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Original Scientific Article

Education, Unemployment and Labour Market Imbalances: a Statistical Overview

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Abstract—**This paper examines labour market imbalances in selected Central and Eastern European (CEE) and Western Balkan countries over the period 2010–2024. Several harmonised indicators are analysed to illustrate labour market dynamics and to identify differences and divergent trends between countries. For labour force participation rates across educational levels, no consistent trends are observed across countries, even when grouped. The relationship between job vacancy and unemployment rates indicates that Czechia is the only country where the job vacancy rate exceeds the unemployment rate for almost the entire period, while data for Romania show declining trends for both indicators. North Macedonia displays the largest discrepancy between these two labour market indicators.**

Keywords - job vacancy rate, labour market inequalities, structural change

I. INTRODUCTION

Imbalances in the labour market caused by structural unemployment or by the mismatch between the training completed and the occupation at the current workplace are the subject of numerous analyses and apply to all economic regimes. Economically observed imbalances in the labour market can suppress productivity, fuel inflationary pressures, negatively affect competitiveness and slow down economic development. This paper examines factors such as the level of education of the current labour force, the unemployment rate and possible imbalances in the labour markets of Central and Eastern European (CEE) countries that are members of the European Union (EU) and the Western Balkan (WB) countries that are aspiring to become members of the Union. This type of analysis is important not only because of the comparison between the two groups of countries, but also due to the fact that institutional change in the latter group of countries is much slower and the data that would allow monitoring of market adjustments and feed policies are generally not available to the extent that it should be.

As Eurostat has long annual data series from the EU Labour Force Survey (EU LFS), statistical trends can be observed which can be used to track changes in the educational structure of both the workforce and, in particular, the employed and unemployed. Changes in the educational structure can testify to the complexity of developments in the labour market and the demands of the economy itself, but also to trends in the development of human capital, the readiness of economies to cope with technological progress, but also to the most modern challenges related to the digital and green transitions, as one of the dominant European challenges today.

Three main causes of structural imbalances in the labour market are the geographical location of work, a lack of or insufficient qualifications and a lack of professional experience. These factors have long influenced the labour market in industrialised countries [1]. The analysis of the labour market situation in the CEE countries before their accession to the EU showed that the introduction of institutional employment protection standards in the CEE countries had a positive impact on employment and labour market participation, while the stricter

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employment protection legislation in the developed countries had a negative impact on employment and labour market activity [2]. From the point of view of labour market functioning, it has been helpful that all developed countries are rapidly improving employment opportunities in the formal sector and contributing to better economic performance.

Since structural imbalances can be observed due to the discrepancy between the supply and demand for labour, various factors dominate the explanation of these differences. On the labour supply side, the main reasons are changes in the composition of the labour force, in particular the entry of young people and women into the labour market, as well as demographic changes due to the ageing of the labour force [3-5]. It is assumed that these changes can contribute to structural imbalances. On the labour demand side, changes in the regional and sectoral composition of employment over time may indicate structural imbalances [3,4,6]. From a long-term perspective, this paper analyses structural imbalances in the labour market by observing trends in the educational structure of the labour force, their effects on the development of unemployment, and the determination of (im)balance in the dynamics of unfilled vacancies. There is also extensive theoretical and empirical background on the potential impact of educational attainment on labour market status throughout the lifespan of an economically active individual [1,2,4]. Taken together, education reduces unemployment and allows for higher wages for a more educated workforce (counteracting wage compression), and produces positive effects when wage growth is matched by productivity growth. For example, the female workforce, whose educational structure in certain occupations is superior to that of men, can significantly enhance competitiveness and potentially stimulate the creation of job vacancies, especially in the service sector during periods of economic growth. However, it can also result in job losses during times of crisis, as demonstrated by the recent impact of Covid-19 and previous institutional shocks (former transitional economies).

The structure of the paper is as follows. After the introductory remarks, the selected literature is reviewed, and the relevant empirical results are discussed. In a separate section, the methodological approach and the data used are explained, followed by a discussion of the results. The paper ends with basic conclusions.

