

**ANALYSIS OF THE EFFECTS OF THE STRUCTURAL FUNDS ABSORBED
DURING THE 2007-2013 PERIOD IN THE NORTHEAST REGION OF ROMANIA
USING A COBB-DOUGLAS PRODUCTION FUNCTION**

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Abstract. *A major objective of the European Union was the establishment of the single market. In implementing this important project, several problems were identified. One of the most important was the disparities between the levels of development of the national economies. Because of this the European Commission devised several economic and financial instruments in order to sustain development. One of these tools is represented by the structural funds. This article analyses the effect that the structural instruments had in the Northeast Region of Romania. We chose this area because it registers a lower value of GDP / per capita, compared with other regions. To quantify the effect of this financing instrument two groups of companies were constructed (a group that received support and a group that did not receive assistance) for the two communities a Cobb-Douglas production function was applied and obtained parameters were compared. In Romania during the 2007-2013 period seven operational programs functioned: Sectoral Operational Programme Increase of Economic Competitiveness (SOP IEC), the Regional Operational Programme (ROP), Sectoral Operational Programme Environment (SOP E), Sectoral Operational Programme Transport (SOP T) Sectoral Operational Programme Human Resources Development (SOP HRD), Operational Programme for Administrative Capacity Development (OP ACD) and the Operational Programme for Technical Assistance (OP TA). Among these only the first two (SOP and ROP) were included in this analysis, because only those programmes directly provide financing business (direct grant funding for businesses). In order to apply the production function, the two communities were stratified by the category of enterprise (micro enterprise, small enterprise, medium enterprise and large enterprise – as defined by the Law 346/2004 - on stimulating the establishment and development of small and medium enterprises). Thus in each layer a greater homogeneity was ensured, thus obtained parameters are representative. In the analysis we used a Cobb Douglas production function with neutral technical progress (type Hicks). This version includes in addition to the labour factor and the capital factor, a factor that quantifies technical progress. As a result, the comparative analysis focused on the three parameters (labour contribution, capital contribution and the contribution of technical progress). After analysing the results, slight differences were found between groups. The results led us to conclude that the perceived impact is minor, in many cases public funds being wasted on uncompetitive investments.*

Keywords: *Structural Funds; SOP IEC; ROP; microeconomic analysis; comparative analysis.*

Introduction

In the existing literature the effectiveness issue of grants is widely debated. Particular attention is paid to the European Union and its cohesion policy (a policy based on awarding grants to private and public entities). Researchers and specialists from this area are divided into two streams: Lolos (2009),

Puigcerver-Peñalver (2004) and Reiner (1998) support the efficiency of subsidies while Alexei and Tatimir (2012) and Lammers (2002) argue that subsidies are inefficient.

In their research, the two groups especially use some examples, in favor of grants the following case studies are mainly used: Spain and Portugal, while in the detriment of grants, two examples are used: East Germany and Greece.

With regard to Romania, the literature is not very extensive; there are studies on the extent of absorption, trying to identify the causes of the malfunction. A number of studies (Horvat, 2005; Horvat & Maier, 2004; Jaliu & Radulescu, 2013; Morovan, 2010; NEI Regional and Urban Development, 2002; Oprescu, Constantin, Ilie & Pîslaru, 2006) focus on the issue of the volume of absorbed funds, while researchers such as, Cace, Cace and Nicolăescu (2011), Zaman and Cristea (2011), and Zaman and Georgescu (2009) focus on the impact that these funds have on the economy as a whole.

In this article we intend to realize an analysis from the perspective of the overall economic impact of non-refundable financial aid received by private parties in the North-East of Romania. Analyses were limited to those units, because this area is one of the poorest parts of Romania and because an analysis of the whole country would involve huge resources.

The overall objective of this research is to identify the effect generated by the absorbed grants to the benefiting companies.

The assumptions that we tested in this research are:

H₁ – The absorbed EU grants generated a representative impact on the efficiency of the labor factor.

H₂ – The absorbed EU grants generated a representative impact on the efficiency of the technical capital.

H₃ – The absorbed EU grants generated a representative impact on the implementation of technical progress.

H₄ – The impact of the absorbed EU grants is influenced by the size of the beneficiary enterprise.

