










# “Competitiveness of regional labor markets as a determinant of international migration: A nexus empirical study”

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# COMPETITIVENESS OF REGIONAL LABOR MARKETS AS A DETERMINANT OF INTERNATIONAL MIGRATION: A NEXUS EMPIRICAL STUDY

## Abstract

A large-scale migration from Ukraine caused by Russian military aggression has triggered new security challenges to the national and regional economies. The paper aims to assess the competitiveness of regional labor markets and examine its nexus with international out-migration (on the example of the Carpathian region of Ukraine). The research methods include a composite approach (assessment of labor market competitiveness), the theory of sensitivity (identification of degree of sensitivity of composite and partial indices to changes in indicators), nonlinear regression (determination of dependence of the international out-migration on labor market competitiveness), and econometric nonlinear optimization (calculation of critical values of migration). The information and analytical basis comprises indicators reflecting the development of labor markets and international migrations in the oblasts of the Carpathian region in 2008–2021. The study reveals that the level of labor market competitiveness in the region mainly remained below the national average. Two groups of indicators dominated the structure of composite indices of labor market competitiveness in the region's oblasts: institutional capacity (indicators measuring the ability of regulatory institutions and labor market entities to provide adequate support to the unemployed and promote employment) and labor motivation (wage and income indicators). Only Lviv oblast demonstrated resilience and growth of competitiveness, which was reflected in moderate out-migration. Meanwhile, the intensity of international out-migration in Zakarpattia and Chernivtsi oblasts (with worse labor market parameters) exceeded the estimated critical values. The paper confirms that low competitiveness of the labor market is a factor increasing migration losses.

## Keywords

human resources, labor market, international migration, competitiveness, nonlinear modeling, Carpathian region of Ukraine

## JEL Classification

F22, J40, O15, R11

## INTRODUCTION

Ukraine is in an active phase of the fight for its independence and place in the global economic and political space. Deep destructive transformations are taking place in the resource markets, especially in the labor and capital markets. Overcoming the negative consequences of migration losses of human resources and preventing a critical intensification of these processes has been an important front in the war against Russia since 2014. Building a competitive labor market and providing effective employment as part of a new strategy for economic competitiveness in line with the National Recovery Plan of Ukraine should be a key priority (Recovery of Ukraine, 2022). These prerequisites create an urgent need to study the competitiveness of the labor market, explain its component structure, and justify the importance of the labor market in shaping a competitive economy resilient to modern challenges.

An empirical analysis of the state of labor market competitiveness and its impact on the intensity of international out-migration is essential to theoretical research. However, Ukraine still lacks a generally accepted methodology for analyzing labor market competitiveness. Regional specifics are not sufficiently taken into account when conducting such studies. More experience is especially needed to strengthen the regional economy, as weak migration policy and a passive attitude to ensuring effective employment in the regions amid general destructive changes in the economy have led to a gradual decline in the human potential of the country and the regions, which has become rapid since the beginning of the Russian-Ukrainian war. In this context, the Carpathian region stands out from other macro-areas of Ukraine by its unique configuration of economic growth factors, which were formed in peacetime but are not fully used today.

Efficient use of these factors, especially in terms of increasing the labor market competitiveness in the Carpathian region and, as a result, mitigating migration losses, can trigger the growth of the national economy and bring its development closer to the level of certain European countries. As border areas, the oblasts of the Carpathian region have the potential to become drivers of such processes. Their phenomenon lies in developing formal and informal cross-border functional and sectoral systems (including constructing a cross-border labor market). In the border areas, the inequalities in socio-economic development are most evident, and convergence can be achieved faster. On the other hand, the current EU strategies define the development of the Carpathian region as backward. This opens up the prospects for cooperation between Ukraine, Poland, Hungary, Romania, and Slovakia in boosting business activity and employment to strengthen the global competitiveness of cross-border labor markets.

Moreover, the Carpathian region currently performs a vital security function as the main destination region for forced internal migrants and relocated businesses fleeing the Russian-Ukrainian war. Nevertheless, insufficient attention is paid to the study of the security concept of the development of regional labor markets and employment in the context of military aggression, high migration activity of the population, rapid dynamics of the European integration vector of the country's development, and other exogenous factors.

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## 1. LITERATURE REVIEW

The concept of labor market competitiveness is not well-established in the international academic literature. It is most often studied in terms of its components: labor force, jobs, and working conditions. Accordingly, there is no clear theoretical and methodological understanding of the concept under study. However, some Ukrainian scholars operate with the category of labor market competitiveness and try to find a comprehensive methodological approach to its assessment. In Ukraine, the systemic and structural aspect of this issue is developed by Libanova (2007), who considers this category through the competitiveness of jobs, labor force, and their qualitative and quantitative balance. Semykina (2008) and Shylovtseva (2019) emphasize that the country's competitive advantages in the labor sphere directly depend on the accumulation of a "critical mass" of competitive employees capable of highly productive and cre-

ative work, creating innovations and new knowledge, providing services quickly and efficiently, and making optimal decisions in accordance with market demand. The imperatives of achieving high labor productivity (Petrova & Blyznyuk, 2018), ensuring decent wages, and implementing the principles of inclusive development (Blyznyuk, 2020) are important for increasing the competitiveness of the labor market and the economy.