II. Literature Review

Despite the changes in the global economy, mainly caused by technology and demographic shifts, the problems of the single labour market take up most of the research presented in the recent literature. Some of the literature deals with the overqualification of university graduates and compares their chances on the labour market with those of secondary school graduates. In addition, labour market imbalances are examined on the basis of situations in labour markets characterised by skills shortages, the ageing of the workforce or lower labour market participation of older or younger cohorts of workers. Sometimes labour market imbalances are examined on the basis of gaps in the geographical or sectoral allocation of jobs.

Technologies can not only lead to a higher demand for skilled labour and promote regional mobility, but also encourage mobility between different employment relationships, pushing more people into self-employment [7]. The opposite can be expected if labour-saving technologies are introduced in industry and the service sector, affecting the low-skilled workforce and increasing potential unemployment in this group of low-skilled occupations [7,8].

In recent years, the discrepancy between educational qualifications has been one of the most studied problems in European labour markets. This problem first emerged in the old EU countries, characterised by immigrant workers who were seen as less adaptable to the challenges of geographical mobility and the mismatch between supply and demand in the labour market, caused primarily by over-education. Later, however, this problem was seen as one of the challenges of labour markets in CEE countries after EU accession. Nowadays, this is a general problem of the EU labour market [5,9,10].

In the study of imbalances in the European labour market, particular attention is paid to the analysis of job polarisation and the mismatch between skills supply and demand, where job polarisation is seen as a situation in which the structure of jobs has shifted according to the skills required, so that the share of high-skilled and low-skilled jobs has increased at the expense of a reduction in the number of jobs requiring intermediate skills [4]. On the contrary, an analysis of the labour markets of the Western Balkans revealed that the projection of labour

market demand by occupational structure indicates the possibility of labour shortages in low-skilled occupations and labour surpluses in some high-skilled occupations [6]. Considering that spatial dimension is important for studying labour market outcomes, some analyses have identified the determinants of overqualification and found that geographical location is inversely correlated with the mismatches caused by overqualification, meaning that employment in larger regions reduces the likelihood of being overqualified in the current job [11].

There are also some conservative studies showing that labour mobility has only a limited impact on labour market imbalances in the euro area [12], which confirms some earlier findings showing that labour mobility cannot be a pervasive mechanism of structural reforms in the EU labour market [13]. Very important is the theoretical constellation that assumes that labour migration can solve the problem of regional imbalances, e.g. in unemployment, but as empirical studies show, the differences between regions do not have enough power to statistically explain migration decisions, set out the theory without adequate empirical evidence [14]. In the context of a developing country, vocational training can significantly improve the mismatch between skills supply and demand and remove regional disparities [15]. Smart hiring decisions by firms also help to reduce the potential imbalances at the micro level [16]. Looking at the Western Balkan countries in the context of the importance of migration as a factor of labour market imbalance, some empirical studies find that migration decisions are statistically significantly determined by the return on human capital, suggesting that European countries with a higher potential premium are more attractive [17].

III. METHODOLOGY

In this paper, the EU Labour Force Survey is used as the primary data source for the analysis presented. Using these data, three broader groups of indicators are analysed:

- Labour force participation rate by educational attainment, with education levels grouped according to the 2011 International Standard Classification of Education (ISCED) as follows: less than primary, primary, and lower secondary education (ISCED 0-2); upper secondary and post-secondary non-tertiary education (ISCED 3-4); tertiary education (ISCED 5-8).

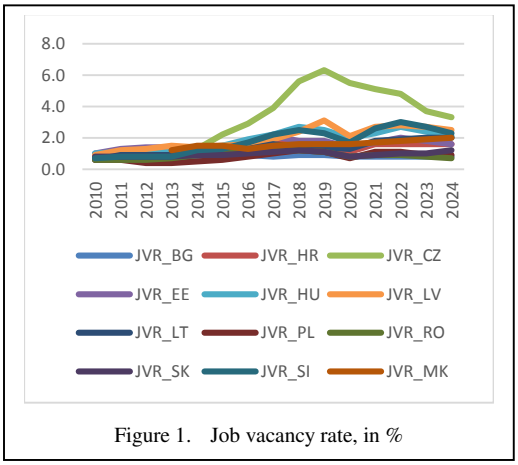

Figure 1. Job vacancy rate, in %

- Unemployment rate (UN) by educational attainment, using the same 2011 ISCED codes.
- The job vacancy rate (JVR) refers to annual averages and is calculated as a percentage of job vacancies in the total number of occupied jobs and the total number job vacancies in each time unit. It is provided for all NACE Rev. 2 activities, excluding the activities of households and extra-territorial organisations and entities [18].

