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The evolution of convergence net added value per conventional worker (euro/worker) in the countries of the European Union, over the period 2007-2021

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# THE EVOLUTION OF CONVERGENCE NET ADDED VALUE PER CONVENTIONAL WORKER (EURO/WORKER) IN THE COUNTRIES OF THE EUROPEAN UNION, OVER THE PERIOD 2007-2021

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**Abstract:** *Apart from the aspects of legislative and institutional convergence, we believe that convergence, more than 14 years after Romania's accession to the EU, can also be measured quantitatively through statistical indicators. For the study, the indicator of the value of net agricultural production per worker (VAN) was taken in the countries of the European Union, for the period 2007-2021. The paper is divided into three sections, of which, in the first section, the evolution of the VAN per agricultural worker is described, in the second, the convergence tendency of the VAN indicator per agricultural worker is analyzed, to fall within the confidence limits of the EU average, for different degrees of probability and in the last section of the paper the evolution of the VAN convergence per agricultural worker is presented, through the value and percentage differences of the net added value per conventional agricultural worker compared to the average of the European Union, for the period 2007-2021. The VAN/AWU analysis, by comparing the growth rates through the value and percentage dispersion around the average and by the statistical positioning of the countries, against the intervals of the confidence limits of 95%, 99% and 99.9%, demonstrates that in the analyzed period 2007 -2021, has increased in value in all countries but they did not have a tendency to converge, respectively to reduce the discrepancies that exist between the countries of the European Union.*

**Keywords:** *convergence, value of net agricultural production, probability, rhythm, confidence limits.*

**JEL classification:** Q19, O47

## INTRODUCTION

Although agricultural incomes are influenced by a number of factors such as: "cost-price influence, uncertain conditions of demand and supply"; "heterogeneous nature of agricultural farms"; "natural conditions", we believe that the present analysis gives the possibility to evaluate the convergence, the discrepancies between farmers' incomes.

Cohesion must be achieved mainly by promoting the conditions for economic growth and by reducing the disparities between the development levels of the EU regions and the member states, ensuring a high level of employment and a balanced and sustainable development (Albu,L., et al.,2017).

Economic convergence is one of the main objectives of the accession treaty of Romania and other countries (Iancu, 2007), which aims to recover the gaps compared to the highly developed EU countries (Necula, Raluca et al., 2016).

Convergence is also a condition for joining the single currency, because if there is a big convergence gap, there is a risk of complicating the management of economic cycles (Isărescu, M., 2015).

Romania, from the point of view of real convergence, compared to the average gross domestic product (GDP) per inhabitant expressed by standard purchasing power (PCS), compared to the European average (EU-28), had the perspective that on the Horizon 2020 it would reach 70% of the European average compared to 57.1% recorded in 2015 (Government of Romania, 2017).

In 2022, nine countries had a per capita consumption (GDP) higher than the EU average: Luxembourg (38% above the EU average), Germany (19%), Austria (18%), the Netherlands (16%),

Belgium (15%), Denmark (11%), France and Finland (both 9%) and Sweden (8%). Our country was at 77% of the European Union average, just like Portugal and Hungary. The lowest GDP was in Bulgaria (41% below the EU average), Slovakia and Greece (both 32%) (Cioba, Laura-Georgiana, 2023).

The first section of the paper describes the evolution of the VAN/agricultural worker and its evolution through the coefficient of variation and the growth rate by European Union countries, for the period 2007-2021.

The second section of the paper analyzes the convergence tendency of the VAN/agricultural worker indicator, to fall within the confidence limits of the EU average, for probabilities of 95%, 99% and 99.9%. The third section of the paper presents the evolution of the VAN/agricultural worker convergence, through the value and percentage differences of the net added value per conventional agricultural worker compared to the European Union average, for the period 2007-2021.

## **MATERIAL AND METHOD**

The indicator net value added (VAN) per unit of annual work, is a different concept from that of business profit and even from personal or household income. VAN represents the reward for all "fixed" factors of production (all land and all capital, whether or not owned by the farmer, and all labor employed or part of the farmer's family).

The Annual Work Unit (AWU) represents, from 2011, 2120 annual work hours (until 2010, it represented 2200 annual work hours).

As indicators of the convergence of the net added value per conventional worker (€/AWU) were calculated: the annual growth rate of the net added value per conventional worker (€/AWU); coefficient of variation; the average net value added per conventional worker at EU level and the confidence limits for 95%, 99% and 99.9% probabilities, the evolution of the number of countries lying between the confidence limits for different probabilities; value and percentage difference of net value added per conventional worker (€/AWU), by country, compared to the EU average.

The coefficient of variation was calculated according to the formula:

$$C\text{ var }(\%) = (\text{AbSt} / \text{Mean}) * 100$$

The growth rate was calculated with the formula:

$$R(\text{rate}\%) = (\text{geomean}(\text{VAN}_0/\text{VAN}_1, \text{VAN}_1/\text{VAN}_2, \dots, \text{VAN}_{(n-1)}/\text{VAN}_n) - 1) * 100$$

Deviations by country and by year of VAN/AWU, in absolute figures and percentages compared to the average of the European Union, according to the formula:

Absolute deviations:  $\text{VAN}(\text{country}/\text{year}) - \text{Average VAN/EU}$  and

The relative deviations:  $(\text{VAN}(\text{country}/\text{year}) / \text{Average VAN/EU}) * 100$

Confidence limits for a given probability were calculated with the formula:  $\text{Average UE}(\text{VAN/AWU}) (+/-) \text{AbST} / (1 / \sqrt{n}) * t_p$ , where:

$n$  = number of observations;  $t_p$  = tabulated values of  $t$  for 95%, 99%, and 99.9% probabilities.

