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Cluster Analysis of the EU Countries in Terms of Labor Market Indicators

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Abstract: Dynamics of main indicators in the EU labor market context reflects that the EU labor market as whole remains tense, and that differs substantially from one country to another. This paper includes an analysis of recent developments in labor market participation, employment, unemployment, education level with special concerning on data disaggregated by age and sex. Paper aims to group the EU countries according to key indicators of the labor market for gaps and similarities identification in order to achieve the objectives of cohesion policies at EU level. To achieve this propose it was used hierarchical cluster analysis method.

Keywords: labor market, cluster analysis method, employment, unemployment, cohesion policies, vulnerable groups.

JEL classification: E24, E19

1. Introduction

A priority of the Europe 2020 strategy is the promotion of an economy with a high rate of employment, ensuring social and territorial cohesion. In this context, the Commission proposed as main objective that 75% of the population aged 20 to 64 should have a job till 2020 year. However, recent dynamics (2010-2013) of the main indicators of the labour market in the European Union reflects the situation across the EU and that remains tense and differs substantially from one country to another.

Following the period of economic crisis which has wiped out years of economic and social progress, changes in the unemployment rate was scored on an upward trend, both in EU and Romania, in 2008-2013 the unemployment rate increased by 3,9p.p. in E.U. and by 1,5p.p in Romania. Although for some indicators have seen some positive signs, such as

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activity rate, which was due mainly to those policies increasing the period of education and less as a result of economic developments. Deterrent effect size for those seeking employment such as young long-term unemployed, people aged but still active on labour market, persons with low education etc. indicates that more acutely manifest structural weaknesses in Europe's economy and Romania.

Once the awareness of active aging EU population and reforming the pension system in crisis and post-crisis remains a question for the public policy reform as a whole in order to stimulate employment of all "ages" and, in particular, young people and seniors.

Labour market activation policies have been developed in recent years in the EU labour markets with common characteristics, taking into account the recommendations made by the European Commission for each country. However taking into account the heterogeneity of national situations, models of integration of young people, women and older workers, considered as vulnerable groups also different, labour market outcomes, employment rates, in part, explain the different dynamics. To understand these differences, the analysis must consider the question of reform policies, the role of institutions and agreements negotiated in the labour market, taking into account the specificities of individual choices and the need to integrate the issue of employment of vulnerable groups in a lifelong learning approach.

European employment strategy makes an effort to stimulate the a converging development around a common way of activation and stimulation of employment, but national employment models differ in their history, their stage of development they are in, the resources they use to implement different measures. They belong to various groups and the transition to a new performance is a process that should be focused by catalytic elements related to political and national institutional construction. The labour market has a national component that can explain the nature of institutional differences between countries.

Regardless of country, there is a specific position of these vulnerable groups in the labour market in most EU countries. Whether it is young workers under 25 years old in most countries they have very high unemployment rates much higher than the other age groups. If older workers employment rates are generally lower than the other groups, their unemployment is lower than that of young people. Women, however, are more inactive due to repeated career breaks and lower employment rates than men.

2. Recent Developments in the Labour Market in Romania Compared to the EU Countries

In this first section we present the synthesis aspects from further analysis of recent developments (2010-2013) of the labour market in Romania, compared to the EU28 countries, making use of existing statistics. The main indicators that formed the basis of this analysis include: activity rate, employment rate, unemployment, long term unemployment. Mentioned indicators were analysed both overall and disaggregated by gender, age, level of education, sector of activity and employment status.

In the period 2010-2013 the activity rate in the European Union has had an upward trend in most member countries. The most significant increases in activity rates were recorded in Malta (7.6% in 2013 compared to 2010), Hungary (4.3%), Czech Republic (3.8%) and Croatia (3.7%). Countries activity rate decreased in this period were Denmark (-1.6%),

Slovenia (-1.3%), Portugal (-0.5%), Belgium (-0.2%) and Greece (-0.2%). Decreases in the activity rate may be due both to the fact that the number of pensioners in the EU ("baby-boom") increased and promoting policies to increase the period of education. In the year 2013, the highest activity rate values are found in central and northern European countries (Sweden 81.1%, Netherlands 79.7%, Denmark 78.1%, and Germany 77.5%). Romania registered in 2013 a fairly low activity rate (64.6%) compared with the average EU28 (72%), although in 2010-2013 has had an increase of 1.5%. This highlights the fact that in Romania the number of inactive people (pupils, students, retirees, home workers, etc.) remains quite high. Romania fits into the trend of Central and Eastern European (except the Czech Republic), who have activity rates below average EU28.