Methodology

“In order to determine impacts of structural funds absorption in the business environment of the North-East of Romania, we have examined the financial statements of companies that benefited from this financial support (Șuşu, 2012). Beneficiary companies (group 1) were taken from the reports published by the managing authorities of operational programs (in Romania, in 2007-2013, seven operational programs functioned, of which only two accorded direct grants to firms - Sectoral Operational Programme Increase of Economic Competitiveness and Regional Operational Programme). The financial statements have been taken from the database of the Ministry of Finance. In the analysis two main periods were considered: the period of project implementation (this was analyzed to see immediate changes arising from implementation of the project) and the operation period (this was analyzed to detect short term changes generated by the project)” (Moroşan, 2014, p.108-109).

“In defining the influence of others factors, we selected a sample of companies that have not received financial aid (group 2), which was used as a reference. The sample has the same structure as that of the group of companies that benefited from structural funds. Such an approach (comparison over time and comparisons between groups) is seen in the work of Edward Altman, "Financial ratios discriminant analysis and the prediction of corporate bankruptcy" published in "The Journal of Finance," September 1968.” (Moroşan, 2014, p.109).

“To increase the accuracy of the study, and to have a clearer picture of the situation and structure of the two groups analyzed comparatively, we proceeded to stratify the two collectivities by businesses size.” (Moroşan, 2014, p.109).

Research results

Micro-enterprises

Of the two groups analyzed (group 1 - consisting of companies that have benefited from financial aid and Group 2 - comprised of companies that have not received such aid) we selected only microenterprises (Defined according to Law 346/2004 Romania), and on the data collected a Cobb-Douglas production function was applied. ($Y = K^\alpha L^\beta e^{-\lambda t}$).

Table 1. Comparative Analysis using a Cobb-Douglas production function - micro enterprises

| Indicators | | Group 1 | | Group 2 | |
|---------------------|-----------|--------------|-------------|--------------|-------------|
| R | | .435 | | .615 | |
| R ² | | .189 | | .378 | |
| | | Value | Sig. | Value | Sig. |
| ANOVA | | 14.563 | .000 | 35.603 | .000 |
| Coefficients | | | | | |
| (Constant) | | 10.073 | .000 | 9.381 | .000 |
| Ln_AI | α | .150 | .177 | .177 | .004 |
| Ln_NS | β | .599 | .864 | .864 | .000 |
| Anul | λ | -.038 | .513 | .000 | .998 |

Comparing the results of the two regressions (**Error! Reference source not found.**) we see that the turnover of micro enterprises from group 1 can be explained only in a small proportion ($R^2=18.9\%$) through the three factors of the Cobb-Douglas production function. In the group 2 the value of the determination ratio (R^2) has a bigger value. Moreover, if we analyze the coefficients obtained for group 1, we find that all values are unrepresentative (practically we cannot determine a Cobb-Douglas production function based on data obtained from these companies). If we analyze the coefficients obtained for the micro enterprises for the control group (group 2) we see that these values are normal, similar to the expected results.

Given that in the case of the microenterprises from group 2 we could determine a Cobb-Douglas production function and based on the data from group 1 we were not able to obtain relevant values, we can conclude that in the case of the micro enterprises that have benefited from EU grants, effects are absorbed, but these effects do not seem to materialize as expected (increase productivity of factors – notably of capital and the implementation of next generation technologies, materialized in the form of unincorporated technical progress).

Although these regressions did not allow us to quantify the impact felt by the micro enterprises that have benefited from structural funds, we can appreciate that there is a notable difference between the two groups.

Small enterprises

In a similar manner, from the two groups we selected only small enterprises and on the data obtained was applied a Cobb-Douglas production function.

Table 2. Comparative Analysis using a Cobb-Douglas production function – Small enterprises

| Indicators | | Group 1 | | Group 2 | |
|---------------------|----------|--------------|-------------|--------------|-------------|
| R | | .621 | | .691 | |
| R ² | | .385 | | .477 | |
| | | Value | Sig. | Value | Sig. |
| ANOVA | | 14.563 | .000 | 40.801 | .000 |
| Coefficients | | | | | |
| (Constant) | | 8.841 | .000 | 8.648 | .000 |
| Ln_AI | α | .190 | .027 | .295 | .000 |
| Ln_NS | β | 1.156 | .000 | .783 | .000 |

| | | | | | |
|------|-----------|-------|------|-------|------|
| Anul | λ | -.116 | .032 | -.163 | .001 |
|------|-----------|-------|------|-------|------|