These indicators analyzed in dynamics over the analyzed period show us the tendency of the VAN/AWU indicator towards the proximity or distance from the EU average.

The data subject to the study on the evolution of net value added per conventional worker (€/AWU) were taken from: Eurostat 2023, FADNP, for the period 2007 to 2021, at the level of the EU and the component countries.

## RESULTS AND DISCUSSION

### (a) Trend of the annual growth rate of net value added per conventional worker (€/AWU) at the level of European Union countries over the period 2007-2021

Net Value Added (VAN/AWU) depends on the factors that compose it: Net Value Added per farm and Annual Number of Workers (AWU) which it influences increasing by increasing VAN per farm and also increasing by decreasing the number of workers per farm.

**Table no. 1. The evolution of net value added per worker (€/AWU) and the growth rate over the period 2007-2021, in the countries of the European Union.**

Area/ UM	Net Value Added per farm (2007-2021)			Annual number of workers (2007-2021)			Net Value Added per worker (2007-2021)		
	Average	Coeff. var.	rhyth m	Average	Coeff. var.	rhyth m	Average	Coeff. . var.	rhyth m
	thousand €/farm	%	%	AWU/far m	%	%	thousand €/AWU	%	%
EU-28	32.25	24.7	4.34	1.61	5.4	-0.49	20.06	22.8	<b>4.86</b>
AND	7.02	21.4	<b>1.31</b>	1.41	15.4	<b>-2.64</b>	5.12	30.8	4.05
EN	8.87	58.0	<b>10.74</b>	1.38	21.0	<b>-2.41</b>	6.47	52.2	<b>13.47</b>
HR	11.98	32.1	<b>10.42</b>	1.65	5.9	<b>-1.13</b>	7.34	34.9	<b>11.68</b>
for	12.42	21.0	3.41	1.65	5.0	-1.04	7.58	25.3	<b>4.51</b>
Lt	16.56	25.7	<b>2.68</b>	1.71	6.9	<b>-1.74</b>	9.80	31.9	<b>4.50</b>
MT	14.23	27.0	<b>-0.27</b>	1.42	5.5	-0.10	9.97	24.6	<b>-0.16</b>
IV	20.51	26.6	<b>2.82</b>	2.07	6.8	<b>-1.54</b>	10.03	30.8	4.44
BG	28.16	63.7	<b>16.98</b>	2.66	9.9	1.56	10.19	55.4	<b>15.18</b>
CY	14.94	22.6	3.51	1.43	6.8	0.76	10.38	18.4	<b>2.73</b>
for	18.17	21.1	<b>4.92</b>	1.60	4.1	<b>-1.09</b>	11.45	23.5	<b>6.04</b>
HE	14.75	8.2	<b>-0.27</b>	1.14	8.2	<b>-1.28</b>	13.02	8.1	<b>1.00</b>
SK	165.13	34.6	3.79	12.39	24.3	<b>-5.22</b>	14.69	51.1	<b>9.51</b>
EE	36.24	33.1	3.98	2.03	11.3	<b>-2.57</b>	18.34	39.5	<b>6.71</b>
CZ	121.17	23.0	<b>4.36</b>	6.02	12.2	<b>-1.33</b>	20.50	26.2	<b>5.78</b>
IV	33.83	26.9	<b>5.02</b>	1.65	6.4	-0.78	20.58	27.7	<b>5.86</b>
AT	36.42	20.6	<b>2.94</b>	1.51	5.8	0.63	24.03	17.9	<b>2.28</b>
IE	28.68	19.5	3.15	1.15	2.4	0.06	24.85	19.1	3.07
ES	40.16	32.0	<b>4.30</b>	1.54	11.0	1.73	25.52	20.9	<b>2.52</b>
IT	37.75	22.7	3.84	1.33	2.9	0.37	28.29	20.1	3.41
BE	37.78	23.5	3.36	1.31	6.4	0.25	28.67	18.7	3.08
FR	69.75	14.5	<b>1.91</b>	2.05	2.0	0.24	34.04	13.8	<b>1.66</b>
it	54.39	24.0	<b>4.21</b>	1.51	5.3	0.99	35.74	19.9	3.20
UK	81.02	9.7	<b>-0.07</b>	2.15	2.4	0.07	37.76	9.5	<b>-0.16</b>
OF	90.02	18.5	3.08	2.26	2.6	0.35	39.84	16.8	<b>2.71</b>
IU	69.96	22.4	<b>2.01</b>	1.73	4.5	0.00	40.47	23.6	<b>2.03</b>
BE	87.17	12.5	<b>1.27</b>	2.08	3.3	0.60	42.02	12.3	<b>0.66</b>
when	156.39	23.2	<b>4.85</b>	2.86	8.5	1.53	54.19	16.7	3.27
D.K	150.05	36.2	<b>6.54</b>	1.92	15.0	2.54	76.78	25.0	3.87