The sample is divided into two groups of countries: 11 CEE countries-Bulgaria (BG), Croatia (HR), Czechia (CZ), Estonia (EE), Hungary (HU), Latvia (LV), Lithuania (LT), Poland (PL), Romania (RO), Slovakia (SK), and Slovenia (SI). The WB countries include four countries: Bosnia and Herzegovina (BA), Montenegro (ME), North Macedonia (MK), and Serbia (RS). The WB countries are selected based on data availability. EU LFS data for Albania are not provided [18]. The time span covers 15 years, from 2010 to 2024.

In the sample of $n_1 = 11$ CEE countries that are members of the EU, only Czechia and Croatia provide administrative data on job vacancies, while all other countries use specially tailored surveys for data collection. In the WBs ($n_2 = 4$), job vacancy data are provided only for North Macedonia; for Serbia, the first edition of data has not yet been published.

The results presented in this paper are obtained using comprehensive statistical

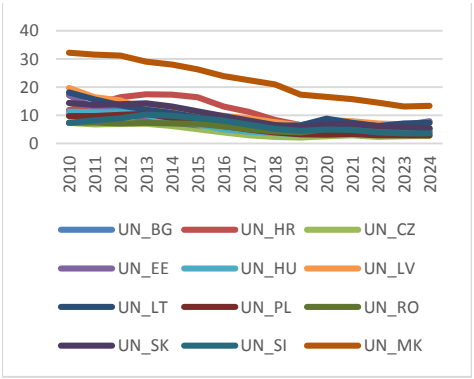

Figure 2. Unemployment rate, in %

descriptive analysis by examining trends in the development of selected labour market indicators for both individual countries and groups of countries. In addition to the statistical descriptive analysis, correlational analysis is applied to provide insights into the direction and strength of the relationship between job vacancy and unemployment rates. All data are used on an aggregate basis, representing annual amounts expressed in either absolute or relative terms. This methodological approach, together with the unavailability of data for all the countries observed, limited the analysis to a descriptive level, so regression analysis was not applied as a final step.

IV. Results and Discussion

The job vacancy rate and unemployment rate show a strong negative relationship across all observed countries during the 2010–2024 period. Among the CEE countries, Czechia displays the most dynamic trend in job creation (Fig. 1). However, the series shows a structural break in 2020, and the pre-Covid-19 dynamic has not yet been regained. Covid-19 divided the series into two sub-periods, clearly showing the two levels around which the data series values fluctuate. Due to the short length of the data series and the use of aggregate annual data, no separate analysis for the two sub-periods is presented. The economies of Hungary, Latvia, and Slovenia also have above-average job vacancy rates. Slovenia and Hungary have returned to pre-Covid-19 levels, while Latvia remains below the highest job vacancy rates recorded before Covid-19. It should also be noted that Bulgaria, Romania, and Poland have the lowest job vacancy rates among the CEE countries. Among the WB countries, job vacancy statistics are available only for North Macedonia, which shows rates insufficient to reduce unemployment more rapidly (Fig. 2).

