

## **Education, innovations and development of local markets in CEE countries: problems and perspectives**

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### **Abstract**

This paper presents brief results of the analysis of educational potential dynamics and its relation with development of regional labour markets. The educational potential is described by the structure of the economically active population with different levels of education. The aim of the research was to study the impact of the educational potential of the economically active population on the development of regional markets in Central and Eastern Europe (CEE). Authors used for research the Eurostat data for

the NUTS2 regions of the following CEE countries: Austria, Czechia, Germany, Hungary, Poland, and Slovakia. Analysis of the distribution of educational potential of the economically active population of these CEE countries at the regional level was carried out using the methods of spatial econometrics and statistics. Research results demonstrated: insufficient response of local markets to changes in the structure of educational potential and the level of investment in fixed assets; strong state regulation of the unemployment rate in the former post-socialist countries (Czechia, Poland, Hungary, Slovakia); complex relationships between labour productivity growth rates, average wages, changes in educational potential and unemployment rates; significant influence of the surrounding regional environment on the socio-economic processes taking place in certain regions.

**Keywords:** Central and Eastern Europe, spatial econometrics, innovations, labour market, educational potential.

## **Edukacja, innowacje i rozwój rynków lokalnych w krajach Europy Środkowo-Wschodniej: problemy i perspektywy**

### **Streszczenie**

Niniejszy tekst skrótowo prezentuje wyniki badań dynamiki potencjału edukacyjnego i jego związku z rozwojem rynku pracy. Potencjał edukacyjny przedstawia struktura ludności aktywnej zawodowo o różnym poziomie wykształcenia. Celem badań była analiza wpływu potencjału edukacyjnego ludności aktywnej zawodowo na rozwój rynków regionalnych w Europie Środkowo-Wschodniej (EŚW). Autorzy wykorzystali do badań dane Eurostatu dla regionów NUTS2 następujących krajów Europy Środkowo-Wschodniej: Austrii, Czech, Niemiec, Węgier, Polski i Słowacji. Analizę rozkładu potencjału edukacyjnego ludności aktywnej zawodowo tych krajów na poziomie regionalnym przeprowadzono z wykorzystaniem metod ekonometrii przestrzennej i statystyki. Wyniki badań wykazały: niewystarczającą reakcję rynków lokalnych na zmiany w strukturze potencjału edukacyjnego i poziomie inwestycji w środki trwałe; silną regulację państwową stopy bezrobocia w byłych krajach postsocjalistycznych (Czechy, Polska, Węgry i Słowacja); złożone zależności między tempem wzrostu wydajności pracy, przeciętnymi płacami, zmianami potencjału edukacyjnego a stopami bezrobocia; znaczący wpływ otaczającego środowiska regionalnego na procesy społeczno-gospodarcze zachodzące w poszczególnych regionach.

**Słowa kluczowe:** Europa Środkowo-Wschodnia, ekonometria przestrzenna, innowacje, rynek pracy, potencjał edukacyjny.

One of the key problems of the EU countries is to increase the competitiveness of national economies and the employment of the economically active population. These goals were proclaimed in many documents of the European Commission, including the well-known *Lisbon Strategy* (see: Benova et al. 2013; European Commission 2005, 2008). In the same time, in the Member States, the regional disproportions in the distribution of labour potential with different levels of education are observed (see: Benova et al. 2013; Blaskó et al. 2021; Eurydice 2007).

For instance, for many EU countries, there are significant differences in the distribution of labour resources with higher education in different age groups. For example, in Poland,

a higher percentage of the labour force with higher education in the 24-29 and 30-34 age groups has recently been observed. A rather high percentage of labour resources with higher education is noted in the age groups of 24-29 and 30-34 years in Sweden, Denmark, the Netherlands, Ireland, France, and Cyprus. In Germany, Austria and Italy, the labour force with higher education in these age groups is significantly lower than, for example, in the Scandinavian countries, Great Britain or Ireland. Rather low rates of the population with higher education in all age groups are observed in Greece, Spain, Portugal, Bulgaria, Romania (Blaskó et al. 2021; Eurydice 2007; European Commission 2012).

The calculation of the coefficients of variation of the population with higher education in different age groups for the EU countries demonstrated that in the age groups of 24-29 years and 30-34 years the fluctuation rates of the population with higher education are less than 30%, while in other age groups the fluctuation indicators exceed 30% (see: Benova et al. 2013; Blaskó et al. 2021). The indicator of the percentage of the population with higher education is not only the indicator that characterises the level of training of labour resources, their knowledge and competencies. Firstly, in the Member States there are quite strong differences in higher education systems and mechanisms for their financing. Essential peculiarities in the national education systems exist in the content of educational programmes, methods and forms of teaching, admission criteria, etc. (Blaskó et al. 2021; Cedefop 2020; Eurydice 2007; European Commission 2013; Madelin, Ringrose 2016; Rayevneva et al. 2010).