Source: Eurostat, 2023, FADNP,

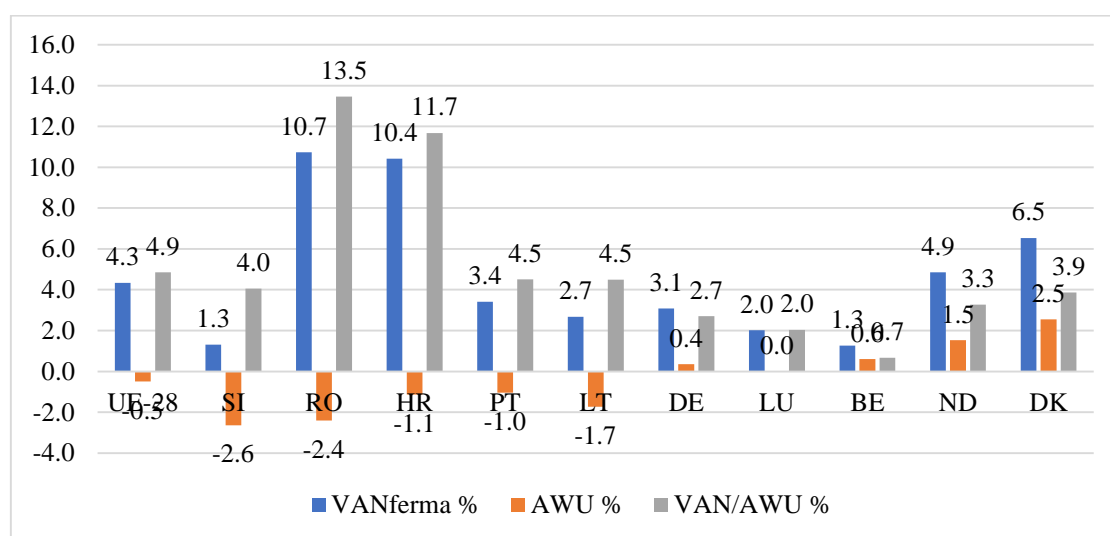
<https://agridata.ec.europa.eu/extensions/FADNPublicDatabase/FADNPublicDatabase.html>

The increase in Net Value Added on the farm is the result of both the increase in total agricultural production and the rational, efficient use of inputs at the farm level, and is subject to the influence of natural and economic conditions. The average number of workers at the farm level is

also a result of the degree of mechanization of the farm's production profile and the level of professional training.

It is also worth noting that the growth rate of VAN/AWU is given by the sum of the rates of the two factors, but where the rate of the annual number of workers is taken with the opposite sign. From the analysis of the evolution of the growth rates of VAN/farm, AWU and VAN/AWU, for the period 2007-2021 for the last five countries with the lowest value and the first five countries with the highest value of VAN/AWU, it is found:

- the countries with the lowest VAN/AWU, from 5.12 thousand €/AWU in SI, to 6.47 thousand €/AWU in RO and to 9.80 thousand €/AWU in LT, all have a negative growth rate, respectively decrease in the number of workers, from -2.6% in SI, to -2.6% in RO to 1% in PT. It is worth noting that the growth rate of VAN/AWU is higher than or equal to the growth rate of the EU; (Table 1 and Chart 1);



**Graph 1. The evolution of the growth rates of VAN/farm, AWU and VAN/AWU, for the period 2007-2021, of the last 5 countries with the lowest VAN/AWU and the first 5 countries with the highest VAN/AWU value**

- the countries with the highest VAN/AWU, from 39.84 thousand €/AWU in DE to 76.78 thousand €/AWU, in DK, all have a positive growth rate of the number of AWU, from 0.66% in BE to 3.87 in BE; (Table 1 and Graph 1).

- thus, the idea that reducing the number of workers would lead to an increase in VAN/AWU, in order to reduce the discrepancies, is not true. This can be explained by the great diversity of agricultural farms, by the great difference in operating capital, by the diversity of the activities carried out, by the size of the farms and of course the place that agricultural products occupy in the market.

**(b). Difference in value and percentage of net value added per conventional worker (€/AWU), by country, compared to the EU average.**

An indicator of the convergence of the net added value per worker (€/AWU), is the difference expressed in absolute and relative figures of this indicator compared to the EU average (Table no. 4).

From the analysis for the years 2007, 2015 and 2021, of the evolution of this indicator, the following can be found:

- the countries that are above average with VAN/conventional worker are 13, the same in the three years analyzed, namely AU, ES, IE, IT, FI, FR, BE, LU, DE, SE, ND, DK and UK, to which CZ is added in the years 2015 and 2021 and EE in the year 2021;

**Table no. 2. Evolution of value and relative deviations of net added production per worker (€/AWU), by country, compared to the EU average, for the years 2007 and 2021**

