

## Impact of european funds upon rural development in the European Union

## Impacto dos fundos europeus no desenvolvimento rural da União Europeia

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### **ABSTRACT**

Rural Development Funds are an important part of the European Union strategies, under the Common Agricultural Policy. They should help in the development of rural areas, which are the most subjected to poverty and social deprivation. The aim of this study is to evaluate the impact of these funds upon rural development in an attempt to assess the efficiency of their usage. To do this, we use data for the 27 European Union members states for the 2000 – 2022 period. Data related to productivity in agriculture, employment and poverty in rural areas is used as dependent and modelled with the help of dynamic panel regression against the amount of money used from these funds. We show that as rural development funds increased in time, poverty decreased, which is an important indicator of efficiency. Additionally, while the variables related to the rural areas, like importance of agriculture in the national economy, employment and poverty in rural areas follow the classical spatial distributions on the West-East direction, the use of rural development funds does not. Absorbed rural development funds have significantly impacted the gross value added in agriculture, employment, and poverty in rural areas. Our most important result is the inverse relationship between rural development funds absorbed and the percentage of rural people at risk of poverty and social exclusion, clearly pointing out the need for continuous support for rural development.

**Keywords:** C33, O13, O18

### **RESUMO**

Os Fundos de Desenvolvimento Rural são uma parte importante das estratégias da União Europeia, no âmbito da Política Agrícola Comum. Eles devem ajudar no desenvolvimento das áreas rurais, que são as mais sujeitas à pobreza e à depreciação social. O objetivo deste estudo é avaliar o impacto desses fundos sobre o desenvolvimento rural em uma tentativa de avaliar a eficiência de seu uso. Para isso, usamos dados dos 27 estados-membros da União Europeia no período de 2000 a 2022. Os dados relacionados à produtividade na agricultura, ao emprego e à pobreza nas áreas rurais são usados como dependentes e modelados com a ajuda da regressão de painel dinâmico em relação ao montante de dinheiro usado desses fundos. Mostramos que, à medida que os fundos de desenvolvimento rural aumentam, a pobreza diminui,

o que é um importante indicador de eficiência. Além disso, embora as variáveis relacionadas às áreas rurais, como a importância da agricultura na economia nacional, o emprego e a pobreza nas áreas rurais sigam as distribuições espaciais clássicas na direção oeste-leste, o uso dos fundos de desenvolvimento rural não o faz. Os fundos de desenvolvimento rural absorvidos afetaram significativamente o valor agregado bruto na agricultura, o emprego e a pobreza nas áreas rurais. Nosso resultado mais importante é a relação inversa entre os fundos de desenvolvimento rural absorvidos e a porcentagem de pessoas rurais em risco de pobreza e exclusão social, apontando claramente a necessidade de apoio contínuo ao desenvolvimento rural.

**Palavras-chave:** C33, O13, O18

## 1 INTRODUCTION

Rural development is an important part of the European Union strategies, since rural areas are, usually, the poorest ones, with the highest share of the population living in precarious conditions. That is why a significant part of the European Structural Funds has been devoted throughout the years to rural development.

The European Union is made up of countries with significantly different economic, social and cultural behaviours and characteristics. First, as Mare (2014) shows, there are two major directions of clusterization of economic behaviour and performance within the European Union. They are positioned on the two types of geographic references – latitude and longitude, but which condition each other. Thus, we have the classical direction of longitudinal behavioural clustering, which is present and highlighted in most of the specialized literature. On the West-East direction, we have democratic Europe after the Second World War, which, benefiting from a market economy, is made up of predominantly developed economies - Germany, Netherland, Finland, etc. Implicitly, their rural environment has a certain type of specificities. The Eastern countries, i.e. the new members of the European Union after 2000, are countries from the former communist bloc, with the lowest level of development in the Union – Romania, Poland, Hungary, etc. Their rural environment was and still is much less developed than that of the Western states. That is why, in order for the goals that were the basis of the formation of the European Union to be achieved, the convergence process had to take place also by supporting the development of the rural environment of these states.

This study aims to assess how efficient the funds allocation and utilization in this respect by putting together the amounts of money used by the European Union members and some important rural development variables. For this, we use data from 2000 to 2022 for the actual 27 members of the European Union.

The paper is structured as follows. Section 1 gives a brief introduction into the topic. Section 2 revises the most important literature. In Section 3 we present the data employed and the methodological development. Results are presented afterwards, while the last section concludes.

## 2 LITERATURE REVIEW

European funds have been created with the primary goal of helping poorer regions lower the difference between them and the more developed ones. The absorption of European funds helps to develop the whole economy. Many factors may affect how funds are absorbed to the primary goal of growth, such as the efficiency of public governance, institutional quality, economic development, or socio-cultural factors (Achim & Borlea, 2015). Accordingly, financial fraud committed with the intention of obtaining illegal advantages is common (Roman, Achim & McGee, 2023). According to official data, certain EU member states are more likely to flout the law when asking for EU subsidies. Romania, Poland, Slovakia, and the Czech Republic—all former communist countries that joined the Union after 2004—have been shown to have among of the highest rates of fraud and irregularities. Among the Western European countries reporting a high number of instances are Spain, Italy, the United Kingdom, Germany, and Portugal (Roman et al., 2022). Additionally, from 2014 to 2020, corruption had a detrimental impact on the amount of European money absorbed (Roman, Popescu & Achim, 2023).