In addition, there is a steady trend of migration of the young and middle-aged population with higher education from countries where the standard of living is lower to countries with higher living standards. Also, recently there has been a flow of graduates from other countries (Eastern Europe, Russia, China), who are striving to get a more prestigious education and work in Western Europe (Blaskó et al. 2021; Cedefop 2020; Eurydice 2007; Madelin, Ringrose 2016). All these factors have an impact not only on the distribution of educational potential in the EU countries, but also in its various characteristics. In most EU countries, the following situation is observed: graduates of the humanities sciences prevail, while the popularity of technical, fundamental and natural sciences, as well as scientific research is low (Eurydice 2007; European Commission 2012). Thus, in Romania, Slovenia, Latvia, Bulgaria, Cyprus, the percentage of graduates who have received higher education in the field of social sciences, business and law is higher than in other EU countries. The highest rates of graduates, who have received higher education in the field of scientific research, mathematics and computer science, were observed in the UK and Germany. As for graduates with higher education in the field of technical sciences, production and construction, the leader here is Finland, where this indicator significantly exceeds the level in other countries. However, relatively high percentages of graduates with higher education in these specialties are observed in Sweden, Austria, Portugal and Romania. With regard to the distribution of graduates with higher education, for all EU countries there is a higher proportion of graduates, who have received diplomas in medical specialties or social protection. The highest rates of graduates with higher education in this area are observed in Sweden and Denmark. The percentage of university gradu-

ates in agriculture and veterinary sciences is traditionally low in all EU countries (Eurydice 2007; European Commission 2012).

Significant differences in the distribution of graduates with higher education in various specialties in the EU countries can be explained by many factors:

- the strengthening of the humanitarian direction of training in secondary schools compared to basic knowledge in the field of natural and exact sciences;
- the prestige of economic, financial and legal specialties due to higher salaries;
- declining interest of young people in scientific research and the career of a scientist.

This situation in the market of educational services is facilitated by the situation in the labour market, especially in countries with relatively low level of incomes and wages. For example, in Slovakia, as well as in other former post-socialist countries, there are significant disparities in the level of wages of specialists with higher education. At the same time, the lowest wages are observed in the field of education, scientific research, pedagogy, culture. And the highest level of wages is in the field of information technology, pharmaceutical industry and management (Eurydice 2007; European Commission 2012; Madelin, Ringrose 2016).

In addition, large disparities in average wages within EU Member States and higher wages in areas, that do not require special skills and higher education in richer EU countries, attract labour migrants with different levels of education. Therefore, in countries with higher incomes, it is much easier to find a fairly well-paid job (by the standards of this country) for a foreign specialist with a higher education and knowledge of foreign languages. For example, the candidates from Asia or Eastern Europe, even if they have good education, can look for simple jobs, which are need in labour markets and are not requiring a high level of education. This situation on the labour markets in Western Europe can be explained both by institutional barriers and methods of protecting domestic labour markets, and their inflexibility to changes associated with various challenges. In particular, the flow of highly skilled labour force, which Western labour markets are not able to effectively use due to for the relatively low growth of jobs in the field of innovative production and services. Significant problem for the effective use of the external influx of highly skilled migrants are bureaucratic barriers, highly regulated labour market, which ultimately leads to a decrease in the competitiveness of Western European markets and a reorientation of both investors and a mobile skilled workforce towards fast-growing and developing Asian markets.

This problem is especially relevant for the countries of Central and Eastern Europe (CEE), where the most acute problems are the issues of border and cross-border migration of the economically active population, especially young people and middle-aged people, with different levels of education and professional skills. The economic and social regional policy in these countries does not sufficiently take into account structural imbalances in labour markets and emerging trends, which is manifested in poor adaptation of labour markets to current and future changes (Cedefop 2020; Eurydice 2007; European Commission 2005, 2012; Madelin, Ringrose 2016).

## The aim, research materials and indicators

The aim of our research was to analyse the impact of the educational potential of the economically active population on the development of regional markets in selected CEE countries. The research tasks were:

- 1) to study the spatial distribution of the educational potential of the NUTS2 regions of selected 6 CEE countries;
- 2) to analyse changes in the educational potential of the economically active population in the regions of these countries;
- 3) to analyse the influence of the educational potential of the economically active population on the level of development of regional labour markets, characterised by such indicators as labour productivity, average wages and unemployment.<sup>1</sup>

Eurostat data for the NUTS2 regions of several CEE countries (Austria, Czechia, Germany, Hungary, Poland and Slovakia) was used as research material. The choice of these countries can be explained by the fact that they have common borders, represent a group of countries with both developed social market economies (Germany and Austria) and post-transformation countries (Czechia, Hungary, Poland and Slovakia).