A number of scholars consider the competitiveness of the labor market through the capacity for economic growth due to the efficiency of human resources, their quantitative and qualitative parameters, and the flexibility of the labor market (Scharle, 2003). Others view the growth capacity of specific industries and sectors (spheres) of the economy in the context of internal and external competition (Porter, 2008) and the possibility of attracting investors capable of creating new jobs and innovative renewal of the production appara-

tus (El-Ehwany & Metwally, 2001). Thus, there are two conceptual approaches to studying the problems of labor market development and its status in competitive relations. The first approach lies in studying the competitiveness of the labor force, jobs, and labor costs while limiting itself to the labor market conditions. While the second one considers competitiveness much more broadly – not only in the microeconomic context but also in the systemic macro context, where the labor market ensures the competitiveness and resilience of the entire economic system.

The synthesis of both approaches implies an understanding of labor market competitiveness as the ability of the labor market, as a complex system of social relations and connections, to compete for the internal and external human resources of the state (region) due to a high-quality competitive environment that shapes the labor market and efficient state regulation. It is important to add that a competitive labor market should ensure migration security and economic growth capacity. At the same time, migration security should be understood as the state of protection of national interests and territories (regions) in the field of migration from the impact of potential and actual threats that lead to an increase in migration losses.

Empirical experience in this area is represented by the following studies: Goto (2008) (analysis of the competitiveness of the formal and informal sectors of the labor market, their nexus with poverty), Obadić (2004) (study of labor market competitiveness in individual countries based on key macroeconomic indicators), Ibarra-Cisneros and González-Torres (2010) (assessment of labor flexibility as a strategy for ensuring competitive advantages of the labor market), Kim et al. (2022) (empirical confirmation of the possibility of minimizing the costs of social insurance programs financed by payroll taxes in a competitive labor market), Wołowiec (2003) (analysis of the labor market impact on the competitiveness of the economy based on the share of labor costs in the GDP structure), and Wojciechowska (2018) (competitiveness of the labor market in the context of professional activity, mobility, and labor costs; security component in terms of local, regional, and supranational (EU) challenges for the Polish labor market).

Given that migration is mostly a consequence of changes in the quality of life caused by social (security and safety) and economic (employment, income, and well-being) factors, the interrelations and interactions between the competitiveness, functioning and development of regional labor markets, on the one hand, and the dynamics of migration, on the other, are most often studied in terms of job dissatisfaction and forced migration (Falk et al., 2011; Ruiz & Vargas-Silva, 2013), long-term implications of migration and problems of destabilization of labor supply and demand (Sarvimäki et al., 2009), social and labor conflicts and migration aspirations of workers (Kondylis & Mueller, 2014), social skills in the labor market and migration intentions (Deming, 2017), intensification of migration due to structural imbalances in regional labor markets (Mulska et al., 2022; Semiv et al., 2021), the strengthening of push-pull factors of the population (Levytska et al., 2020; Mulska et al., 2020; Mulska et al., 2021), and the state policy of structural reform of established labor markets to rethink the tasks of their resilience in accordance with changes in the volume and structure of internal and external migration (Long, 2014).

In the context of the long-lasting Russian-Ukrainian war, the processes of so-called transnational migration have intensified. The consequences of the war have become the dominant cause of massive forced displacement in Ukraine. However, many decisions were also made in accordance with the physical safety of the stay, the current situation in the labor market, and employment opportunities. The issue of transnational migration has been repeatedly raised in studies on the critical imbalance of labor markets in the context of wars and environmental, social, and other instabilities (Carling et al., 2021; Guarnizo, 2003; Levitt & Jaworsky, 2007; Privara, 2022; Rahimli, 2021; Zembylas, 2012), which emphasize the scale of migration as a social phenomenon resulting in migrants becoming more than just the community and creating new social networks that cross the borders of states and continue to function in global social networks. However, the specifics of the war in Ukraine necessitate more profound research in this area, particularly considering the peculiarities of the competitiveness of Ukraine's regional labor markets and its impact on migration, and the future intentions of Ukrainians, including transnational ones.

Integral assessments of labor market efficiency are widely used in international and interregional comparisons, in particular when compiling the EU regional competitiveness ranking (EU, 2022), assessing regional competitiveness at the level of individual countries (Huggins et al., 2023), and in special studies, such as the assessment of Malaysia's labor market competitiveness (EU-ERA, 2022), which is based on 44 indicators of labor supply and demand and market efficiency.

International rating assessments frequently adjust the methodology and criteria used in calculating composite indices, depending on changes in socio-economic policy and its course or the emergence of new macroeconomic challenges. However, there is a national specificity in the selection of methods and tools for conducting these assessments, which, in turn, is the main reason why they are not extensively used by other countries.

Ukraine has also developed methodologies for a comprehensive assessment of regional competitiveness, which include the regional human development index and the regional competitiveness index based on monitoring the socio-economic development of regions. In both studies, labor market efficiency indicators related to income, employment, unemployment, unemployment benefits, professional training, etc. are crucial integral indicators. However, these methods have the disadvantage of being unchangeable in the dynamics of the weighting coefficients of indicators (their groups), a limited number of criteria by which regional labor markets are assessed, and fragmentation or inconsistency of indicators.

Some authors attempt to address these methodological gaps by narrowing the focus of the analysis to a particular component of labor market competitiveness or a specific type of labor market (by territory, industry, sector, or other characteristics). For instance, Adamovska et al. (2022) analyze the motivational component of the competitiveness of sectoral labor markets in Ukraine, Rudenko and Lisohor (2021) consider structural changes in regional employment, while Pavlikha et al. (2018) examine the competitiveness of the labor market of the border region with a reflection on the migration caused by the situation in this labor market.