The employment rate is an important indicator for the EU, especially since it was a major objective in the Lisbon Agenda (2000-2010) and stored also in the current Europe 2020 and Agenda 2010-2013. The Member EU employment rate experienced significant decreases especially in southern countries (Mediterranean), which have been most affected by the economic crisis. Thus, in 2013, the employment rate in Greece was 49.3%, falling down to 17.2% from same indicator in 2010, Cyprus was 61.1%, with 4,5pp lower than in 2010 and in Spain and Portugal fell by 6.8% reaching 54.8% and 61.1%. Decreases by more than two percent of registered employment rate, have been recorded in Slovenia and Italy. Given that the target set by the Agenda 2020, the employment rate of 75% (EU28 average) in the year 2013 we see that no country has achieved this goal. States with the highest employment rate in 2013 are those of the northern and central Europe - Sweden (74.4%), the Netherlands (74.3%), Germany (73.3%) and Denmark (72.3%). The EU -28 averages is almost 10 percentage points lower than the target set for the year 2020. Romania has not a very high employment rate (59.7%), where the target assumed for 2020 is 70%, but in the next period we can notice a slight increase of 0, 9 percentage points.

Concerning the age cohort 15-24, the employment rate of most EU Member States declines, indicating that young people were the most affected by the economic crisis and they are a vulnerable group in the labour market. At the level of the U.E.-28, the employment rate for age group 15-24 years decreased from 33.9% in 2010 to 32.3% in 2013. In the analysed period, the southern countries had significant reductions in employment rate among young people - Greece (-41.6%) reaching only 11.9% in 2013; Croatia (-36.9%), falling from 23% to 14.5%, Spain (-32.8%) reaching 16.8% in 2013, Cyprus (-30.4%), Portugal (-21 7%) and Italy (-20.4). Central and Eastern European countries have declined the employment rates - Slovenia (-22.2%), Poland (-8.3%), Bulgaria (-4.5%). The highest rate of youth employment (over 50%) is observed in the Netherlands, Austria and Denmark. In Romania, the employment rate among young people is only 23.5%.

In the EU 28 self-employment rate (self-employed) had a slight decrease in 2010-2013, reaching the 15.4% of total employment. In the year 2013, Romania had the second highest rate of self-employment (31.8%), following Greece (34.9%), indicating that there are a lot of people who feel self-employed, especially in agriculture and services (especially tourism). The Mediterranean and Central and Eastern Europe are those that have the highest rates of self-employment, while continental and Nordic countries have the lowest rates (in 2013 Sweden recorded a rate of self-employment of 5.1%, 5.9% in Denmark and 6% in Luxembourg). We can see that the Baltic countries have among the highest increases in this rate - Estonia has had an increase of 8.4%, Lithuania an increase of 8.2% and Latvia of 0.8%.

Percentage of persons employed on a temporary contract (fixed-term employment contract) of the E.U.-28 had a slight decrease from 13.9% in 2010 to 13.8% in 2013. In Poland and Spain, at least one of four employees had a temporary contract in 2013 and in Portugal there was a similar percentage (21.5%). Among other Member States, the percentage of employees who have worked on the basis of fixed-term contracts ranged from 20.6% in the Netherlands and only 1.5% in Romania. Important variations from one Member State to another regarding the tendency to use fixed-term contracts may reflect, at least to some extent, national practices, supply and demand labour characteristics, employers' assessments concerning economic growth/reduction and the employer's facility to hire or fire.