An essential part of this financing tool is provided by the rural development funds available under the Common Agricultural Policy (CAP). The first and most important provisions related to CAP were related to increasing the productivity of agriculture and the efficiency of agricultural businesses, levels of decent development for citizens in villages and rural communities, ensuring satisfactory incomes for agricultural workers in EU countries, support for European producers in relation to international competition, interventions on product prices and markets agricultural (Loux, 2020). These main ideas have remained mostly unchanged over time, but the MacSharry reform dating back to the beginning of the 1990s brought significant organizational changes (Papadopoulos, 2015). Gradually, the subsidy mechanisms supported less and less agricultural products and more and more agricultural producers and the development of communities and the rural economy (Scown et al., 2020).

Although we can say that this common policy has grown enormously over time as well as in terms of targeted objectives, financing, and implementation structures, and has gradually accumulated new components regarding complex rural development, social and environmental issues, it has not been possible to avoid or solve persistent problems like the predominantly agricultural economic structure of many rural communities, the development inequalities between member states and the gap between urban and rural environments (Papadopoulos, 2015, Matthews, 2017).

Even today these major problems persist and are identifiable through statistical data. There are some rural areas that can be considered as peripheries of the European Union. From a geographical point of view, there are visible gaps on the North-West / South-East axis. This shows obvious differences in competitiveness, both in terms of agricultural productivity and of economic efficiency of rural businesses, as well as the standard of living of the inhabitants of these regions. Some studies show that periods of economic growth at the global European level manage to reduce the gaps and increase the speed of

convergence of the rural environment; instead, in periods of recession, the common policy does not prove to be an effective tool for solving economic and social inequalities (Papadopoulos, 2015; Giannakis & Bruggerman, 2020).

One very important change that appeared in time in CAP was represented by the emergence of rural development as a pillar, which eroded the orientation of the common policy as support for agriculture as an economic sector, towards the advantage of territorial approaches and more complex regulations, including a social role (Mantino & Vanni, 2019). The European Commission overly optimistically presented the latest change as a successful path to territorial policy approaches (Cairol et al., 2009; Dax et al., 2011; Guth et al., 2020) before the effects proved policy effective.

Literature that actually evaluates the effectiveness of the impact of rural development funds upon rural development is divided into two major groups. First, there is the group pointing out towards the positive impact and to the fact the rural areas have evolved and developed because of the CAP and the European rural development funds. For example, Puie (2020) proves that new agricultural and non-agricultural business were created in Romania through the EAFRD support and urges the need for a coherent overall strategy. Also, in Romania, EAFRD facilitates the development of rural areas through modernization, sustainable management, and labor force transition, increasing the standard of living (Stancu, 2008).

Second, there is the group of studies that emphasizes an opposite effect. For example, the study of Kiryluk-Dryjska et al. (2020) shows that regional disparities in Poland have increased in rural areas instead of decreasing. On the same direction, Moser et al. (2018) show that quality of life in rural areas has improved only in some German federal states.

However, up to our knowledge there is no study putting together the European Agricultural Funds for Rural Development and rural development proxies to account for the actual impact. This is the gap that our study aims to treat.

### 3 DATA AND METHODOLOGY

Variables used are presented in table 1. They are all measured annually, for the 2000 – 2022 period.

The first step of the analysis is the descriptive one. In this research we present some of the plots, either line charts for the European Union, or maps for different years and variables.

As our data is made up of a panel for the 27 EU members for the 2000 – 2022 period of time, the first step is to assess the time properties of the variables. We applied the Levin-Lin-Chu unit root tests for panel stationarity and the panel autocorrelation Wooldridge test. Table 2 presents stationarity results, while Table 3 presents the autocorrelation ones.

Table 1. Variables employed in the analysis

| Variables        | Description   | Source                 |
|------------------|---|------------------------|
| <b>Dependent</b> |   |                        |
| GVAagri%GDP      | Gross Value Added in Agriculture as a share in GDP, in %  | Eurostat               |
| Employment       | Share of workforce employed in Agriculture, in %  | World Bank             |
| Poverty          | Share of rural population at risk of poverty or social exclusion, in %  | Eurostat               |
| <b>Factor</b>    |   |                        |
| EFRD             | The amount of money spent by each member state for rural development through the dedicated financing program, mil. euro | European Union budgets |
| <b>Controls</b>  |   |                        |
| GVAcap           | Gross Value Added per capita in euro  | Eurostat               |
| Rpop             | Rural population – ruralization rate, share of rural population in total population, in %                               | World Bank             |

Source: own construction

The obtained probabilities clearly show that the variables GVAagri%GDP and Employment are stationary (table 2). The Poverty variable is stationary only at the 10% confidence level, the obtained p-value being exactly equal to 0.05. On the contrary, in all specified models there is significant autocorrelation in our panel (table 3). Consequently, a dynamic approach is necessary. Out of the methodological possibilities in this respect, we chose to apply the Arellano & Bond (1991) dynamic panel, but in the respecified version of Roodman (2009).