Analyzing the data obtained from the application of the production function in the two groups (**Error! Reference source not found.**) we find that the differences between the correlation ratio (R) and the determination ratio (R^2) are not ample. ANOVA indicated a representative link between the independent and the dependent variables. Analyzing the values of the coefficients we find that they are representative (in all cases Sig.<0.05), but there are differences between the two groups. After adjusting the coefficients (the imposed condition was $\alpha+\beta+\lambda= 1$), we obtain the following values:

- a) for **group 1**: $\alpha=0,130$ $\beta=0,791$ $\lambda=0,079$;
 b) for **group 2**: $\alpha=0,238$ $\beta=0,631$ $\lambda=0,131$.

Analyzing the adjusted values we find the existence of some abnormalities. The first is the unexpected situation encountered for the parameter λ , which describes the effect of technological progress. Normally we expect that businesses from group 1 to submit a higher value (due to the implementation of an investment with financial aid), but we can see that the parameter for the group 2 is 65% higher than in group 1. The results for the parameter α , which describes fixed capital productivity, are also contrary to expectations, the value for group 1 being inferior to that for group 2.

Following this analysis we estimate that the enterprises from group 1 overestimated their investment plans, the economic and financial projections were based on overoptimistic assumptions, which after the project implementation did not occur. The enterprises from group 1 achieved turnovers below their expectations, and thus they did non-use the factors of production to their optimum capacity and therefore the abnormal parameters were recorded.

Medium and large enterprises

In the analysis of medium and large enterprises we have encountered some difficulties due to much lower volume of data.

Table 3. Comparative Analysis using a Cobb-Douglas production function – Medium and large enterprises

| Indicators | | Group 1 | | Group 2 | |
|---------------------|-----------|--------------|-------------|--------------|-------------|
| R | | .739 | | .841 | |
| R^2 | | .546 | | .708 | |
| | | Value | Sig. | Value | Sig. |
| ANOVA | | 20.458 | .000 | 25.010 | .000 |
| Coefficients | | | | | |
| (Constant) | | 11.247 | .000 | 8.324 | .000 |
| Ln_AI | α | .099 | .196 | .364 | .003 |
| Ln_NS | β | .795 | .000 | .573 | .001 |
| Anul | λ | -.064 | .363 | -.110 | .173 |

The volume of the two types of enterprises (medium and large) is much lower than the other two categories. Analyzing the indicators obtained (**Error! Reference source not found.**) we can state that the majority are unrepresentative (Sig. <0.05). The two production functions are functional, both the correlation ratio (R) and the determination ratio (R^2) recorded high values. However, we appreciate that for group 1 only one independent variable (number of employees) is representative, and for group 2, two independent variables (fixed capital and number of employees) are representative.

As for the results obtained in the group 2, they are as expected, because the companies did not implement extensive investments, the main factors explaining the evolution of production are capital assets and the number of employees (α and β registering Sig.<0, 05), the unincorporated technical progress does not influence the dependent variable (λ recorded Sig.>0.05).

As regards to group 1, we would have expected these companies to record an influence from all three factors of production, but the results only confirm the influence of a single factor (number of employees).

This development raises questions about the quality of projects implemented because an important effect of non-repayable financial aid is the transfer of technology (implementation of the latest technology) whose effects are not felt in the case of medium and large enterprises from the North-East of Romania.

Conclusions, limitations and perspectives

The analysis in this paper allowed us to delimitate the effects of projects with EU grant, felt by the benefiting companies. Thus, we identified the existence of many representative differences between the analyzed groups (at the level of turnover and number of employees) that can be attributed to absorption of EU funds.

To increase the accuracy of the study, both groups were stratified by field of activity, but the results were not significantly different from those obtained in the present paper.

In paper we presented a comparative analysis between the results obtained by applying a Cobb-Douglas production function for the two groups; we found no significant differences in the results, this indicates a little effect of the EU funds.

One limitation of this research is that it takes into account only the short term effect of the EU grant. In perspective we will continue to collect data for the enterprises of the two groups and we will continue our research, thereby analyzing the medium and long term effect.

Acknowledgment: This paper has been financially supported within the project entitled „SOCERT. Knowledge society, dynamism through research”, contract number POSDRU/159/1.5/S/132406. This project is co-financed by European Social Fund through Sectoral Operational Programme for Human Resources Development 2007-2013. **Investing in people!**”

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