If one examines the agreement in the data on job vacancy and unemployment rates, several regularities are observed among the countries studied over the 2010-2024 period. Correlation analysis shows that countries with reverse dynamics between these two indicators (such as Slovakia, Bulgaria, and Croatia) exhibit coefficients of the relationship between -0.72 and -0.78 ($p < 0.001$). Countries where the dynamics gradually switch between growing and declining trends (such as Lithuania, Latvia, and Slovenia) show stronger relationships, with correlation coefficients ranging from -0.82 to -0.87 ($p < 0.001$). In the only country (Romania) where both rates have a declining trend, the correlation coefficient is the lowest, estimated at -0.56 ($p < 0.05$). There are clear differences among the CEE countries, indicating a heterogeneous group in which regional policies and individual enterprise decisions determine a significant portion of vacancy and (un)employment dynamics as empirically identified in previous studies [8,16]. It should also be mentioned that the data include the total workforce, so the potential effects of migration are reflected in the indicators, as the migrant labour force - those integrated into the labour market - is included in the analysis [8].

Labour force participation rates vary significantly by educational level, indicating that individuals with less than primary, primary, or lower secondary education (ISCED 0-2) are less likely to be active in the labour force (Table I). This is related to their current educational status and the fact that many are still pursuing further education. The labour force participation rate more than doubles for those with vocational or general secondary education (ISCED 3-4) and increases further for individuals who have completed tertiary education (ISCED 5-8). The population includes individuals aged 15 to 64 years.

Several CEE countries experienced an increased labour force participation rate for the ISCED 0-2 educational group over the 2010-2024 period, including Bulgaria, Estonia, Hungary, Lithuania, and Slovakia. Among WB countries, higher rates were recorded in Montenegro and Serbia (data for previous years are not available for Bosnia and Herzegovina). However, the most important finding is that the labour force participation rate for the ISCED 5-8

TABLE I. LABOUR FORCE PARTICIPATION RATE BY EDUCATION AND COUNTRY, IN % [18].

CEE Country	Education level					
	ISCED 0-2		*ISCED 3-4*		*ISCED 5-8*	
	2010	2024	2010	2024	2010	2024
Bulgaria	38.6	39.4	72.3	75.3	86.7	92.1
Croatia	40.9	27.2	69.6	74.6	87.6	90.2
Czechia	29.5	29.4	75.7	83.7	83.4	88.3
Estonia	38.7	49.7	78.8	86.1	88.3	93.8
Hungary	34.1	44.8	67.9	82.6	81.2	92.7
Latvia	41.0	38.2	77.1	79.4	89.8	91.4
Lithuania	23.9	30.3	73.7	78.9	92.5	94.3
Poland	28.9	23.4	69.1	74.8	86.8	92.2
Romania	47.5	43.6	69.5	69.6	87.7	91.7
Slovakia	25.6	27.5	75.7	81.2	82.9	89.8
Slovenia	45.4	39.5	74.2	78.1	90.5	91.3
Bosnia and Herzegovina	n/a	23.9	n/a	68.6	n/a	89.1
Montenegro	25.1	28.0	61.5	63.0	84.7	85.0
North Macedonia	44.2	37.7	73.5	71.9	90.4	90.6
Serbia	38.9	42.5	64.2	75.1	80.0	90.8

Notes: ISCED 2011 is applied, where ISCED 0-2 refers to less than primary, primary, and lower secondary education; ISCED 3-4 to upper secondary and post-secondary non-tertiary education; and ISCED 5-8 to tertiary education. For all ISCED levels, the most recent data for Montenegro are from 2011 and 2020, respectively; for North Macedonia, the most recent data are from 2020. n/a indicates data not available.

educational group increased in all observed countries, with smaller shifts among the WB countries compared to the CEE group. North Macedonia is the only country where the labour force participation rate for the ISCED 3-4 educational group decreased in 2024 compared to 2010. There are numerous reasons that could be linked to these developments in the labour force, but the most important are demographic and structural shifts [2, 3, 6].

Over the 2010-2024 period, the unemployment rate (for the working-age population) decreased significantly across countries and educational groups (Table II). However, the unemployment rates for the ISCED 0-2 educational group remain, on average, higher in two CEE countries (Estonia and Slovakia) and in all the WB countries, with Serbia having the lowest unemployment rate and showing a moderate decline. The unemployment rates dropped significantly among ISCED 3-4 graduates, showing the largest decline over the 2010-2024 period in Croatia, Estonia, Hungary, Latvia, Lithuania, Poland and Slovakia. While all the observed Western Balkan countries experienced a decline in unemployment rates for the ISCED 3-4 educational group, these rates remain higher on average than in the CEE countries, with Serbia having the lowest

TABLE II. UNEMPLOYMENT RATE BY EDUCATION AND COUNTRY, IN % [18].