The most competitive regions attract skilled labor and investment, thus providing opportunities for innovation. Meanwhile, destructive processes in the employment and the labor market, such as shadowing, precarization, social devaluation, and imbalance, lead to the loss of human resources and, accordingly, the "leaching" of labor potential. Such processes are pushing people out and, as a result, reducing the competitiveness of the labor market. Consequently, there is a "transfusion" of resources and a change in the competitive position of territories, with migration becoming a factor in their development. This is confirmed by recent studies on the impact of international migration on the development of the UK economy and its individual markets (Bijak et al., 2019), the effect of demographic shift and migration on labor markets in OECD countries (Docquier et al., 2019), the projection of the impact of refugee migration on regional labor markets in Germany (Vanella et al., 2022), and the effects of migration on the economic development of Ukraine and Poland (Polkovnychenko & Salai, 2023).

New security challenges and new social and humanitarian crises have exposed empirical gaps in current studies, particularly in assessing the causal links between the parameters of labor market competitiveness in the regions and migration indicators, modeling their mutual influence, and calculating the threshold values of the given variables.

Therefore, this study aims to assess the competitiveness of regional labor markets and examine its nexus with the intensity of international out-migration (on the example of the Carpathian region of Ukraine). The paper elaborates on the following hypothesis:

*H1: Labor market competitiveness has a complementary impact on international out-migration intensity, which determines the extent of migration losses of the territory.*

## 2. METHODOLOGY

The study applies the system-structural method to understand the content and components of labor market competitiveness, uses a composite approach to assessing the labor market competi-

tiveness of the region and its components, adapts elements of the sensitivity theory to determine the degree of variability of composite and partial indices (sub-indices) resulting from changes in input indicators and their weighting coefficients, and applies the method of modeling the nonlinear dependence of international out-migration intensity on the level of labor market competitiveness and the method of econometric nonlinear optimization of the studied parameters.

The methodology for the composite assessment of labor market competitiveness in the oblasts of the Carpathian region is based on sensitivity coefficients and a multiplicative approach. The input indicators were systematized based on the fact that the structure of labor market competitiveness is primarily shaped by the following components: competitiveness of jobs and working conditions that determine the demand in the labor market, price, and non-price competitive advantages; competitiveness of the labor force that forms the supply in the labor market. Accordingly, 26 indicators were selected using the expert method and grouped into 5 categories (Appendix A): quality of jobs, intellectual-human resources, labor motivation, employment and labor market efficiency, and institutional capacity of the labor market.

The study uses data on the labor market and international migration indicators in the oblasts of the Carpathian region from the State Statistics Service of Ukraine and the State Employment Service of Ukraine for 2008-2021. Constructing the composite index of regional labor market competitiveness has 7 key stages.

1. Standardization of the indicator values. Data are suggested to be standardized according to formula (1) for stimulating indicators (stimulators) and formula (2) for de-stimulating indicators (de-stimulators), choosing a reference minimum or maximum value of the indicator among the studied regions (oblasts) in each period (year):

$$z_{irt}^s = \frac{x_{irt}}{x_{maxrt}}, \tag{1}$$

$$z_{irt}^d = \frac{x_{minrt}}{x_{irt}}, \tag{2}$$

where  $z_{irt}^s$  are the standardized values of the  $i$  stimulating indicator for the  $r$  region (oblast) in the  $t$  period ( $i = \overline{1, n}; r = \overline{1, m}$ );  $z_{irt}^d$  are the normalized values of the  $i$  de-stimulating indicator for the  $r$  region (oblast) in the  $t$  period ( $i = \overline{1, n}; r = \overline{1, m}$ );  $x_{irt}$  are the initial values of the indicators ( $i = \overline{1, n}; r = \overline{1, m}$ );  $x_{minrt}, x_{maxrt}$  are the minimum and maximum values of the  $i$  indicator for the  $r$  region (oblast) in the  $t$  period ( $i = \overline{1, n}; r = \overline{1, m}$ ).

Based on the standardization results, interregional comparisons are used to form a series of standardized indicator values ( $z_{irt}$ ) for all regions within each particular year  $t$ .

2. Calculation of the weighting coefficients of indicators in groups. Dynamic weighting coefficients of indicators within each group of indicators for the selected set of regions (oblasts) are calculated by the formula (3):

$$w_{it}^{kr} = \frac{|\mu_i^{kr} \Delta x_{it}^r|}{\sum_{i=1}^j |\mu_i \Delta x_{it}^r|}, \tag{3}$$

where  $w_{it}^{kr}$  is the weighting coefficient of the  $i$  indicator in the  $k$  group for the  $r$  region (oblast) in the  $t$  period;  $\mu_i^{kr}$  is the sensitivity coefficient of the  $i$  indicator in the  $k$  group for the  $r$  region (oblast) in the  $t$  period (calculated based on the correlation matrix);  $\Delta x_{it}^r$  is the coefficient of variation of the  $i$  indicator for the  $r$  region (oblast) in the  $t$  period.

3. Calculation of partial weighting coefficients of indicators. The weighting coefficients of indicators within the  $k$  group of labor market competitiveness indicators are calculated using the formula (4):

$$\beta_{it}^{kr} = z_{irt}^{w_{it}^{kr}}, \tag{4}$$

where  $\beta_{it}^{kr}$  is the weighting coefficient of the  $i$  indicator in the  $k$  group for the  $r$  region (oblast) in the  $t$  period;  $z_{irt}$  is the standardized value of the  $i$  indicator for the  $r$  region (oblast) in the  $t$  period.

4. Construction of group coefficients of labor market competitiveness based on a multiplicative approach (formula 5):

$$\gamma_{kt}^r = \prod \beta_{it}^{kr}, \tag{5}$$

where  $\gamma_{kt}^r$  is the group coefficient for the  $k$  group of indicators for the  $r$  region (oblast) in the  $t$  period.