For this research, data from Eurostat was selected to characterise the level of educational potential of the economically active population. We also use the main indicators that determine the level of development of labour markets, such as: labour productivity, average wages and unemployment.

The educational potential is described by the structure of the economically active population with one or another maximum achieved level of education. There are three main levels:

- ED02 – the proportion of the economically active population with incomplete and secondary levels of education;
- ED34 – the proportion of the economically active population with an education above secondary, but not higher;
- ED56 – the proportion of the economically active population with first and second levels of higher education (Benova et al. 2013: p. 25).

Analysis of the distribution of the educational potential of the economically active population of selected CEE countries at the regional level was carried out using the methods of spatial econometrics and statistics. There have been some changes in the spatial distribution of the share of the economically active population with an education level of ED02 in the NUTS2 regions of the studied CEE countries. Based on the analysis of results of the spatial distribution of the shares of the economically active population with education levels ED02, ED34 and ED56, it can be assumed that the distribution of groups of regions with higher or, conversely, lower values of these indicators is not random. To test the assumption about the non-random nature of the distribution of regions with different educational potential we use the values of Moran and Geary statistics (see:

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<sup>1</sup> See more about these indicators in publication: Benova et al. 2013.

Benova et al. 2013; Suhecki 2010). The Moran and Geary coefficients are usually used to estimate the degree of spatial autocorrelation and determine its nature (positive spatial autocorrelation of values or negative). Taking into account the identified spatial effects in the distribution of the educational potential of the economically active population for 84 NUTS2 regions of 6 CEE countries, it is important to analyse the impact of educational potential indicators on the state of regional labour markets and study their changes in connection with changes in educational potential and other factors. Two different specifications of spatial econometrics models, known as the *spatial lag model* and the *spatial error model*, were chosen to investigate causal relationships.

The various specifications of spatial econometric models were built and tested to assess the impact of the educational potential of the economically active population on the state and development of regional labour markets. For the data of 2002 and 2007, a spatial lag model was obtained that explains the dependence of labour productivity in 84 NUTS2 regions of 6 CEE countries on indicators of the structure of educational potential and additional factors, such as the level of investment in R&D per employee and the level of capital-labour ratio.

## Brief results and conclusions

The research demonstrated that in addition to the influence of exogenous factors, the indicator of labour productivity is affected by the situation in neighboring regions. Due to the possibility of transferring new technologies and using mobile human resources in regions surrounded by more successful neighboring regions, additional externalities are created and they increase labour productivity. Conversely, less favorable conditions of the economic and social environment give less chances for the development of a certain region. For such regions more internal or external interventions are required to achieve the economic development.

Thus, the calculation with application of methods of spatial statistics demonstrated the non-random nature of the spatial distribution of the educational potential of the economically active population in the NUTS2 regions of the countries of Central and Eastern Europe (namely: Austria, Germany, Hungary, Poland, Czechia, and Slovakia).

Despite significant disproportions in the distribution of indicators of the educational potential of the economically active population, explained by both regional and country specifics, in the spatial distribution of indicators of the educational potential of the economically active population, phenomena of moderate spatial autocorrelation are observed.

This means that regions with higher rates of educational potential of the economically active population are surrounded by regions with higher values of this indicator. The spatial nature of the distribution of key indicators characterising the situation in labour markets and the peculiarities of their development leads to the need to use the apparatus of spatial econometrics. These methods make it possible to take into account both the influence of neighboring regions and the shocks arising in them on the state and development trends of regional markets.

On the basis of the developed models of spatial econometrics, which characterise the situation in regional labour markets and their development trends in the studied CEE countries, the following problems were identified:

- insufficient response of local markets to changes in the structure of educational potential and the level of investment in fixed assets and research and development developments;
- strong state regulation of the unemployment rate in the former post-socialist countries (Czechia, Poland, Hungary, and Slovakia);
- complex relationships between labour productivity growth rates, average wages, changes in educational potential and unemployment rates;
- significant influence of the surrounding regional environment on the socio-economic processes taking place in certain regions.

It should be noted that the study of the prospects for the development of educational potential in the regions of the countries of Central and Eastern Europe is an important task. Recently, due to the flows of migrants and certain demographic trends, the faster development of certain sectors of the economy, the structure of the educational potential has changed in certain regions of the mentioned countries. In this regard, it is necessary to consider various scenarios for the development of educational potential and the prospects for its formation in the medium and long term.

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