Table 2. Stationarity results

| Variable    | p-value |
|-------------|---------|
| GVAagri%GDP | 0,000   |
| Employment  | 0,000   |
| Poverty     | 0,050   |

Source: own calculations

Table 3. Autocorrelation results

| Dependent   | Factor | Control variable | p-value |
|-------------|--------|------------------|---------|
| GVAagri%GDP | EFRD   | -                | 0,000   |
|             |        | Rpop             | 0,000   |
|             |        | GVAcap           | 0,000   |
|             |        | Rpop + GVAcap    | 0,000   |
| Employment  | EFRD   | -                | 0,000   |
|             |        | Rpop             | 0,000   |
|             |        | GVAcap           | 0,000   |
|             |        | Rpop + GVAcap    | 0,000   |
| Poverty     | EFRD   | -                | 0,000   |
|             |        | Rpop             | 0,000   |
|             |        | GVAcap           | 0,000   |
|             |        | Rpop + GVAcap    | 0,000   |

Source: own calculations

In its most complex form, our model is given by eq. (1):

$$Dependent_{it} = \beta_0 + \beta_1 * L1. Dependent_{it} + \beta_2 * L2. Dependent + \beta_3 EFRD_{it} + \beta_4 * L1. EFRD_{it} + \varepsilon_{it}$$

eq. (1)

with  $L1$  giving the first order lag of the variable, while  $L2$  stands for the second lag, while the  $Dependent$  is each of the three variables presented in table 1. The  $i$  and  $t$  indexes stand for the country and the year.

Eq. (1) reproduces the most general model as, from one dependent variable to another, both the lags required to be entered for the dependent variable and the way of entering the EFRD differ. For example, when the dependent is  $GVAagri\%GDP$ , the method requires entering the first-order lag of the variable and both the level and first lag of EFRD. When Employment becomes the dependent, EFRD per level is no longer relevant, only its first lag. Thus, the coefficient  $\beta_2$  for EFRD disappears from the equation. Moreover, in the third specification of eq. (1), the one with Poverty as the dependent variable, it is necessary to introduce the 2nd order lag of the dependent variable. Thus, eq. (1), customized for each dependent variable, becomes:

$$GVAagri\%GDP_{it} = \beta_0 + \beta_1 * L1. GVAagri\%GDP_{it} + \beta_2 EFRD_{it} + \beta_3 * L1. EFRD_{it} + \varepsilon_{it}$$

eq. (1.1) - table 4

$$Employment_{it} = \beta_0 + \beta_1 * L1. Employment_{it} + \beta_2 * L1. EFRD_{it} + \varepsilon_{it}$$

eq. (1.2) - table 5

$$Poverty_{it} = \beta_0 + \beta_1 * L1. Poverty_{it} + \beta_2 * L2. Poverty + \beta_3 EFRD_{it} + \beta_4 * L1. EFRD_{it} + \varepsilon_{it}$$

eq. (1.3) - table 6

Besides changing the dependent variable, another way for robustness check is to introduce control variables. Eq. (1) becomes:

$$Dependent_{it} = \beta_0 + \beta_1 * L1. Dependent_{it} + \beta_2 * L2. Dependent + \beta_3 EFRD_{it} + \beta_4 * L1. EFRD_{it} + \sum_k \lambda_k * X_{itk} + \varepsilon_{it}$$

eq. (2)

where  $k$  stands for the control variables used in the estimation process, as shown in table 1. Eq. (2) is also respecified according to the dependent variable.

For all models built we present the number of observations, the number of instruments used in the estimation process, the Wald test and its associated probability, and the Arellano-Bond test probability for autocorrelation. For all final models, Sargan and Hansen tests attached to the estimation procedure returned p-values greater than 0.05. Thus, they show that there are no specification errors in each of the final models.

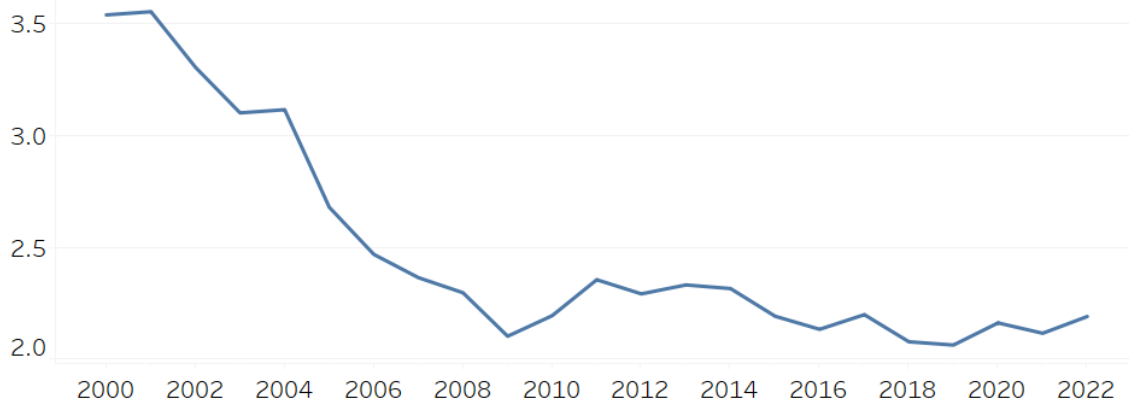
To deal with the heteroscedasticity issues, all models were estimated in the robust form.