5. Calculation of weighting coefficients for groups of indicator. The weights of the groups of indicators ( $\tilde{w}_i^{kr}$ ), as well as the weights of the indicators (see Step 2), are determined based on the calculation of sensitivity coefficients.
6. Calculation of weighted group coefficients. Weighted group coefficients ( $\tilde{\gamma}_{kt}^r$ ) are calculated in the same way as the partial weighting coefficients of the indicators (see Step 3).
7. Construction of the composite index of the labor market competitiveness of the region (oblast) is based on the additional calculation of dynamic weighting coefficients by the multiplicative method according to formula (6):

$$LMC_t^r = \prod \tilde{\gamma}_{kt}^r \quad (6)$$

where  $LMC_t^r$  is the composite index of labor market competitiveness for the  $r$  region (oblast) in the  $t$  period. The values of the composite indices range from 0 to 1. The growth of the index indicates an increase in the labor market competitiveness.

The intensity of international out-migration ( $MIGRoutEXT_t^r$ ) is calculated as the ratio of the number of people who have moved abroad (external migrants) from the  $r$  region (oblast) in the  $t$  time interval ( $M_t^r$ ) to the current population in the  $r$  region (oblast) in the  $t$  time interval ( $P_t^r$ ) and is expressed in permille:

$$MIGRoutEXT_t^r = \frac{M_t^r}{P_t^r} \cdot 1000, \quad (7)$$

Nonlinear regression functions of the dependence of international out-migration intensity on the level of labor market competitiveness in the oblasts of the Carpathian region are obtained using the CurveExpert Professional software. The dependence is built based on a rational function (formula 8) and a 3- and 4-degree polynomial regression model (formula 9), the adequacy of which is confirmed by the relevant parameters of statistical significance of the results obtained at  $p = 0.05$  (in particular, the coefficients of determination, standard error, and AIC).

$$MIGRoutEXT_t^r = \frac{a + bLMC_t^r}{1 + cLMC_t^r + d(LMC_t^r)^2}, \quad (8)$$

$$MIGRoutEXT_t^r = a + bLMC_t^r + c(LMC_t^r)^2 + d(LMC_t^r)^3 + e(LMC_t^r)^4, \quad (9)$$

where  $a, b, c, d, e$  are the model parameters.

Based on the modeling results, the range of optimal values of the composite index of labor market competitiveness to mitigate migration losses is calculated for each oblast of the Carpathian region.

Following the systems theory, the results of econometric nonlinear optimization are used to calculate the critical values (upper and lower thresholds) of international out-migration intensity in the oblasts of the Carpathian region. These values are used to identify the potential for maintaining competitive positions and resilience of the oblasts and the region as a whole.

### 3. RESULTS AND DISCUSSION

Based on the results of a comprehensive assessment of labor market competitiveness in the oblasts of Ukraine in 2008–2021, sub-indices of indicator groups and final composite indicators have been obtained on the basis of sensitivity coefficients (used to calculate weights) and a multiplicative approach (Appendix B). In 2008, Kyiv, Sevastopol, and Dnipropetrovsk, and Kharkiv oblasts demonstrated the highest competitive positions in the entire set of indicators. In 2021, Kyiv and Lviv, Dnipropetrovsk, and Kharkiv oblasts became the leading ones.

The annexation of the Autonomous Republic of Crimea and the outbreak of hostilities in the eastern part of Ukraine in 2014 resulted in massive internal displacement, which affected regional labor markets and the stability of regional economies. A significant deterioration in the competitive position regarding labor market development occurred in some eastern and northeastern oblasts, primarily in Donetsk and Luhansk oblasts. The level of the composite indicator decreased from 0.42 and 0.38 in 2008 to 0.16 and 0.01 in 2014, respectively. This is quite predictable, as territories

**Table 1.** Composite indices of labor market competitiveness of the Carpathian region of Ukraine, 2008–2021

Region/ oblasts	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	21/08, %
Carpathian region	0.338	0.207	0.310	0.347	0.280	0.330	0.406	0.351	0.444	0.410	0.415	0.317	0.208	0.339	0.43
<b>oblasts</b>															
Zakarpattia	0.343	0.283	0.373	0.342	0.292	0.350	0.431	0.356	0.480	0.456	0.458	0.367	0.303	0.330	-3.53
Ivano-Frankivsk	0.325	0.106	0.280	0.366	0.239	0.252	0.401	0.427	0.384	0.326	0.340	0.258	0.366	0.305	-6.14
Lviv	0.372	0.237	0.277	0.349	0.266	0.393	0.451	0.333	0.527	0.490	0.472	0.364	0.094	0.471	26.83
Chernivtsi	0.312	0.201	0.310	0.330	0.321	0.324	0.341	0.287	0.386	0.367	0.390	0.281	0.070	0.250	-19.82
oblasts' average*	0.379	0.271	0.299	0.354	0.297	0.384	0.393	0.313	0.438	0.366	0.327	0.333	0.230	0.354	-6.54

Note: \* based on the 24 oblasts of Ukraine, the city of Kyiv, the Autonomous Republic of Crimea (ARC), and the city of Sevastopol. Since 2014, it has excluded part of the temporarily occupied territories of Donetsk and Luhansk oblasts, and the temporarily occupied territory of the ARC and the city of Sevastopol (Appendix B).

in a state of war cannot ensure resilience, competitiveness, and economic growth. After 2014, Dnipropetrovsk (from 0.47 to 0.42), Zaporizhzhia (from 0.41 to 0.34), and Zhytomyr (from 0.31 to 0.29) oblasts also lost their competitive capacity.