Years/MU/ Area	2007			2015			2021		
	Thousands of €/AWU	(+/-) €/AWU	%	Thousands of €/AWU	(+/-) €/AWU	%	Thousands of €/AWU	(+/-) €/AWU	%
eu	15.0	0.0	100.0	18.8	0.0	100.0	29.1	0.0	100.0
MT	13.3	-1.7	88.9	9.3	-9.5	49.4		-29.1	0.0
AND	4.4	-10.5	29.7	3.7	-15.1	19.6	7.7	-21.4	26.6
Hr		-15.0	0.0	5.4	-13.4	28.7	10.4	- 18.7	35.8
CY	8.2	-6.7	55.0	8.6	-10.2	45.7	12.0	-17.1	41.3
PL	6.7	-8.3	44.8	6.3	-12.5	33.5	12.4	-16.7	42.7
EN	2.2	-12.8	14.8	4.2	-14.6	22.2	13.0	-16.1	44.8
IV	8.2	-6.8	54.6	10.6	-8.2	56.3	14.7	-14.5	50.3
HE	13.3	-1.7	88.6	11.9	-6.9	63.3	15.3	-13.9	52.4
Lt	8.7	-6.3	58.0	9.2	-9.6	49.1	17.2	-11.9	59.1
for	7.6	-7.4	50.7	12.5	-6.3	66.5	17.3	-11.8	59.4
BG	3.3	-11.7	21.8	9.5	-9.3	50.3	23.6	-5.5	81.2
SK	8.1	-6.9	54.0	14.5	-4.3	77.2	28.8	-0.3	99.1
CZ	13.6	-1.4	90.7	19.7	0.9	104.8	29.8	0.7	102.4
EE	13.5	-1.5	89.8	15.9	-2.9	84.7	33.4	4.3	114.7
HAVE	23.8	8.9	159.1	19.2	0.4	102.2	32.7	3.6	112.3
ES	23.7	8.8	158.5	25.9	7.1	137.9	33.6	4.5	115.5
IE	23.3	8.4	155.8	25.8	7.0	137.4	35.0	5.9	120.2
IT	23.2	8.3	155.2	31.0	12.2	165.1	37.2	8.1	127.7
BE	26.1	11.2	174.6	26.6	7.8	141.7	40.0	10.9	137.3
FR	34.4	19.5	229.9	33.8	15.0	180.0	43.4	14.3	149.1
BE	42.5	27.5	283.6	35.7	16.9	190.1	46.6	17.5	160.0
IU	37.7	22.7	251.8	41.0	22.2	218.0	52.1	23.0	179.1
OF	36.0	21.0	240.1	36.3	17.5	193.2	52.3	23.2	179.6
it	33.8	18.8	225.5	34.1	15.3	181.5	52.5	23.4	180.3
when	45.0	30.0	300.4	52.8	34.0	281.2	70.6	41.5	242.4
D.K	60.3	45.3	402.4	64.6	45.8	343.9	102.6	73.5	352.4
UK	40.6	25.6	270.7	31.2	12.4	165.8			
<b>Average deviations above the EU average</b>		<b>-7.0</b>	<b>53.0</b>	<b>x</b>	<b>-9.4</b>	<b>57.8</b>	<b>x</b>	<b>-14.7</b>	<b>49.4</b>
		<b>19.7</b>	<b>231.4</b>	<b>x</b>	<b>15.3</b>	<b>181.6</b>	<b>x</b>	<b>18.2</b>	<b>162.4</b>

Source: Eurostat, 2023, FADNP,

<https://agridata.ec.europa.eu/extensions/FADNPublicDatabase/FADNPublicDatabase.html>

- the value exceedance was 19.7 €/AWU/worker in 2007, decreased to 15.3 €/AWU/worker in 2015 and increased again to 18.2 €/AWU/worker in 2021;

- the percentage exceedance was decreasing from 231.5% in 2007, to 181.6% in 2015 and to 162% in 2021;

- the countries that are below the average with a value deviation are 14 in 2007, with an average of -7.0 €/AWU, 13 in 2015 with -9.4 €/AWU and 12 in 2021 with -14.7 €/AWU;

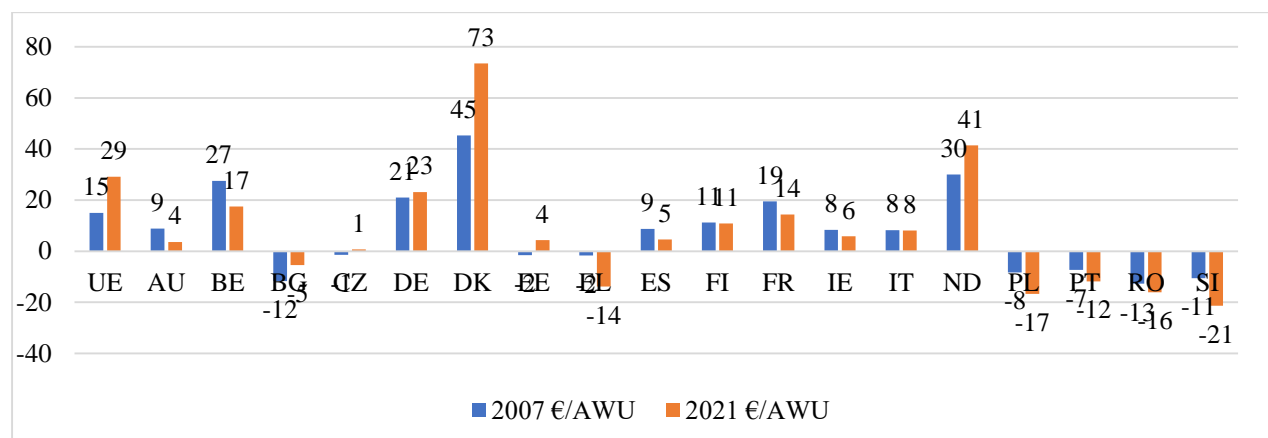
By percentage, the number of countries, as an average of deviations from the average, is 53.0% in 2007, 57.8 in 2015 and 49.4% in 2021.

Thus, for Bulgaria over the entire period, the net added value was below the average with values between €8.2/AWU (62.6%) in 2017 and €27.8/AWU (19.82%) in 2011.