Analyses were run in Tableau 2023.2 and STATA 15.

#### 4 RESULTS

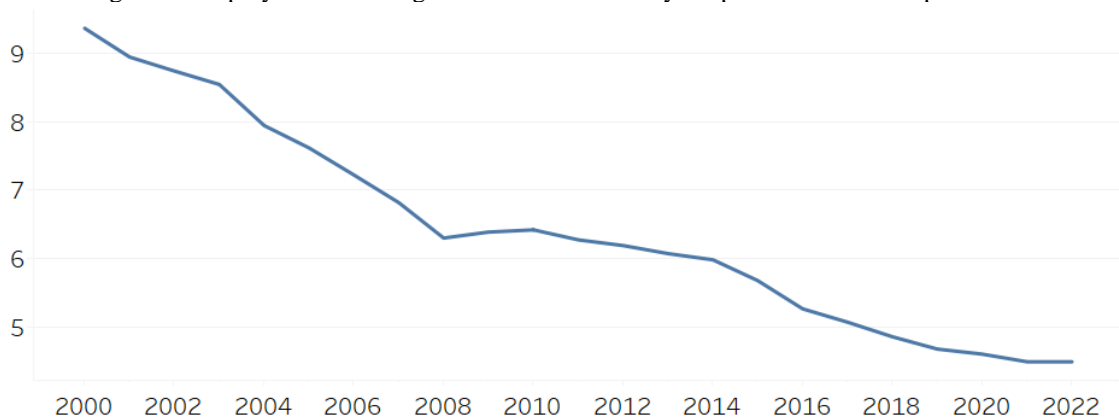
The first step in any analysis is the descriptive one, which, in this case, was conducted based on plots. Figure 1 shows that, in time, the importance of Agriculture in the national economy has decreased, on average, in the European Union member states. The same evolutionary pattern is to be seen the figure 2, in terms of employment in agriculture.

Figure 1. Gross Value Added in Agriculture as a share in the GDP – average evolution in the analysed period for the European Union



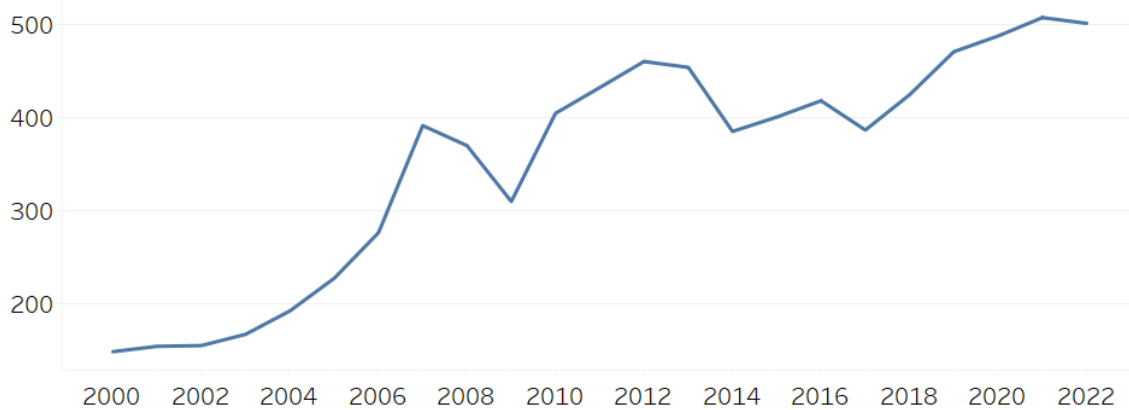
Source: own construction

Figure 2. Employment – average evolution in the analyzed period for the European Union



Source: own construction

Figure 3. EFRD – average evolution in the analyzed period for the European Union



Source: own construction

The development of the rural environment, respectively an efficient use of the funds available in this sense, should lead to the improvement of the conditions in the rural areas. The use of funds leads, in part, to the mechanization of agricultural work, and, implicitly, to the decrease of the labour force involved in agriculture. Both figures confirm the assumptions made previously. While the EFRD trend is upward, both Employment and Poverty are downward trending. Thus, we expect that more complex analyses based on the regression functions will confirm the efficiency of financing for rural development and its positive effect.

As significant convergence processes take place at the EU level, we also present the spatial distribution of the variables in 2022. Maps are centred in the median value to account for heterogeneity.