The values of the composite indices of labor market competitiveness in the oblasts of the Carpathian region and their sub-indices for each component (group) of integral competitiveness are presented in Table 1 and Appendix D.

The calculations reveal that the integral level of the labor market competitiveness of the Carpathian region is below the national average, as its values in 2008–2021 ranged from 0.207 to 0.444 (over 14 years, the composite index increased by only 0.43%). Only Lviv oblast showed real resilience and growth (by 26.83%). Appendix B shows the final results of the composite competitiveness assessment for 27 regional labor markets in Ukraine.

The weighting coefficients of the indicator groups calculated on the basis of sensitivity coefficients made it possible to assess the contribution of each group to the development of integral competitiveness in the spatial and dynamic aspects (Appendix C). Mostly the institutional capacity of the labor market and labor motivation were the dominant determinants of labor market competitiveness in the structure of the composite index.

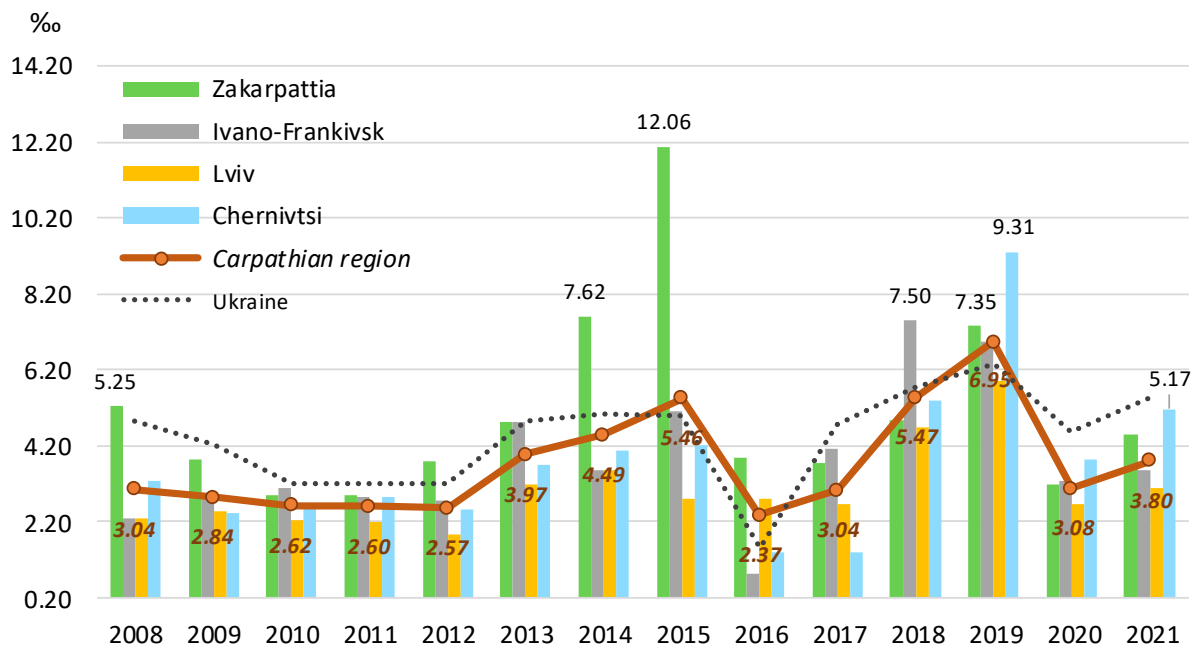
The study also reveals that the Carpathian region did not stand out with high values of the

sub-indices of indicator groups compared to other regions of Ukraine during the period under research (Appendix D). All five components of labor market competitiveness were at or below the regional average, except some growth in the job quality sub-index values since 2014 (mainly due to Zakarpattia and Lviv oblasts with their average annual growth of 25.5% and 8.8% against the regional average) and improvement in labor motivation since 2014 (due to Zakarpattia and Ivano-Frankivsk oblasts with growth of 68.9% and 32.9%). However, it is worth noting that labor market competitiveness increased in the oblasts of the Carpathian region to a large extent due to a sharp decline in the competitive position of the eastern oblasts (especially Donetsk and Luhansk oblasts) after the outbreak of war in the east of Ukraine in 2014. Meanwhile, before the war, the Donetsk macro-region had above-average values of sub-indices (especially in terms of employment and labor market efficiency) and final indices.

In recent years, prior to the full-scale invasion, there was an increase in international out-migration from regions of Ukraine with less competitive labor markets, which provisionally confirms the research hypothesis regarding the nexus between labor market competitiveness and emigration intensity.

In fact, Figure 1 shows that the intensity of international out-migration from the Carpathian region is increasing, although it remains mostly be-





**Figure 1.** Intensity of international out-migration from the Carpathian region in 2008–2021, ‰

low the national average. While this indicator (per 1,000 inhabitants) was declining in 2008–2012, starting in 2012 (except 2016 and 2020), there has been a steady upward trend.

The rise in out-migration was triggered by political and economic instability and security challenges in 2014 and subsequent years by signing the visa-free regime agreement between Ukraine and the EU in 2017 and socio-economic stagnation during the 2020 pandemic, which escalated into the current war-driven crisis. Moreover, the expansion of official employment opportunities for Ukrainian citizens in the EU also explains the above-mentioned dynamics of out-migration over the period under study.

Based on the results of the economic and mathematical modeling of the dependence between the intensity of international out-migration and the level of labor market competitiveness in the oblasts of the Carpathian region, performed with CurveExpert Professional 2.6.3 software, nonlinear regression functions (based on 3- and 4-degree polynomial regression and a rational function) were constructed. The optimal values of the competitiveness of the studied labor markets, at which migration losses are reduced, are also calculated (Table 2).