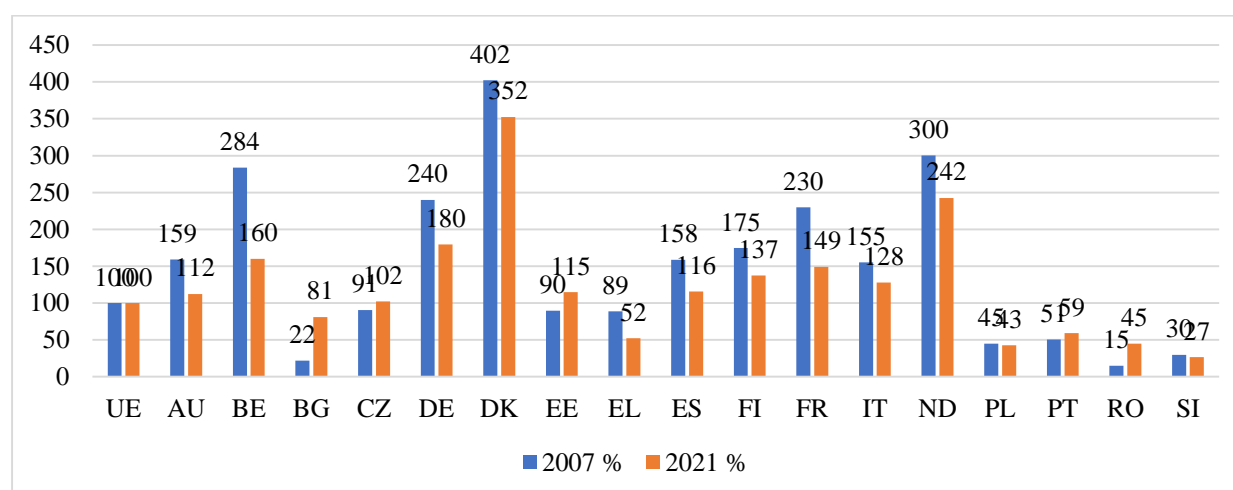
The closest to the EU average was in 2021 of 81.17%.

For Romania in the same period, the lowest difference was €10.6/AWU (22.3%) in 2009 and the highest €29.5/AWU in 2011 (15%). The closest to the EU average was 44.8% in 2021.

For Denmark the difference compared to the EU average ranged between €29.9/AWU (318.7%) in 2009 and €75.5/AWU (389.5%), and for the Netherlands between €11.2/AWU (132.2%) in 2011 and €43.3/AWU (297.9%) in 2017.



**Graph 2. Evolution of value deviations of net added production per worker (€/AWU), by country, compared to the EU average, for the years 2007 and 2021**

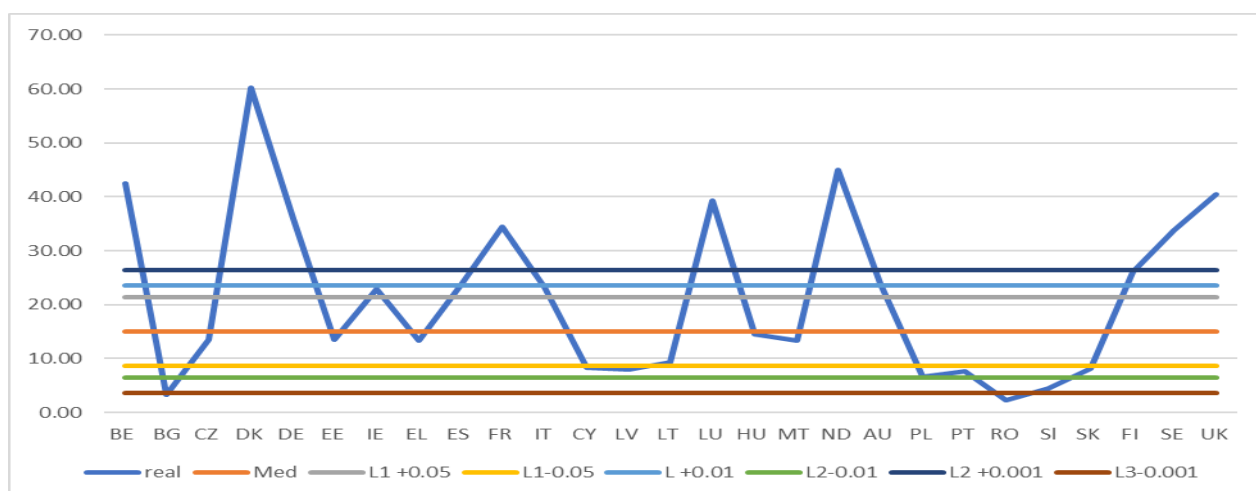


**Graph 3. Evolution of percentage deviations of net added production per worker, by country, compared to the EU average (EU=100%), for the years 2007 and 2021**

### (c) Confidence limits for 95%, 99% and 99.9% probabilities, evolution of the number of countries lying between the confidence limits for different probabilities

Thus, for the year 2007, confidence limits were calculated around the EU average for probabilities of 95% (between €21.33/AWU and € 8,621 /AWU), 99% (between €23,564 /AWU and €6,394/AWU) and for 99.9% (between €26,411/AWU and €3,547/AWU) (Graph no. 1).