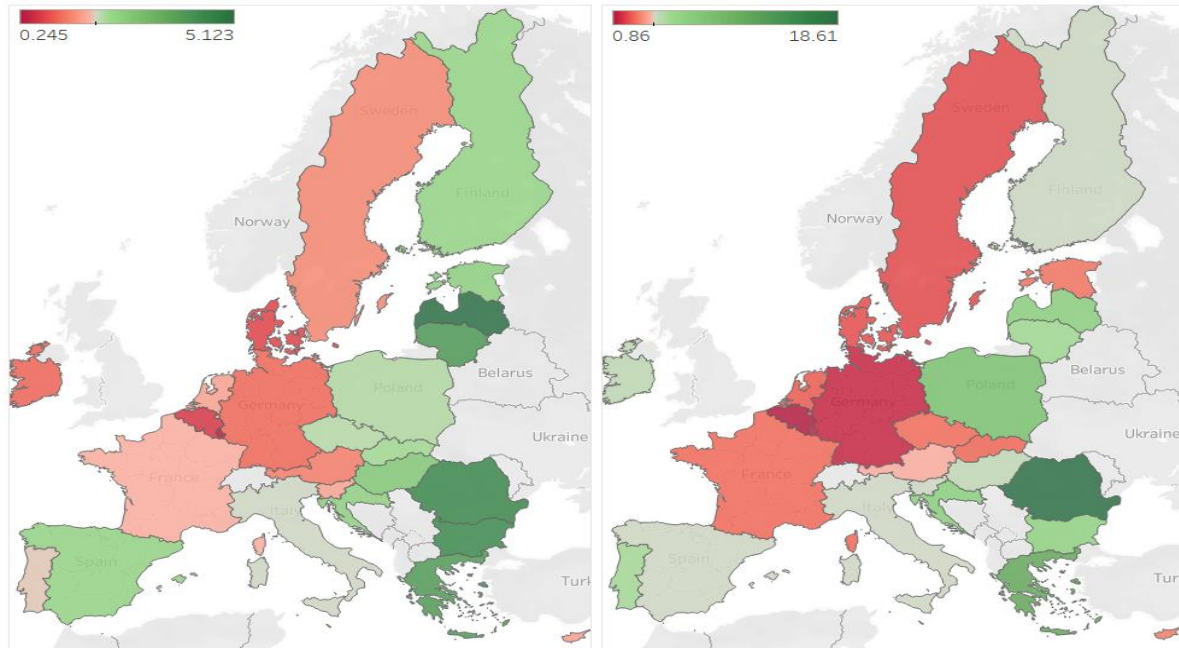
We know that Western members are more developed and have higher GDP values. But when it comes to the importance of Agriculture in the national economy, the spatial positioning is contrary. The more developed a country is, the less important the Agriculture is in the national economy. It is therefore not surprising that Romania and Bulgaria, the countries with the lowest productivity per inhabitant, have the highest share of the gross added value obtained in Agriculture. Finland and Slovakia obtain an above-average share of agriculture in GDP in 2007, and in 2022, Italy also enters this group.

Regardless of the year analysed, Romania is the country in the European Union with the highest proportion of GDP of the gross added value obtained in agriculture. At the same time, it also has the largest share of the labour force involved in Agriculture. From this point of view, figure 4 (right) highlights that, in addition to the Eastern states, Ireland, Portugal and Spain are also in the upper half in terms of the proportion of the workforce that is employed in agriculture. And in the case of this variable, Finland also enters in 2014 in the upper half. Interestingly, Austria, known as a predominantly agricultural country, ranks in the lower half, with a lower than median agricultural employment rate.

In respect to the rural population, the longitudinal clusterization preserves, as shown in figure 5 (left).