In the period 2010-2013 the unemployment rate in the EU Member States remained at relatively high levels, continuing to remain a priority in the policies pursued by governments. Average E.U.-28 increased by 1,2percentage points, reaching 10.8%. The most significant reductions in unemployment took place in the Baltic countries - Estonia arrived to reduce the unemployment to half from 16.7% to 8.6%; Latvia decreased by 11.9% reaching 7,6 p.p. and Lithuania decreased of 6 p.p., in 2013, recorded an unemployment rate close to the EU average. In the period 2010 - 2013, countries affected by the economic crisis continued to deepen the unemployment. Greece is the country where the unemployment rate increased by 116%, reaching a high record of 27.5%. Cyprus unemployment has also increased a lot in recent years from 6.3% in 2010 to 15.9% in 2013; other states knew unemployment rate as Spain (26.1% in 2013), Croatia (17.3%), and Portugal (16.4%). Regarding Romania, the unemployment rate of 7.3% (below the EU average) has remained constant.

Analysing long-term unemployment is observed that it has a significant proportion among the unemployed. In the year 2013 the highest rates were recorded in Slovakia (70.2%), Greece (67.5%) and Croatia (63.7%). Romania is found in the top of three countries with the most significant increases in long-term unemployment rate in the period 2010-2013 with an increase of 32.9%, following Poland (36.6%) and Spain (35.7%). At EU level 28 long-term unemployment is rising from 40.1% in 2010 to 47.5% in 2013 This indicates that in EU many people still face serious difficulties in finding work, especially for those who are in long term unemployment. Thus, Member States must do more to stimulate creating jobs and combat social exclusion, particularly through active labour market measures and social investments.

3. Hierarchical Clustering EU28 Countries by Main Labor Market Variables

Based on deeply analysis of recent developments (2010-2013) of the labor market from Romania compared to the EU countries was made clusters of countries from the European Union 28 according to key indicators of the labor market and the share of county in EU28 GDP using the "hierarchical cluster analysis" (HCA), Agglomerative clustering type. This method is a 'bottom-up' in the sense that each observation starts in its own group, and pairs of groups are joined into one, thus moving up in the hierarchy. The Labor market variables selected for development dendrogram were: activity rate, employment rate and unemployment rate, the total dissociated by gender, age and education level. The metrics used for hierarchical clustering was Squared Euclidean distance. The mathematical formula for calculus is:

$$d(C1,C2) = \sqrt{(Ra1 - Ra2)^2 + (Ro1 - Ro2)^2 + (Rs1 - Rs2)^2}$$

Where:

$d(C1,C2)$ = the distance between Country1 and Country2

$Ra1, Ra2$ = the activity rate in Country1 and Country2

$Ro1, Ro2$ = the employment rate in Country1 and Country2

$Rs1, Rs2$ = the unemployment rate in Country1 and Country2

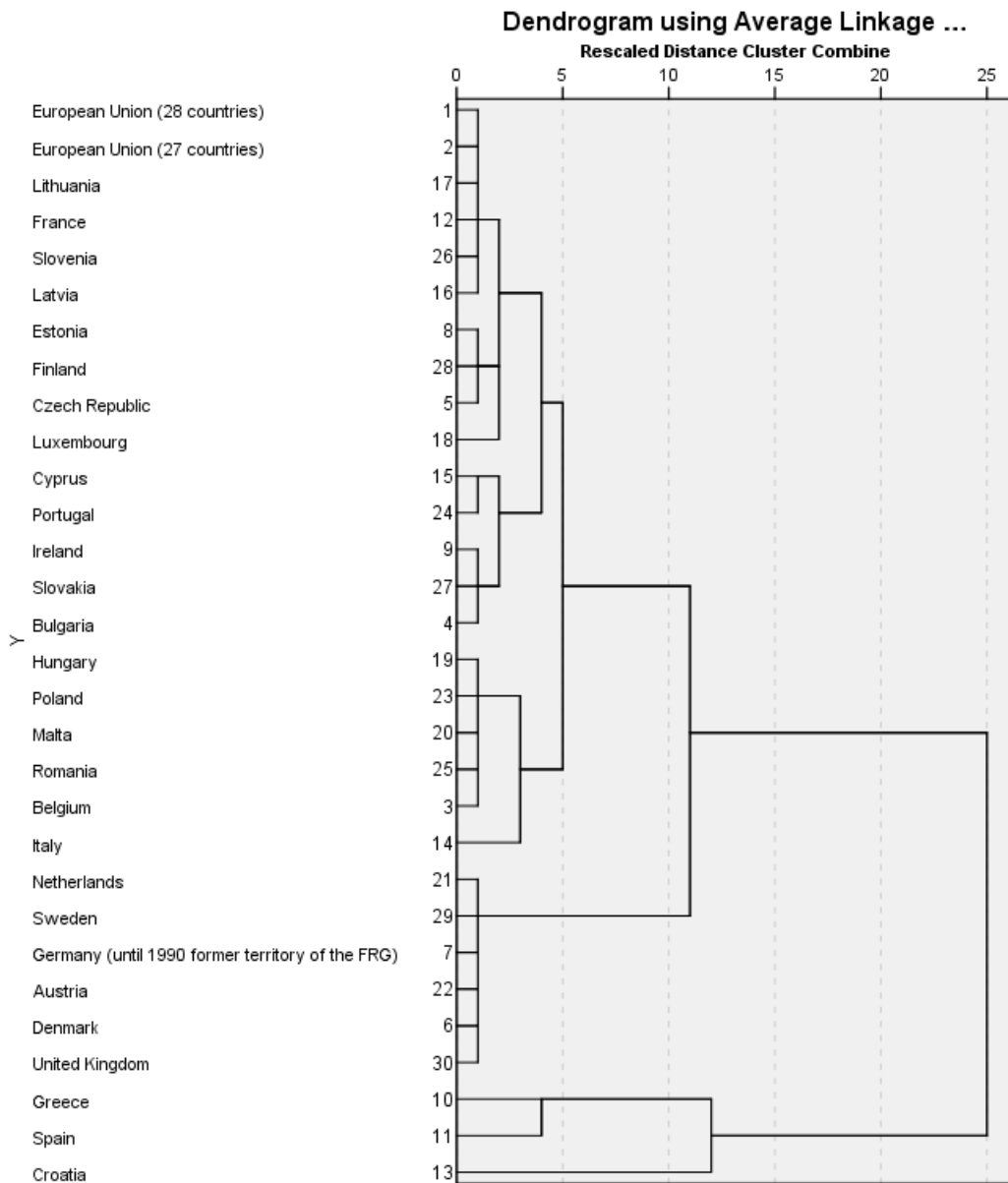


Figure 1: Dendrogram - Clusters

Source: processing authors based on Eurostat, LFS database

Dendrogram analysis for the total population aged 15-64 years, for 2013, showed the following (fig. 1). EU countries have been clustered according to the three selected variables (activity rate, employment rate and unemployment rate) in four clusters as follows: cluster 1 (includes Belgium, Bulgaria, Czech Republic, Estonia, Ireland, France, Italy, Cyprus, Latvia, Lithuania, Luxembourg, Hungary, Malta, Poland, Portugal, Romania, Slovenia, Slovakia and Finland), cluster 2 (including Denmark, Germany, Netherlands,

Austria, Sweden and the UK), cluster 3 (including Greece and Spain) and cluster 4 includes Croatia. In bottom cluster Romania is together with Belgium, Malta, Poland and Hungary, forming the upper cluster together with Italy. For other dendrogram drawn for vulnerable group, Romania is in the bottom cluster, as follows: for women, with Poland and Hungary; for men with Belgium, Poland, Slovenia and France; for young people with Belgium, Lithuania, Czech Republic, Slovenia and Poland; for elderly with Luxembourg, Belgium, Italy, Hungary, Poland and Austria; and for those with ISCED 0-2 education level with Luxembourg and up cluster with Austria and Malta.

If we compare the groupings obtained on the basis of the three labor market variables with groups obtained by the Commission in the analysis of flexicurity models on a total of 22 states (listed in Employment in Europe 2007), we see that the cluster are maintained, with little differences (Greece is not in the same cluster with the countries of East European model, Finland is no longer in the same cluster with countries from Nordic Model, Ireland is not in the same cluster as the United Kingdom, Belgium and France are not the same the cluster of countries from Continental Model and the countries from Mediterranean Model there are in different clusters.

4. The Dynamics of the Labor Market Status of Vulnerable Groups

A separate section is devoted to analyzing the dynamics of the labor market variables dissociated by gender, age and education level. The main issues raised are summarized below.