Using a Count IF command in Excel, the countries that are within these confidence limits, as well as those that are outside of these limits, at the top and at the bottom, were counted.



**Graph no. 4. The comparison with the confidence limits of the EU average, of the net added values per supplier, of the EU countries, in 2007**

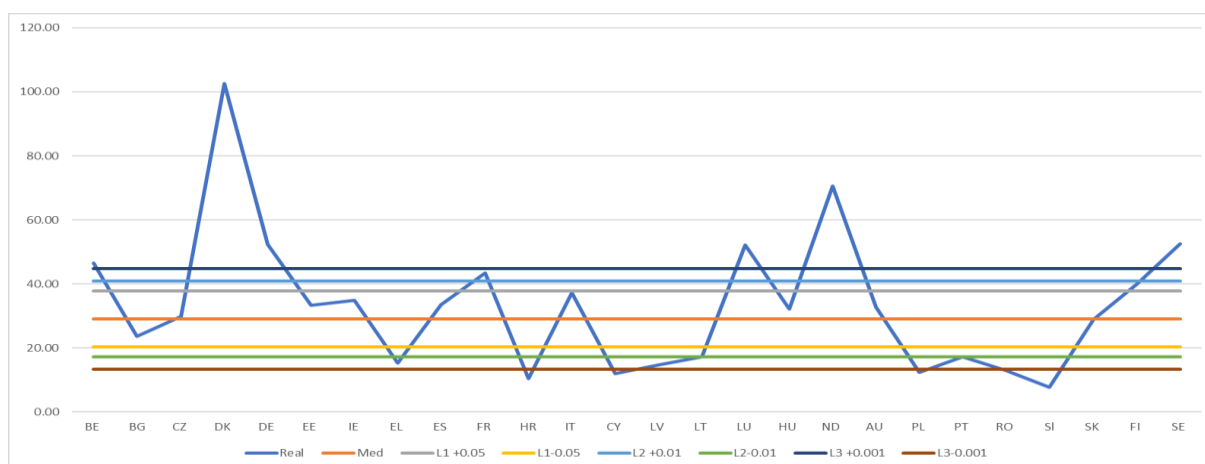
**Table no. 3. Confidence limits of average net value added per worker, by confidence intervals, of the EU average, 2007-2021**

Limits/ Years/ MU	EU Average	Prob Limits 95%		Prob Limits 99%		Prob limits 99.9%	
		L1 (Sup,0.05)	L1 (Inf,0.05)	L2 (Up,0.01)	L2 (inf,0.01)	L3 (Sup,0.001)	L3 (Inf,0.001)
	Th.€/AWU	Th. €/AWU	Th. €/AWU	Th. €/AWU	Th. €/AWU	Th. €/AWU	Th. €/AWU
2007	14.98	21.34	8.62	23.56	6.39	26.41	3.55
2008	14.67	20.04	9.30	21.92	7.42	24.33	5.01
2009	13.66	18.29	9.03	19.92	7.40	21.99	5.33
2010	17.47	24.31	10.63	26.70	8.24	29.77	5.17
2011	34.7	25.65	10.86	28.25	8.27	31.56	4.96
2012	18.95	25.31	12.59	27.53	10.37	30.38	7.52
2013	18.13	25.93	10.33	28.66	7.60	32.15	4.11
2014	18.39	24.75	12.02	26.98	9.79	29.83	6.94
2015	18.79	24.86	12.73	26.98	10.60	29.70	7.89
2016	19.78	25.90	13.66	28.04	11.52	30.78	8.78
2017	21.90	29.48	14.32	32.14	11.66	35.53	8.27
2018	24.60	30.78	18.41	32.95	16.25	35.72	13.48
2019	26.00	33.95	18.05	36.74	15.26	40.30	11.70
2020	26.14	33.93	18.34	36.66	15.61	40.15	12.12
2021	29.11	37.88	20.34	40.95	17.27	44.87	13.35

Source: Eurostat, 2023, FADNP,  
<https://agridata.ec.europa.eu/extensions/FADNPublicDatabase/FADNPublicDatabase.html>

The same was done for the other years. We also exemplify for the year 2021, where the confidence limits for probabilities of 95% (between €21.33/AWU and €8,621/AWU), 99% (between €23,564/AWU and €6,394/AWU) and for 99.9% (between 26,411€/AWU and 3,547€/AWU) (Graph no. 2).





**Graph 5. The average of EU in the confidence limits of the net value added per worker, of EU countries in 2021**

From the analysis of the scatter of countries around the EU average (€/AWU), for 95% confidence limits, it is found that:

- in the period 2007-214 the number of countries that were within these limits was of 7 countries (CZ0, EE, IE, EL, LT, HU, MT), a number that is also maintained for the period 2015-2021 (BG, CZ, EE, IE, IT, AU, SK);
- during the same period, of course, the number of countries that are outside the confidence limits, delimited by the 95% confidence probability, has also been maintained;

**Table no. 4. The net value added per worker by confidence intervals, EU average, EU countries, 2007-2021 and sub-periods (2007-2014 and 2015-2021)**