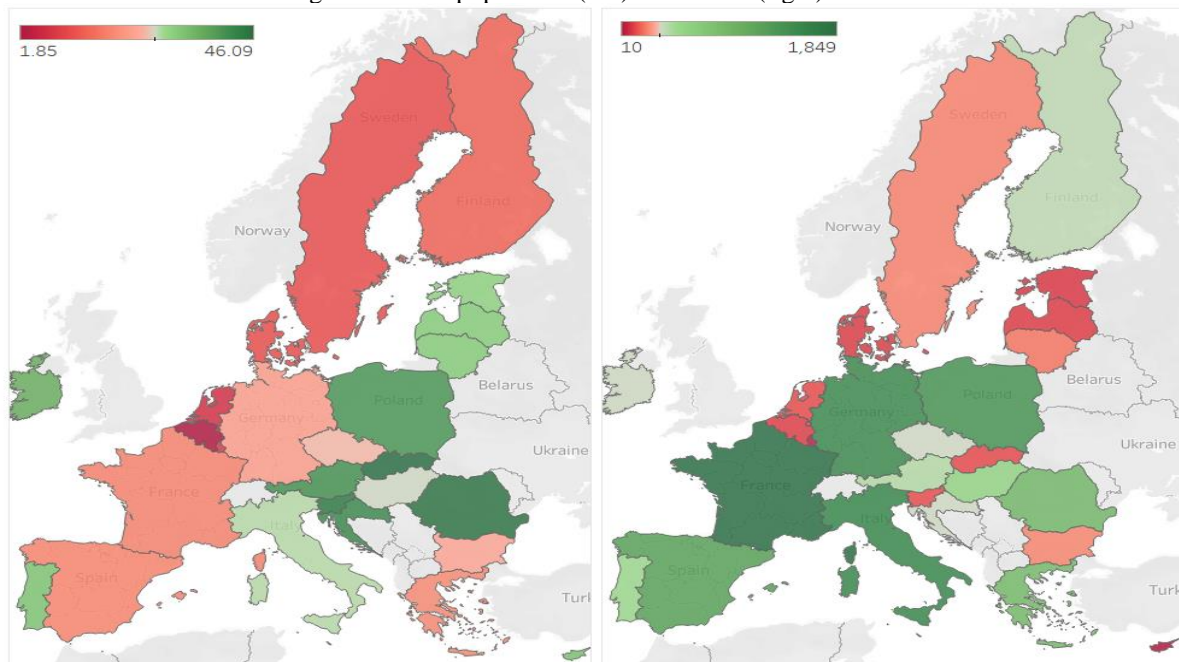


Figure 4. Gross Value Added in Agriculture as a share in the GDP (left) and Employment (right) in 2022



Source: own construction

Figure 5. Rural population (left) and EFRD (right) in 2022

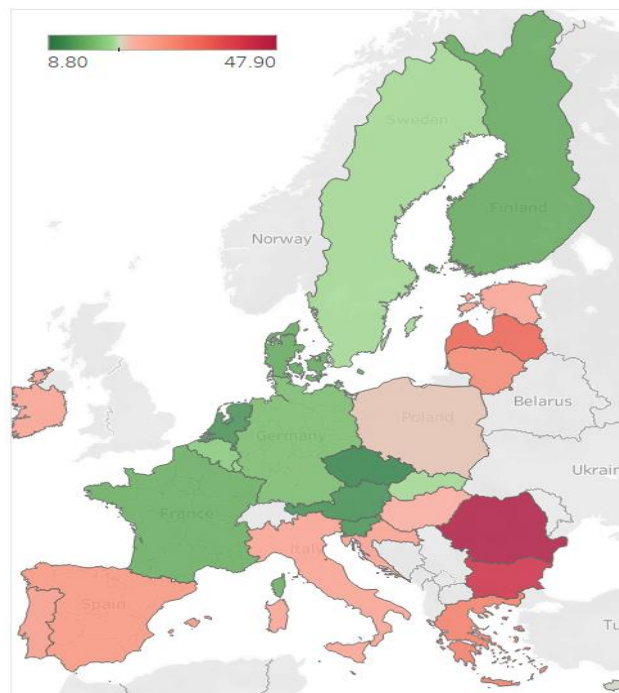


Source: own construction

The basic variable in this research – the main factor - is the one that measures the amounts from the European Agricultural Fund for Rural Development and their predecessors – EFRD. At the beginning of the analysed period, no Eastern European Union state benefited from such funds. These states being in the pre-accession phase, they benefited from other types of financing. The spatial distribution of the EFRD is much less clear than that of the other variables. Thus, in 2007, Poland absorbed the most funds for rural development, while Romania remained behind, just like Bulgaria or Cyprus. Poland is the best performing user, but the situation changes until 2014 for Romania. Thus, Romania is now a beneficiary of the upper

half of the use of rural development funds. The spatial distribution is no longer so clear, nor do we see a clustering process in a certain direction. Efficient users of rural development funds are Eastern and Southern states, as well as old, developed members like France and Germany. It becomes interesting that, in the year 2022, figure 5 shows that the more efficient users are no longer the new, less developed members, but precisely the founding states, such as France and Germany. However, in the year 2022 a clearer grouping is observed, but this time by latitude, with the Nordic countries characterized by smaller amounts used from the EFRD.

Figure 6. Poverty in 2022



Source: own construction

Figure 6 shows that, in 2022, member states with the highest level of rural poverty are the worst performers in terms of economic efficiency and have the largest share of agriculture in the national economy. Once again, Romania ranks first, with the highest rural poverty rate, closely followed by Bulgaria. Additionally, the clusterization process is stable in time.

In the next step we apply the dynamic panel estimation to account for the impact of European funds on rural development.

Table 4. Results of the dynamic panel regression for GVAagri%GDP

| Variable              | Eq. (1.1)         | Eq. (2.1)            | Eq. (2.2)         | Eq. (2.3)         |
|-----------------------|-------------------|----------------------|-------------------|-------------------|
| L1. GVAagri%GDP       | 0.560*** (0.119)  | 0.597***<br>(0.119)  | 0.437*** (0.11)   | 0.523*** (0.134)  |
| EFRD                  | 0.093* (0.053)    | 0.104* (0.06)        | 0.094** (0.047)   | 0.155* (0.088)    |
| L1.EFRD               | -0.257*** (0.050) | -0.264***<br>(0.052) | -0.219*** (0.039) | -0.216*** (0.028) |
| Rpop                  | -                 | -0.020 (0.025)       | -                 | -0.104 (0.072)    |
| GVAcap                | -                 | -                    | -0.557 (0.344)    | -1.072* (0.648)   |
| Constant              | 1.779*** (0.53)   | 2.207** (0.985)      | 7.353** (3.541)   | 14.765* (7.945)   |
| N                     | 621               | 621                  | 621               | 621               |
| No of instruments     | 26                | 26                   | 26                | 26                |
| Wald (p-value)        | 139.46 (0.000)    | 226.15 (0.000)       | 196.89 (0.000)    | 326.15 (0.000)    |
| Arellano-Bond p-value | 0.990             | 0.974                | 0.882             | 0.862             |

Coef.\*\*\* (robust standard error)

\*\*\*, \*\*, \* representative at the 1%, 5%, 10% significance level.