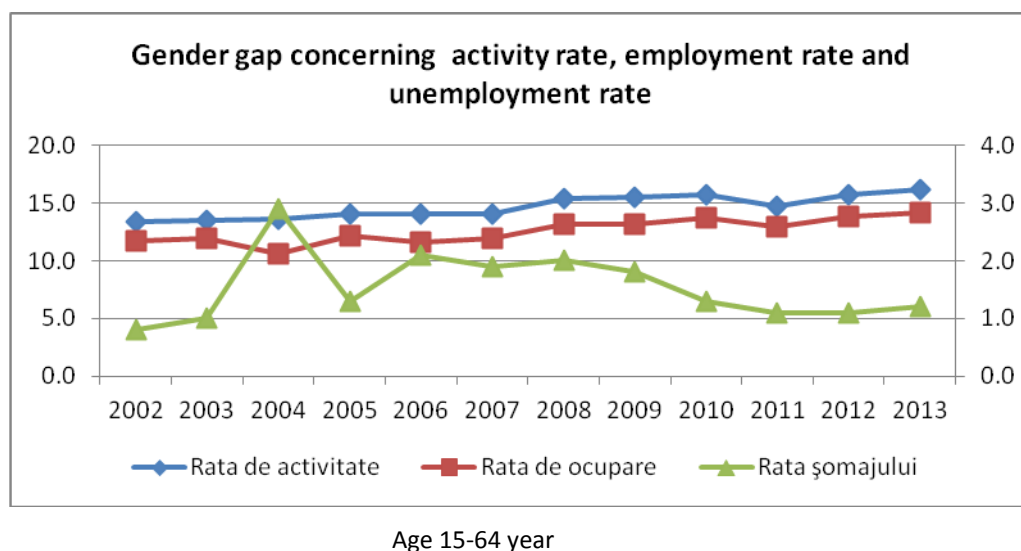


Figure 2: Gender gap concerning activity rate, employment rate and unemployment rate

Source: processing authors based on Eurostat, LFS database

Regarding the employment rate (Chart 1) gender gap curve has an upward trend of 2.8 pp in the period under review, and in 2011-2013 it was 1.2 pp. Both, gender gap curve concerning activity rate and the employment rate registered an upward trend, with a higher growth after 2008, due to lower growth of the indicators of women compared to men. The gap between men and women concerning the employment rate achieve in 2013 of 14.2p.p.and 16.2 p.p. for the activity rate, representing the maximum values in the analyzed period. Gender gap curve concerning unemployment rate is trending downward after 2008, explained by the sharp increase in the unemployment rate for women in this

period. This can be explained by higher employment of women in jobs with higher volatility, which due to the outbreak of the economic crisis led to a further deterioration of the employment of women compared to men. We conclude that despite the measures taken in the period under review to reduce gender gaps concerning employment, continue recorded a deterioration of labor market conditions for women.

The overall activity rate in the analyzed period 2002-2013 had a small increase of 0.4pp in Romania, compared to growth in the EU, the 3,4p.p. Female activity rate decreased from -1,1p.p. between 2002-2013 in Romania, while the EU28 grew by 5,6p.p. If in 2002 the difference of female activity rates in the EU and Romania was 2,8p.p, in the year 2013 reached at 9,5p.p value. For the other periods analyzed, namely 2008-2013 and 2010-2013 increases in Romania for female activity rates were lower than those recorded in the EU, ie 1,3p.p. and 0,7p.p. in Romania and EU 2,3p.p and 1,6p.p. On the other hand, the values recorded for the male activity rate increases in the intervals analyzed. 2013/2008, 2013/2010 and 2013/2002 being superior in Romania, reaching values 2,1p.p.; 1,2p.p. and 1,7p.p., versus to the EU, where the values recorded are 0,2p.p. ; 0,5p.p. and 1,5p.p.

The overall employment rate has increased slightly in Romania for all periods analyzed (2013/2008, 2013/2010 and 2013/2002), respectively 0,7p.p., 0,9p.p and 1,1p.p., while in the EU28 is a decrease with 1,6p.p. for the first interval, due to the negative effects of the economic crisis on employment, a sign that the economic crisis has not been yet fully improved, and for the next two intervals increases were 0,1p.p. and 1,8p.p. Although in the case of Romania, during 2002-2013 there is a decrease in the rate of female employment with 0,2 p.p., between 2010-2013 it increased slightly from 0,6p.p., as compared to the growth registered for the EU28 from the same period. Variation in male employment rate has been positive for all intervals analyzed in Romania, while those registered in the EU are negative, reflecting the EU's recent economic crisis affected mainly the male population.