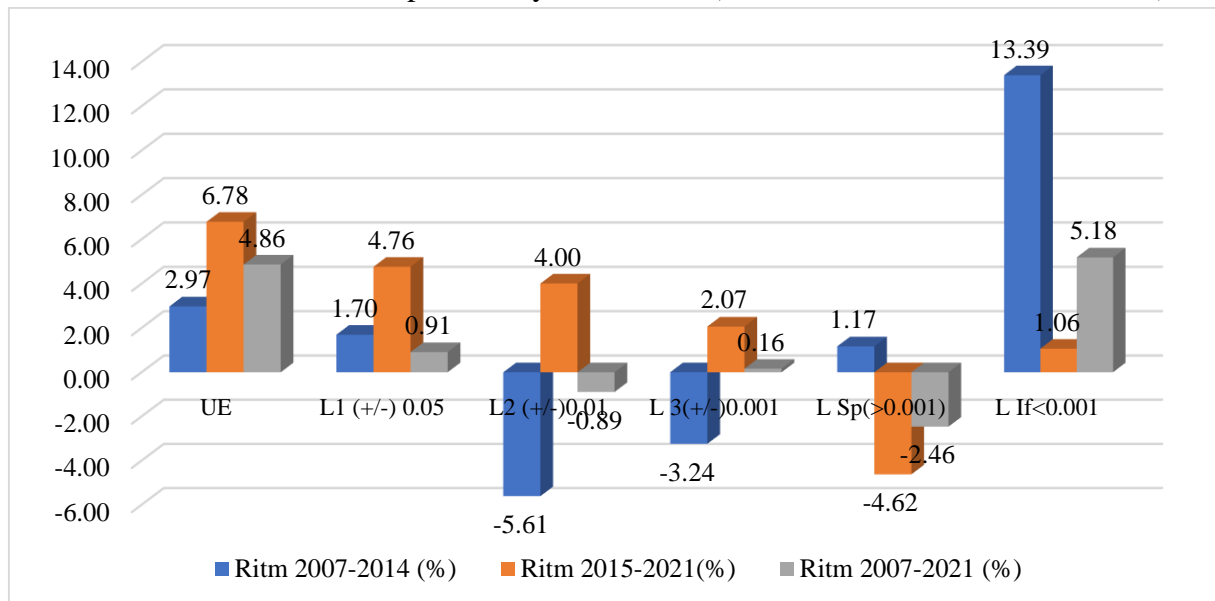
Indicators/Years	EU(€/AWU)	L1 (+/-) (0.05)		L2 (+/-) (0.01)		L3 (+/-) (0.001)		etc (>0.001)		Lif (<0.001)	
		No.	%	No.	%	No.	%	No.	%	No.	%
2007	14.98	6	22.2	13	48.1	17	63.0	8	29.6	2	7.4
2008	14.67	5	18.5	13	48.1	15	55.6	9	33.3	3	11.1
2009	13.66	4	14.8	10	37.0	14	51.9	8	29.6	5	18.5
2010	17.47	9	33.3	10	37.0	18	66.7	7	25.9	2	7.4
2011	34.65	9	33.3	13	48.1	18	66.7	8	29.6	1	3.7
2012	18.95	7	25.9	8	29.6	16	59.3	8	29.6	3	11.1
2013	18.13	11	39.3	16	57.1	20	71.4	7	25.0	1	3.6
2014	18.39	7	25.0	9	32.1	14	50.0	9	32.1	5	17.9
2007-2014 average	18.86	7	26.78	11.5	43.61	17	62.06	8	28.97	2.75	8.98
Rhythm 2007-2014 (%)	2.97	2.23	1.70	-5.12	-5.61	-2.74	-3.24	1.70	1.17	13.99	13.39
2015	18.79	5	17.9	10	35.7	15	53.6	9	32.1	4	14.3
2016	19.78	6	21.4	8	28.6	14	50.0	8	28.6	6	21.4
2017	21.90	6	21.4	13	46.4	17	60.7	7	25.0	4	14.3
2018	24.60	7	25.0	8	28.6	12	42.9	7	25.0	9	32.1
2019	26.00	8	28.6	10	35.7	17	60.7	6	21.4	5	17.9
2020	26.14	7	25.0	12	42.9	18	64.3	6	21.4	4	14.3
2021	29.11	9	34.6	11	42.3	15	57.7	6	23.1	5	19.2
Average 2015-2021	22.87	7	24.84	10	37.17	15	55.69	7.00	25.24	5.29	19.07
Rhythm 2015-2021(%)	6.78	10.29	4.76	1.60	4.00	0.00	2.07	-6.53	-4.62	3.79	1.06
Average 2007-2021	21.15	7	25.76	10	39.84	15	58.28	7	27.44	5	14.28
Rhythm 2007-2021 (%)	4.86	5.87	0.91	-2.07	-0.89	-1.48	0.16	-2.19	-2.46	9.16	5.18

Source: Eurostat, 2023, FADNP,

<https://agridata.ec.europa.eu/extensions/FADNPublicDatabase/FADNPublicDatabase.html>