The labor market in Zakarpattia oblast (for the period of analysis from 2008 to 2021) was unappealing to immigrants and provoked excessive migration losses of its own human resources. These losses were higher than the national average (see Figure 1). The economic growth rate in recent years has been insufficient to ensure the optimal level of labor market competitiveness in the oblast in the range of 0.3999–0.4652 (the actual level of the composite index in 2021 was only 0.3305). Consequently, the intensity of international out-migration in 2021 surpassed the critical upper threshold (actual value – 4.49‰, threshold value – 4.12‰). High migration rates were facilitated by the signing of several bilateral agreements on local border traffic by Ukraine, which made it easier for the population of Zakarpattia oblast to travel to Hungary, Romania, Poland, and Slovakia.

Despite the relatively high migration activity of the population of Ivano-Frankivsk oblast (compared to other oblasts of the Carpathian region), international out-migration accounted for only 3.38% of the total migration from the oblast on average in 2008–2021. This means that the specifics of the Ivano-Frankivsk oblast's economy, with its low growth rate and low level of labor market competitiveness (0.2499 – composite index in 2021) work to “push” the population out of the oblast,

**Table 2.** Empirical analysis of the international out-migration dependence on the labor market competitiveness on the example of the oblasts of the Carpathian region of Ukraine\*

Oblasts Parameters	Zakarpattia	Ivano-Frankivsk	Lviv	Chernivtsi
a	1.132 (0.180)	1.157 (0.165)	0.634 (0.036)	2.149 (0.023)
b	-0.121 (0.059)	-0.105 (0.084)	-0.575 (0.045)	-0.321 (0.072)
c	4.787 (0.705)	6.779 (0.727)	22.210 (0.159)	-5.263 (0.282)
d	-8.236 (1.352)	-17.763 (1.818)	-2.392 (1.708)	2.504 (1.153)
e	5.214 (2.879)	16.356 (4.118)	–	–
Correlation coefficient (r)	0.658	0.635	0.595	0.698
Coefficient of determination (r-squared)	0.433	0.403	0.354	0.487
Standard error (SE)	0.093	0.099	0.106	0.080
Akaiké information criterion (AIC)	33.170	24.614	15.534	25.207
Regression functions				
Zakarpattia	Polynomial Regression model (df = 9): $MIGRoutEXT_t = 1.132 - 0.121LMC_t + 4.787LMC_t^2 - 8.236LMC_t^3 + 5.214LMC_t^4$			
Ivano-Frankivsk	Polynomial Regression model (df = 9): $MIGRoutEXT_t = 1.157 - 0.105LMC_t + 6.779LMC_t^2 - 17.763LMC_t^3 + 16.35LMC_t^4$			
Lviv	Polynomial Regression model (df=10): $MIGRoutEXT_t = 0.634 - 0.575LMC_t + 22.210LMC_t^2 - 2.392LMC_t^3$			
Chernivtsi	Rational model (df=10): $MIGRoutEXT_t = \frac{2.149 - 0.321LMC_t}{1 - 5.263LMC_t + 2.504LMC_t^2}$			
Optimal values of the labor market competitiveness				
Actual value of $LMC_t$ in 2021	0.3305	0.3053	0.4712	0.2499
<b>Optimal range of <math>LMC_t</math></b>	0.3999 – 0.4652	0.2838 – 0.3833	0.4345 – 0.6024	0.3021 – 0.4142
Threshold values of international out-migration (subject to compliance with the optimal range of labor market competitiveness)				
Actual value of $MIGRoutEXT_t$ in 2021	4.49‰	3.58‰	3.08‰	5.17‰
Upper thresholds	4.12‰	4.66‰	3.67‰	3.32‰
Lower thresholds	3.09‰	3.26‰	2.12‰	2.20‰

Note: \* dependence between composite indices of labor market competitiveness ( $LMC_t$ ) and the intensity of international out-migration ( $MIGRoutEXT_t$ ) from the oblasts of the Carpathian region (time period: 2008–2021). Parentheses enclose standard error with the p-value of 5% significance. In 2022, the intensity of international out-migration increased dramatically in all oblasts of the Carpathian region due to the forced emigration of the population caused by the full-scale war in Ukraine: up to 91.2‰ in Zakarpattia, up to 34.1‰ in Ivano-Frankivsk, up to 81.8‰ in Lviv and up to 44.9‰ in Chernivtsi oblasts (based on the Centre for Economic Strategy Survey presented by Mykhailyshyna et al. (2023)).

mainly to other regions of the country. In addition, it is the only border region in Ukraine that does not have a single checkpoint with the country it borders (49 km of common border with Romania). This is due to the difficult mountainous terrain in the border area and the lack of political will to organize large-scale and expensive infrastructure projects. Even though the issue of openness of the border between Ukraine and Romania has been raised since 1994, it has not yet received proper support. However, opening the border crossing points could create the preconditions for the con-

struction of ski resorts, stimulating a significant influx of tourists and creating new jobs.

Thus, the Ukrainian central authorities (primarily the Ministry for Communities, Territories, and Infrastructure Development of Ukraine, the State Agency for the Restoration and Infrastructure Development of Ukraine, and the State Customs Service of Ukraine) and local governments, together with their EU partners (the EU Advisory Mission Ukraine), should pay attention to the prospect of cross-border cooperation and incorpo-

rate it into their long-term plans for EU-Ukraine economic cooperation. Accordingly, regional employment programs and plans in Ivano-Frankivsk oblast should be aligned with new economic priorities in developing the Ukrainian-Romanian border's capacity, thereby increasing the competitiveness of the regional labor market.