Unemployment rate continued to rise in the EU 28 in all analyzed intervals, both overall and on female and male. The highest increases were registered for male unemployment rate, taking values 4,3p.p., 1,2p.p. and 2,6p.p. In Romania there were only increases in the period 2013/2008 range, values recorded were lower than those recorded in the EU28 both overall and for male and female.

Despite efforts, young people face severe difficulties in finding jobs in several EU Member States, the evolution of the employment rate indicating a decrease for all time intervals, including Romania. This is due to low or no experience; employment, especially with unstable employment contracts, such as fixed-term or part-time, which involves limited access to unemployment benefits; transition from school to work is often very difficult and that youth entering on the labor market tend to leave education early. Lack of employment opportunities is an additional burden for those who have not managed to find a job. The older workers employment rates are generally lower than in the other groups, but often higher than the young case.

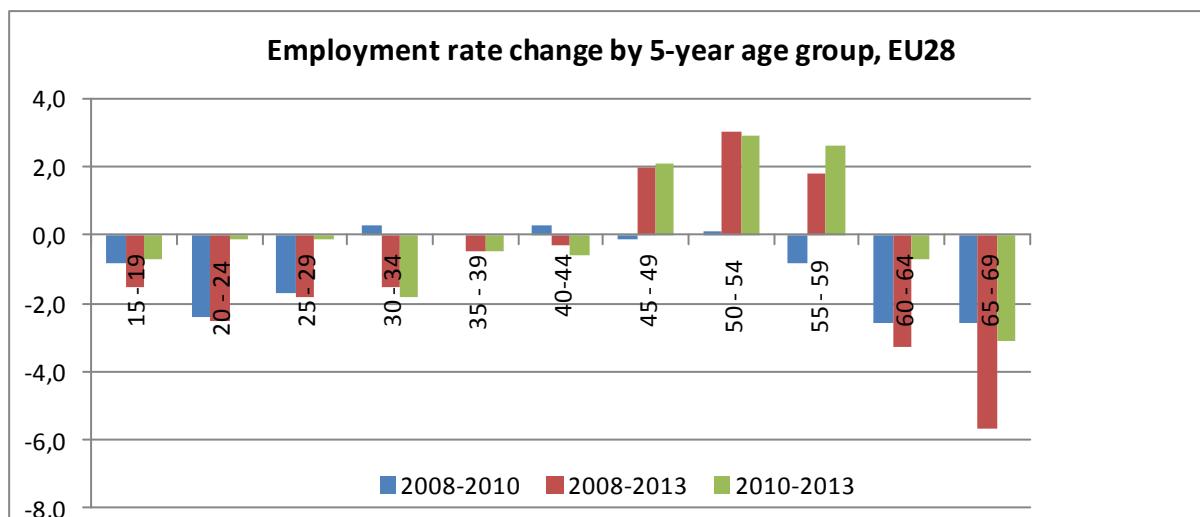


Figure 3: Employment rate change by 5 years age group, EU28

Source: processing authors based on Eurostat, LFS database

Conclusion

Cluster analysis based on the three variables of the labor market indicates three clusters and one singleton. The country outlier in our analysis is Croatia which has the lowest employment rate of EU28 countries, is the second country with the lowest activity rate and the third country with the highest unemployment rate. Best placed on the labor market are countries in cluster 2, respectively Sweden, Nederland, Austria, Germany, Denmark and United Kingdom. The cluster 3 includes Greece and Spain, countries which have negative values of the analyzed indicators, respectively, highest unemployment rates, employment rates among the lowest EU28 values and average values for activity rates.

In recent decades, efforts have been made in all EU Member States so as to combine the entry on the labor market of the youth with retention in the activity of the older persons, reconciliation of private and professional life and equal opportunities on the labor market for women. There is a specific position of vulnerable groups in the labor market in most EU countries.

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