CEE Country	Education level					
	ISCED 0-2		*ISCED 3-4*		*ISCED 5-8*	
	2010	2024	2010	2024	2010	2024
Bulgaria	23.1	14.7	9.7	4.2	4.6	1.7
Croatia	14.0	11.4	12.4	5.5	8.4	3.3
Czechia	25.3	12.3	7.0	2.4	2.8	1.4
Estonia	31.9	26.9	19.4	8.7	9.6	4.9
Hungary	25.4	14.0	10.6	4.3	4.6	1.8
Latvia	33.7	15.6	21.4	8.5	10.8	4.2
Lithuania	41.3	17.6	22.0	9.8	7.8	4.3
Poland	18.3	9.0	10.6	3.7	5.0	1.4
Romania	6.9	15.4	8.0	4.4	4.8	1.9
Slovakia	44.3	40.5	14.1	4.5	5.8	2.1
Slovenia	12.5	8.3	7.6	4.0	4.3	2.0
Bosnia and Herzegovina	n/a	24.3	n/a	12.9	n/a	7.9
Montenegro	31.2	35.5	20.5	18.3	13.3	13.6
North Macedonia	39.8	22.3	32.1	16.2	21.8	13.8
Serbia	18.4	14.2	22.6	9.1	13.2	6.6

Notes: ISCED 2011 is applied, where ISCED 0-2 refers to less than primary, primary, and lower secondary education; ISCED 3-4 to upper secondary and post-secondary non-tertiary education; and ISCED 5-8 to tertiary education. For all ISCED levels, the most recent data for Montenegro are from 2011 and 2020, respectively; for North Macedonia, the most recent data are from 2020. n/a indicates data not available.

unemployment rate and Montenegro the highest among the WB countries. Despite a significant decline over the 2010-2024 period, the unemployment rates of ISCED 5-8 graduates remain higher on average in Croatia, Estonia, Latvia, and Lithuania. Among the WB countries, Serbia has the lowest unemployment rates, while North Macedonia and Montenegro have the highest, exceeding several times those recorded for the CEE countries. Previous studies have empirically confirmed for EU countries that the (un)employment rates of university graduates may be obscured by overeducation and difficulties in the transition to employment, and can potentially expose some labour market participants to the unemployment trap [5, 9, 10].

V. CONCLUSION

This paper analyses structural imbalances in the labour market, examining trends in the educational structure of the labour force, recent developments in unemployment, and job vacancy rate dynamics, as well as their correlation with the unemployment rate over the 2010-2024 period. The data sample includes eleven CEE countries and four WB countries, with the analysis limited by data availability on

the studied determinants of labour market developments.

In summary, the analysis leads to the following conclusions:

- The labour force participation rates indicate that the activity of vocational, general secondary, and tertiary education graduates increased in the labour markets of all the observed countries, with smaller changes among the WB countries compared to the CEE group.
- Unemployment across all educational groups remains, on average, lower in all CEE countries than in all WB countries and has significantly decreased over the observed period.
- The job vacancy rate and unemployment rate show a strong negative relationship across all observed countries (eleven CEE countries and one WB country). However, further analysis reveals that this is a heterogeneous group of countries, and only two CEE countries were able to return their job vacancy dynamics to pre-Covid-19 levels. The unavailability of data limited this part of the analysis to only one WB country.

Despite employing a descriptive statistical analysis approach, this paper provides insight into the educational structure of the workforce and the relationships between unemployment and job vacancy dynamics. Using aggregate annual data for the countries selected for analysis, it was not possible to examine causalities by including gender, age, or economic sector (of employment or job openings) in statistical models, as these variables describe individual characteristics of the workforce. However, this analysis paves the way for further research and consideration of additional indicators, such as the interaction between education level and labour market status resulting from long-term unemployment.

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