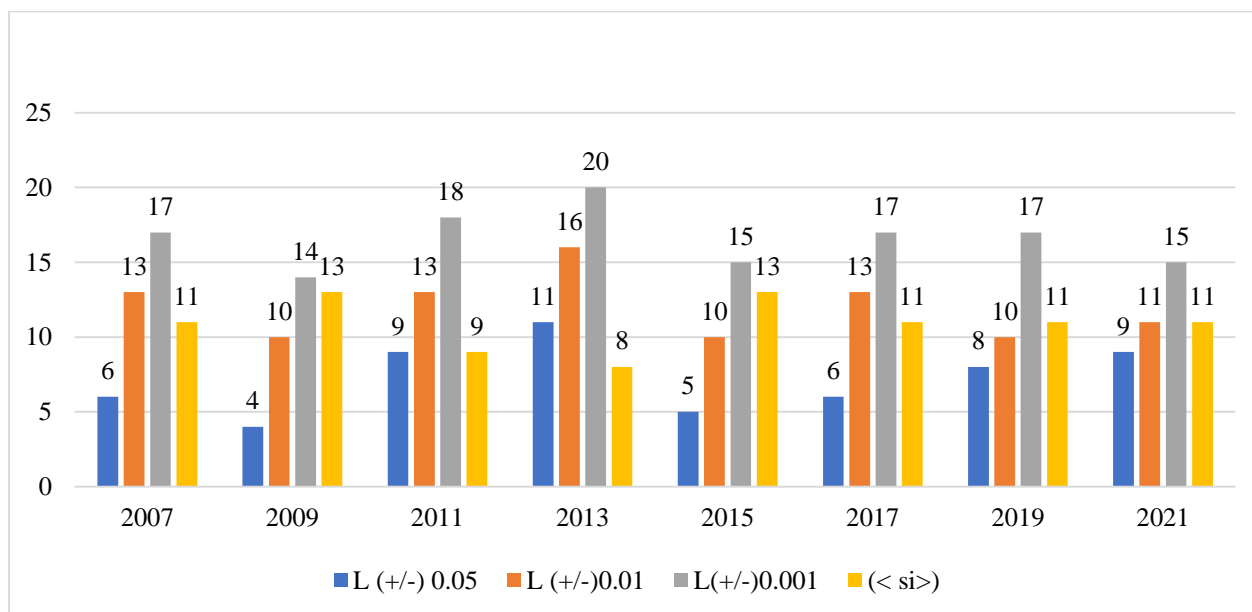
- it is noted that, for the period 2007-2014, the number of countries that are above the confidence limit with a probability of 95% is 12 (BE, DK, DE, ES, FR, IT, LU, ND, AU, FI, SE, UK)

of which above the limit of 99.9%; and for the period 2015-2021, the number of countries that are above the confidence limit with a probability of 95% is 8 (BE, DK, DE, FR, LU, ND, FI, SE);



**Graph 6. Growth rates of the number of countries, by confidence intervals, for the period 2007-2021 and by sub-periods, at the level of EU countries**

- as a statistical significance, the number of countries that are significantly above the average, i.e. exceed the 99.9% limit, is 7 (BE, DE, FR, LU, ND, SE, UK) in 2007 and 6 (BE, DK, DE, LU, ND, SE) in 2021;



**Graph 7. Distribution of the number of countries according to the size of the net added value per worker, by confidence intervals, for the period 2007-2021**

- regarding the number of countries that are below the average with a very significant negative significance, below the limit given by the probability of 99.9%, there are 2 in 2007 (BG, RO) and 5 in 2021 (HR, CY, PL, RO, SI).

## CONCLUSIONS

1. Net added value per worker (VAN/AWU) in the period 2007-2021, has a growth rate of 5%, at EU level, from -0.16% in Malta, to 3.87% in Denmark, to 13.45% in Romania and at 15.18% in Bulgaria.

As components of VAN/AWU, net value added per farm also has different rhythms, from -0.27% in Malta and Greece, to 6.54 in Denmark and 10.74 in Romania and 16.98 in Bulgaria, and the average annual number of workers also has very different rhythms from -5.22 in SK to -2.41 in Romania, to 1.73 in Italy and 2.54% in Denmark.

The growth rate of VAN/AWU cannot define convergence, because in the first 5 countries with the highest VAN/AWU, they have increases in the rate of the number of workers, while the last countries in terms of VAN/AWU level have decreases of the growth rate, which demonstrates the diversity of VAN/AWU growth paths.

2. Analyzing the number of countries *that have a VAN/AWU value above the average for the three representative years, they are 13, in these years, namely AT, ES, IE, IT, FI, FR, BE, LU, DE, SE, ND, DK and UK, to which CZ is added in 2015 and 2021 and EE in 2021.*

3. Analyzing the convergence of VAN/AWU, of the EU countries, compared to the average, it is found that there are 7 countries within the confidence limits with 95% probability, both in 2007 and in 2021. Regarding the number of countries that were above the mean with a very significant positive significance, above the limit given by the probability of 99.9%, they were 6 in the year 2007 and 6 in the year 2021, and the number of countries that were below the limit given by the probability of 99.9% %, were 2 (BG, RO) in 2007 and 5 in 2021 (HR, CY, PL, RO, SI).

4. VAN/AWU analysis, by comparing the rhythms of growth of VAN/AWU, by the value and percentage scatter around the average and by placing the countries from a statistical point of view, between confidence limits of 95%, 99% and 99.9%, demonstrates that during this period, 2007-2021, it increased in value in all countries, but they did not have a tendency to converge, respectively to reduce the discrepancies that exist between the countries of the European Union.

## PROPOSALS

1. Due to the importance of convergence in the economic and social cohesion of our country in general and agriculture in particular, we consider it necessary for the institutions empowered with scientific research to define the indicators of convergence, in order to analyze them and make them available to administrative and political institutions.

2. It is necessary to analyze and disseminate the trend of convergence indicators in the countries of the European Union, in order to know the multitude of development paths, in order to reduce the discrepancies that separate the countries of the European Union.

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