Source: own calculations

Results of the analyses carried out are presented in table 4 when the dependent variable is the share of gross value added in agriculture in GDP, table 5 when the dependent is the proportion of the labour force employed in agriculture, respectively table 6 when the dependent is the poverty rate.

As can be seen in table 4, the current value of the GVA share in GDP in agriculture is directly influenced by its value in the last year, regardless of the specification. Absorbed rural development funds have a positive impact in the same year, but the opposite in previous years.

The introduction of the two control variables into the analysis does not change the main relationships found in eq. (1). The share of the rural population is not a determining factor of the efficiency of the agricultural sector expressed by the share in GDP of GVA obtained in agriculture, regardless of the form of the equation eq. (2) specified. The level of general development, expressed by GVA per inhabitant, is significant at the 10% level only in eq. (2.3).

When the dependent variable becomes the share of the labour force employed in agriculture, the EFRD level is no longer relevant, only its first-order lag, i.e. the value of the amounts for rural development absorbed in the previous year (table 5). Again, Employment in the current year is directly impacted by its value in the previous year. The EFRD also has a direct effect, on average – the rural development funds of the previous year led, on average, to an increase in the level of employment in the following year. Practically, the efficiency of the use of rural development funds at the European Union level is confirmed when the employment rate is used as a proxy. And in this case the main relationships are stable, they do not change when the control variables are introduced. Regarding the latter, their relationship with the dependent variable is also stable. Thus, even in this case the rate of ruralization is not significant, and GVAcap is significant only at the 10% level. The negative coefficient confirms the results of the visual analyses based on maps – the more developed a country is, the less important the agricultural sector is and, implicitly, the labour force involved in agriculture is lower.

Table 5. Results of the dynamic panel regression for Employment

| Variable              | Eq. (1.2)        | Eq. (2.1)           | Eq. (2.2)        | Eq. (2.3)        |
|-----------------------|------------------|---------------------|------------------|------------------|
| L1.Employment         | 0,983*** (0,014) | 1,023***<br>(0,065) | 0,815*** (0,103) | 0,860*** (0,134) |
| L1.EFRD               | 0,116** (0,051)  | 0,153** (0,064)     | 0,220*** (0,085) | 0,266*** (0,092) |
| Rpop                  | -                | -0,032(0,049)       | -                | -0,039 (0,091)   |
| GVAcap                | -                | -                   | -1,981* (1,073)  | -2,013* (1,137)  |
| Constant              | -0,649** (0,326) | -0,165 (0,810)      | 19,338* (11,066) | 20,228* (11,986) |
| N                     | 621              | 621                 | 621              | 621              |
| No of instruments     | 23               | 23                  | 23               | 23               |
| Wald (p-value)        | 10366,6 (0,000)  | 5883,2 (0,000)      | 1344,3 (0,000)   | 3435,4 (0,000)   |
| Arellano-Bond p-value | 0,683            | 0,649               | 0,557            | 0,510            |

Coef.\*\*\* (robust standard error)

\*\*\*, \*\*, \* representative at the 1%, 5%, 10% significance level.

Source: own calculations

Table 6. Results of the dynamic panel regression for Poverty

| Variable              | Eq. (1.3)        | Eq. (2.1)             | Eq. (2.2)         | Eq. (2.3)         |
|-----------------------|------------------|-----------------------|-------------------|-------------------|
| L1.Poverty            | 0,673*** (0,149) | 0,349** (0,166)       | 0,475*** (0,168)  | 0,329* (0,170)    |
| L2.Poverty            | 0,207** (0,099)  | -0,122 (0,133)        | 0,042 (0,726)     | -0,132 (0,134)    |
| EFRD                  | -2,856* (1,489)  | -4,356***<br>(1,420)  | -3,5** (1,457)    | -4,372*** (1,421) |
| L1.EFRD               | 3,060* (1,624)   | 2,326 (1,485)         | 3,62** (1,577)    | 2,570* (1,549)    |
| Rpop                  | -                | 1,541***<br>(0,461)   | -                 | 1,368** (0,557)   |
| GVAcap                | -                | -                     | -5,775** (2,620)  | -1,661 (2,988)    |
| Constant              | 1,147 (1,204)    | -12,266***<br>(4,157) | 68,690** (30,659) | 8,673 (37,898)    |
| N                     | 243              | 243                   | 243               | 243               |
| No of instruments     | 9                | 9                     | 9                 | 9                 |
| Wald (p-value)        | 494,34 (0,000)   | 615,55 (0,000)        | 543,21 (0,000)    | 615,05 (0,000)    |
| Arellano-Bond p-value | 0,535            | 0,463                 | 0,961             | 0,455             |

Coef.\*\*\* (robust standard error)

\*\*\*, \*\*, \* representative at the 1%, 5%, 10% significance level.

