon" resulting from the (mini)system of previous indicators, plus the social cohesion index (e.g. IRS, or the ratio between the maximum and the minimum incomes in the economy analyzed).

Several indicators of social and community balance can be listed (which are able to assess social harmony and cohesion): a) the Social Cohesion Indicator (SCI); b) the difference between the minimum wage and the maximum wage; c) the ratio between the average and the minimum wage; d) strikes and conflicts; e) cost of living and human development indexes; f) the degree of income concentration, etc. In practical terms, two concrete solutions for the construction of a social cohesion indicator can be identified:

Solution A – choosing a salary ratio between absolute indicators (including the analysis of some effects deriving from numerator analysis)

Social cohesion aims at a way of dividing income between economic subjects and society members. The Social Cohesion Indicator (SCI) more recently occurs by the name of social equity ratio deriving from the excessive revenue polarization, and is represented by the "ratio between the highest personal incomes and the lowest personal incomes", rounded out by the developments of net real incomes and net real net average income (Săvoiu, 2013b, p. 169).

The Social Cohesion Index (SCI), or Index of Social Equity (IES), is the ratio between the maximum and the minimum value of incomes (either gross or net):

$$SCI = \text{Maximum Wage} : \text{Minimum Wage} \quad (1)$$

(through values normalized and regulated by law, and materialized in a ratio specific to the wage scale of the public domain, for example 6 to 1, or 8 to 1, or 12 to 1).

Still, why can SCI not apply through the classic ratio presented above? The first reason is that there is the real possibility of quantification of

the maximum salary (usually, not officially communicated in the Romanian economy, as there are wages paid in euros that are higher than the apparent maximum wage, i.e. that of the country's president). A second reason is given by the coexistence of a number of solutions concealed by means of further increases, vouchers, etc., which cause a substantial change in real incomes and, implicitly, in the minimum or maximum wages. Another reason is the existence of ambiguous agencies and areas in interstices of public and private property, where people benefit by unfair confidential salaries, or wages whose calculations are never known (including special annual fees). Two derived questions automatically occur: 1) Does the significant degradation of cohesion exclusively derive from the SCI numerator? and 2) When can the excessive evolution of the denominator lead to problems of exclusion, or even serious inequity?

Generally, inequality occurs as a result of SCI degraded status, by excessive of the index numerator (simultaneously with the increase in the frequency of the wage population placed there) and manifested by seemingly inexplicable polarizations, or polarizations that are not socially explained in real terms. In situations of wage equalization (opposed to various wage compensation of distinct activities) it will be noticed that even the denominator of the index may "distort" social cohesion when the exaggeration occurs through the excess of the minimization and equalization of the compensation, which absorbs the major frequencies of the employees and the wage population, bringing salaries closer to the others, up to their near identity, and also closer to the minimum wage; in their vast majority, the average wage, the medium and even the modal salary is statistically getting excessively close to the minimum wage. Such a statistical SCI-type indicator (in keeping with solution A) cannot be practically built in Romania.

Solution B – choosing an average and minimal type of salary indicator reasserts the discussion of the risk-free or representative average (and implicitly of the homogeneous or heterogeneous population of wage earners or employees)

Table 3 presents a construction of the S-type statistical indicator, based on the ratio between the average wage and the minimum wage (under the essential reserve of the heterogeneity of the wage population in Romania, and implicitly the lack of representativeness of the average wage and the major risk of its use):