The results of modeling the studied variables on the example of Lviv oblast show that the intensity of international out-migration is sensitive to changes in the composite index of labor market competitiveness. Meanwhile, a significant growth potential of the index was identified. Its optimal limits were calculated in the range from 0.4345 to 0.6024, with the actual value of the index in 2021 at 0.4712. The oblast's migration capacity was also not exhausted before the full-scale war in Ukraine. The rate of emigration from Lviv oblast was approaching the upper limit in some years of the study period (2018–2019), even crossing the so-called "red line." In 2020, due to the pandemic, migration intensity began to decline and remained within the calculated optimal rate until 2021. The study also suggests that by increasing the level of labor market competitiveness in Lviv oblast to the upper optimal value (0.6024), migration losses in the oblast can be reduced to 2.12‰.

Chernivtsi oblast significantly differs from other oblasts of the Carpathian region of Ukraine regarding out-migration. In fact, in 2021, the intensity of the outflow of human resources abroad from the region reached 5.17‰ (with an average value in the Carpathian region of 3.80‰). For comparison, the level of this indicator in Lviv oblast was 1.7 times lower and amounted to 3.08‰. The low economic level is among the main reasons for this situation in Chernivtsi oblast. This is confirmed by the data from the State Statistics Service of Ukraine on the oblast's lowest share (1% in 2021) in the country's GDP structure compared to other oblasts, the lowest amount of foreign direct investment (\$ 57.3 per capita) and capital investment (\$ 134.9 per capita, which surpasses only the amount of capital investment in the economy of Donetsk and Luhansk oblasts), as well as insufficient development of small and medium businesses in Chernivtsi oblast – 2.5 medium enterprises and 43.3 small enterprises per 10,000 inhabitants, with the national average in 2021 being 3.6 and 66.9,

respectively. The standard of living in the studied oblast is considered the worst in population income, as the average monthly nominal wage of a full-time employee was only UAH 11,100, the lowest level among all oblasts in 2021.

Quite predictably, this socio-economic situation in the oblast resulted in one of the country's lowest labor market competitiveness levels in 2021 – 0.2499 (other low-ranking oblasts include Rivne, Vinnytsia, and Luhansk with even lower rates). The optimal level of the labor market competitiveness index for Chernivtsi oblast, calculated based on economic and mathematical modeling, was in the 0.3021 to 0.4142 range. This means that to reduce international out-migration, the level of labor market competitiveness in the oblast should increase by 20-40%.

The obtained outcomes of the composite assessment of the regional labor market competitiveness largely correlate with the results of the ongoing monitoring of the socio-economic development of Ukrainian regions, which has been conducted since 2015 at the initiative of the Ministry for Regional Development, Construction, Housing, and Communal Services of Ukraine. The monitoring is carried out regularly to assess the effectiveness of the state regional policy. Analyzing the efficiency of the labor market covers 6 key indicators: labor productivity, employment and unemployment rates, the ratio of new hires to retirees, the real wage index, and the amount of wage arrears. In 2016, the labor markets of Kyiv and Kharkiv, Odesa, Lviv, Kyiv, and Zhytomyr oblasts (in no particular order) were the most efficient (Ministry of Regional Development, Construction, Housing and Communal Services of Ukraine, 2017) and competitive according to this paper. The exceptions included Chernivtsi and Vinnytsia oblasts, which had high ratings solely in national monitoring results, and Dnipropetrovsk oblast, which ranked high in the assessment of regional labor market competitiveness. In 2021 (Ministry of Regional Development, Construction, Housing and Communal Services of Ukraine, 2021), Kyiv and Lviv, Dnipropetrovsk, and Kharkiv oblasts were the leaders in both surveys.

Despite the numerous scientific works on the impact of migration on the demographic and labor potential of territories, and thus on the efficiency

of labor markets, the feedback (when the situation on labor markets is a factor in shaping migration) is currently being studied and tested for different types of dependence. The pattern of higher levels of migration from countries with low or insufficient labor market and employment development parameters identified in Germany (Privara, 2022) has been empirically confirmed in this study on the example of the Carpathian region of Ukraine. The German pattern is vital for Ukraine, as a large number of Ukrainian refugees (1.07 million people) left for that country during the war. The key criteria for the attractiveness of the German labor market include the level of state support (under programs for employment activation and market development), which is also proved by the high

weighting coefficients of institutional capacity indicators for the labor markets of the Carpathian region's oblasts.

The results of the study confirm the assumption of a complementary relationship between labor market competitiveness and international out-migration, which determines the extent of migration losses of the territory. It is necessary, on the one hand, to consider the specifics of the environment of a particular labor market, which impacts the migration activity of the population, and, on the other hand, to monitor the impact of particular exogenous factors on the labor market environment, such as large-scale migration flows caused by the war.

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## CONCLUSION

The aim of the study was to assess the competitiveness of regional labor markets and examine its nexus with the intensity of international out-migration (on the example of the Carpathian region of Ukraine in 2008–2021). The study shows that the competitive labor market positions in the Carpathian region were below the national average. Only Lviv oblast demonstrated resilience and growth (by 26.83%), while the labor markets of Zakarpattia and Chernivtsi oblasts were mostly less competitive during the study period. It turns out that the level of international out-migration in these oblasts surpassed the critical values calculated by econometric nonlinear optimization, and the migration potential of Ivano-Frankivsk and Lviv oblasts was not exhausted. This confirms the hypothesis that oblasts with a higher level of labor market competitiveness are more attractive to local residents and immigrants (especially for highly skilled labor) and experience lower migration losses, which serves as the basis for regional migration security.