Source: own calculations

Replacing the dependent variable with the poverty rate, it is also necessary to introduce the second-order lag of Poverty. Interestingly, over time, past values of the share of the rural population at risk of poverty and social exclusion have a direct impact on future values. This result shows that decreases in the poverty rate over time lead to even larger decreases, again confirming the results of the descriptive analyses. The introduction of control variables makes the second-order lag lose its significance. But the first-order lag remains significant and positive.

The EFRD shows its impact both through the level and through the lag of the first order. The rural development funds absorbed in the same year have an inverse impact on the rural poverty rate, which confirms the fact that rural areas that benefit from more funds reduce their poverty rate. But the coefficient of the first lag of EFRD is negative, but significant only at the 10% level. Member States that absorbed more funds last year are those that have a higher poverty rate this year. As there are opposite signs of the two EFRD components on the rural poverty rate, assessment of their aggregate effect and more complex

investigations are needed.

The relationship between the EFRD and the poverty rate is the least stable. The introduction of control variables causes, in certain cases, the significance of the EFRD first lag to disappear, which shows that, in fact, the stable effect is the negative one - the more funds are used for rural development, the greater the share of the population in the environment rural areas subject to the risk of poverty and social exclusion decreases.

The rate of ruralization is directly related to the poverty rate in the countryside – countries with a larger rural population also have a higher share of those in this environment who are at risk of poverty and social exclusion.

Overall economic performance has a negative impact on the rural poverty rate, but only in the simple model with this control variable.

The results of the built dynamic panel models confirm the relationships between the variables that we detected based on maps, respectively the impact of rural development funds on the development of this environment within the European Union.

## 5 CONCLUSIONS

Results of our analysis clearly point out that, indeed, the usage of structural funds for rural development has had a significant positive impact upon the rural areas in the European Union, satisfying our main analysis goal.

The general development is observed in a continuous decrease in the importance of the agricultural sector in the European economies, with GVA obtained in agriculture having a significant downward trend as a share in GDP - from an average of over 3.5% in 2000, at the beginning of the analysis period, at just over 2% average share in 2022, at the end of the analysed period. Also at a chronological level, as an average at the level of the European Union, the present analysis highlighted a global trend of increasing the amounts used by the member states for rural development. Although more intense fluctuations appear for this variable in certain periods, its upward trend is preserved even during the Covid-19 pandemic.

As stated by the economic theories found in the specialized literature, the employment rate in agriculture is continuously decreasing, from an average of almost 10% in the year 2000, to approximately 4.5% in the year 2022. Thus, we can appreciate that also in this case the previously mentioned theories are validated. One of the main sources of this evolutionary trend is the fact that through rural development, farmers can acquire machinery, thus mechanizing a good part of the work, which makes the labour requirement in agriculture decrease.

Also, in a significant and maintained decrease is the rate of poverty in the rural environment, estimated here by the share of people from the rural environment who are subject to the risk of poverty and social exclusion. This has decreased from an average of over 26.5% in 2000 to approximately 22% in

2022 in the European Union.

Results obtained through the descriptive analyses are validated by the regression models. As expected, the relationships between the variables are not necessarily contemporaneous. This is validated by the need to introduce lags of various orders into the specified dynamic panel models. Thus, including access to rural development funds, it takes time for its effects to manifest. This result is expected, because in any project of this type there is a period of implementation and then the effects begin to be seen.

The regression results show that the gross added value obtained in agriculture as a share in the GDP is directly related to the rural development funds used in the same year, but inversely with those of the previous year. This result confirms the fact that the effective use of rural development funds obviously leads to the development of society, and, implicitly, to the validation of economic theories from the specialized literature that confirm the reduction of the importance of agriculture along with economic development.

The level of employment in agriculture is directly impacted by the rural development funds from the previous year. The source of this result may be, again, the term in which the effects of such investments are seen. Thus, the decrease in the employment rate at the same time as the increase in the level of development and mechanization or technology takes place over a longer period of time, until the investments are actually made and the period of inertial behaviour passes, and the rural environment adapts to the new conditions.

An extremely important result that must be highlighted is the significant inverse relationship between rural development funds absorbed and the percentage of rural people at risk of poverty and social exclusion. Thus, the positive effect of the use of the EFRD and its predecessors on rural development is clearly observed. Through the use of these funds, the share of poor people from rural areas has been significantly reduced in the European Union. This is probably the most important result of the use of European funds, which is fully consistent with the principle underlying structural funds of any kind: the purpose of this European funding is to help poorer countries/regions to reduce the differences between them and wealthier countries/regions.

The relationships remain stable in the presence of the control variables, ruralization rate and GVA per inhabitant.

The results of this analysis are of particular importance, showing the efficiency of European funding for the development of the rural environment. Implicitly, there is a need to continue supporting this type of financing, in order to continue reducing existing gaps between member states and increasing the standard of living in rural areas.

It is, however, of extreme importance the quality of the projects that are implemented, on the one hand, but also the efficiency of the national authorities in supporting these financings for the development of the rural environment.

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