The Social Cohesion Index (SCI), between 1993 and 2018

Table no. 3

No	Document GD/YEAR	Valid from:	Minimum wage (ROL or * = RON)	Net average wag (ROL or * = RON)	SCI = Ratio of the average and minimal wages
1	586/1993	1.10.1993	40.200 ROL	79.732 ROL	1,983
2	683/1193	1.12.1993	45.000 ROL	101.331 ROL	2,252
3	85/1994	15.03.1994	60.000 ROL	112.603 ROL	1,877
4	353/1994	1.07.1994	65.000 ROL	142.657 ROL	2,195
5	184/1995	1.03.1995	75.000 ROL	182.803 ROL	2,437
6	594/1995	1.07.1995	97.000 ROL	218.535 ROL	2,253
7	27/1997	1.02.1997	150.000 ROL	456.305 ROL	3,042
8	468/1997	1.08.1997	225.000 ROL	650.641 ROL	2,892
9	468/1997	1.10.1997	250.000 ROL	797.194 ROL	3,189
10	183/1998	1.04.1998	350.000 ROL	1.045.498 ROL	2,987
11	296/1999	1.05.1999	450.000 ROL	1.460.453 ROL	3,245
12	101/2000	1.02.2000	700.000 ROL	1.748.052 ROL	2,497
13	1166/2000	1.12.2000	1.000.000 ROL	2.911.570 ROL	2,912
14	231/2001	1.03.2001	1.400.000 ROL	2.819.240 ROL	2,014
15	1037/2001	1.03.2002	1.700.000 ROL	3.666.430 ROL	2,157
16	1105/2002	1.01.2003	2.500.000 ROL	4.730.761 ROL	1,892
17	1515/2003	1.01.2004	2.800.000 ROL	5.771.049 ROL	2,061
18	2356/2004	1.01.2005	3.100.000 ROL	7.233.398 ROL	2,333
19	1766/2005	1.01.2006	330* RON	866* RON	2,624
20	1507/2007	1.01.2007	390* RON	1.042* RON	2,672
21	1507/2008	1.01.2008	500* RON	1.309* RON	2,618
22	1051/2008	1.10 2008	540* RON		2,424
23	1051/2008	1.01.2009	600* RON	1361* RON	2,368
24	1051/2008	1 .01.2010	600* RON	1.391* RON	2,318
25	1193/2010	1.01.2011	670* RON	1.444* RON	2,155
26	1225/2011	1.01.2012	700* RON	1.507* RON	2,153
27	1225/2011	1.01.2013	700* RON	1579: 780	2,024
28	23/2013	1.02.2013	750* RON		
29	23/2013	1.07.2013	800* RON		
30	871/2013	1.01.2014	850* RON	1697 : 875	1,939
31	871/2013	1.07.2014	900* RON		
32	1091/2014	1.01.2015	975* RON	1859: 1013	1,835
33	1091/2014	1.07.2015	1050* RON		
34	1017/2015	1.05.2016	1250* RON	2046: 1183	1,729
35	1017/2015	1 .02.2017	1450* RON	2380 :1433	1,661

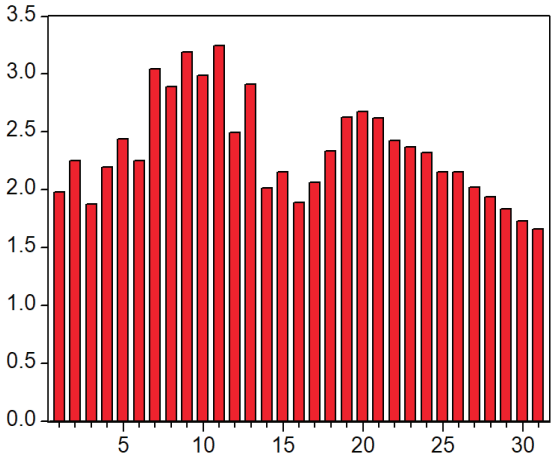
Source: Adapted after (Săvoiu, 2013, pp. 169-170)

Over the past 25-odd years there have been 35 legislative changes to the minimum wage, ever since 1993. The presentation of the statistical indicator built in an expressive graph (Figure 4) identifies a continuing trend of diminishing the SCI specific ratio in the last 10 years, virtually since the EU accession. This continuous process distorts the wage population, being accentuated by the abnormal distribution of net salaries through the frequency of change, which has become biannual, as well as the macroeconomic forecasts in Romania. The SCI

indicator finally reaches values that are increasingly relevant to the evolution abnormality of wage distribution, confirming the exaggeration that occurs through the excess of minimization and equalization of compensation, which absorbs major employee frequencies, excessively bringing salaries closer to each other, with the minimum wage getting closer to the value of 1.5–1.6 (Figure no. 4):

Evolution of SCI in Romania after 1993

Figure no. 4



Source: Data of the indicator built by the author in Table 3. Note: Made with the EViews software package

4. What is the future of the minimum – medium – maximum relationship in the Romanian wage statistical population?

Starting January 2018, the minimum gross salary was 1,900 lei, of which, this time, the net minimum wage is only 1,162 lei (61.1%). The level of gross minimum salary, according to the trend announced in Romania for the next two years, will be 2,200 lei in 2019, and 2,400 lei in 2020. About 1,55 million Romanians are already paid with the gross minimum wage for the economy, on the basis of a labour contract, as indicated by data issued by the Labour Ministry (according to the ECONOMICA.net source), which highlights an excessive massification in the vicinity of the minimum wage, where the wage population has been growing by more than 0.65 million compared to 2015.

The expected gross and net average wages for the same period, according to the forecasts provided by the Romanian specialized commission, are shown in Table 4:

Forecast of gross minimum wage, net and minimum wages, between 2018 and 2021

Table 4

Indicator of the Prognosis or Government Commission*	2018	2019	2020	2021
Gross average monthly incomes – lei/month	4,162	4,507	4,841	5,190
Net average monthly incomes – lei/month	2,614	2,834	3,045	3,268
*Minimum monthly incomes – lei/month	1,900	2,200	2,400	-

Starting in 2018, the structural changes in the gross wages result in its impossibility to use in comparisons of temporal evolution, due to the lack of statistical comparability. Analogously, the data about the minimum wage can no longer be used, either, because they are exposed to the same structural change.

However, anyone who will continue doing so making use of statistical indicators that seem apparently identical will come to totally alarming conclusions, which are anyway incomparable with the rest of the series under the impact by the lack of representativeness through excessive data heterogeneity and the content of both notions (i.e. average wage and minimum wage). Thus, the ratio between net monthly average wage and minimum wage (forecasted SCI) becomes an alarming signal of excessive equalization and discouragement of the compensation process: 1.288 in 2019 and 1.269 in 2020. All these predicted values are not coherent and real, but rather apparent, and should be redefined in real rather than nominal terms.

5. A final remark that raises other questions

An increase in the minimum wage is necessary, but not accompanied by the complete alteration of the salary structure, in other words preserving grids meant to ensure the formation of a middle class that may give a normal distribution to the wage population, which brings about social cohesion.

The same increase in the minimum wage is useful, but only when there has been an increase in investment effort and an increase in productivity, otherwise it generates a more pronounced reduction of jobs in order to maintain the necessary macroeconomic balances for the functioning of a national economy.

Several issues that are even more serious lie beyond this potential indicator (SCI), which provides an important signal, but can no longer quantify, compare or confront: What does the maximum wage income in a household or family look like? What does the income of a category looks like, which divides all wages at family or household level?

In order not to become conflicting and profoundly unbalanced, these increases in minimum wages should be accompanied by a rescheduling of all

employees' scaling. The salary approach according to which the minimum salary of an employee not having higher education in the public sector should be equal to that of an employee with higher education, or when the wage is residually differentiated by several hundred lei, can only contribute to educational demotivation and the degradation (if at all still possible below the current level) of higher education.

A final question is inevitable for any statistician: *Cui prodest* to completely destroy the structure of a statistical indicator without securing anticipated criteria of later comparability? We incline to think that it would be normal to capitalize, in advance, on the statistical expertise in all structural changes in order to find comparability and confrontation solutions, without which any real economic analysis in real terms becomes impossible.

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