Therefore, the competitiveness of regional labor markets can be considered the most complex object of state regional policy. It requires considering the territorial specifics of job quality, human resources, motivational support, employment performance, and institutional capacity, as well as the strength of the impact of labor market competitiveness on migration (in particular, the international out-migration vector). The obtained empirical basis opens up new opportunities for adjusting the regional policy of employment regulation and labor market development. This issue is particularly relevant for Ukraine, given the new stage of the country's European integration efforts. Thus, it seems promising to study the mechanisms for increasing the competitiveness of regional labor markets to ensure the socio-economic convergence between Ukraine and the EU and accelerate the post-war recovery.

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## APPENDIX A

**Table A1.** Systematization of criteria (groups) and indicators for assessing labor market competitiveness

Indicators	Economic content	Impact*
<b>Quality of jobs</b>		
Level of labor force intake	Ratio of the number of new hires to the average number of employees, %	S
Staff turnover rate	Ratio of the number of employees dismissed (voluntarily and for violations) to the average number of employees, %	D
The level of forced underemployment (hidden unemployment)	Ratio of the number of employees who worked part-time (a day or a week) to the average number of employees, %	D
Share of employees working in hazardous conditions	Ratio of the number of employees working in hazardous conditions to the number of employees, %	D
Employment in the informal economy	Share of the informally employed population in total employment, %	D
Share of employees covered by collective bargaining agreements	Ratio of the number of employees covered by collective bargaining agreements to the average number of employees, %	S
<b>Intellectual-human resources</b>		
Employment rate of the population aged 15-70	Ratio of the employed population aged 15-70 to the total population of this age, %	S
Level of potential staffing	Ratio of the number of graduates from educational institutions (higher education and vocational training) of all levels to the total population, people per 10,000 population	S
Share of employed population aged 15-70 with complete higher education	Ratio of the employed population aged 15-70 with complete higher education to the total population aged 15-70 with complete higher education, %	S
Share of scientists (researchers)	Ratio of the number of scientists (researchers) involved in research and development to the total number of employees aged 15-70, %	S
Share of IT employees	Ratio of the number of employees in information and communication to the total number of employees aged 15-70%	S
<b>Labor motivation</b>		
Average monthly real wage of an employee	Real wages on average per employee per month, UAH/person	S
Share of wages in the total income of the population	Ratio of the average annual nominal wage per employee to the total income of the population, %	S
Wage arrears	Ratio between unpaid and actual accrued wages, %	D
Share of the population with average per capita equivalent cash income per month below the subsistence level	Determined based on data on the distribution of the population by the level of equivalent total income, %	D
Gender pay parity index	Ratio of the average monthly nominal wage of women to the corresponding indicator for men, coefficient	S
<b>Employment and labor market efficiency</b>		
Total labor productivity	Ratio of gross value added (GVA) in actual prices to the total number of employees aged 15-70, UAH/person	S
GVA to payroll ratio	Ratio of GVA in actual prices to the annual payroll, coefficient	S
Innovative labor productivity	Ratio of the number of innovative products sold to the total number of industry employees aged 15-70, UAH/person	S
Unemployment rate of the population aged 15-70	Ratio of the unemployed aged 15-70 to the economically active population of the respective age group, %	D
Share of lost working time	Ratio of the number of hours not worked to the timesheet, %	D
<b>Institutional capacity of the labor market</b>		
Unemployment registration rate	Ratio of the number of unemployed registered with the state employment service to the total unemployed population aged 15-70, %	S
Long-term unemployment rate	Ratio of the number of unemployed aged 15-70 who have been looking for work for 12 months or more to the total number of registered unemployed, %	D
Employment of unemployed rate	Ratio of the number of employed to the total number of registered unemployed, %	S
Workload per vacant workplace	The ratio between the number of unemployed registered with the state employment service and the number of vacancies, persons/vacancy	D
Efficiency of assistance to the unemployed	Ratio of the total amount of unemployment benefits, adjusted for the unemployed people's employment rate, to the number of people receiving these benefits (adjusted benefits on average per month), UAH per month/person	S

Note: \* The nature of the indicator's impact on labor market competitiveness (S – stimulators, D – de-stimulators).



## APPENDIX B

**Table B1.** Composite indices and sub-indices of regional (oblast) labor market competitiveness in Ukraine, 2008–2021

Oblasts	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021 / rank/
<b>Composite indices</b>														
Vinnycia oblast	0.33	0.21	0.28	0.33	0.28	0.33	0.44	0.38	0.42	0.41	0.31	0.34	0.39	0.23 /24/
Volyn oblast	0.36	0.15	0.29	0.39	0.24	0.36	0.39	0.31	0.47	0.31	0.35	0.29	0.18	0.39 /8/
Dnipropetrovsk oblast	0.47	0.35	0.28	0.48	0.49	0.50	0.42	0.32	0.50	0.42	0.35	0.33	0.14	0.47 /3/
Donetsk oblast	0.42	0.18	0.28	0.40	0.31	0.38	0.16	0.32	0.09	0.34	0.25	0.32	0.15	0.33 /16/
Zhytomyr oblast	0.31	0.22	0.27	0.36	0.26	0.38	0.29	0.31	0.46	0.37	0.37	0.34	0.13	0.38 /9/
Zakarpattia oblast	0.34	0.28	0.37	0.34	0.29	0.35	0.43	0.36	0.48	0.46	0.46	0.37	0.30	0.33 /15/
Zaporizhzhia oblast	0.41	0.24	0.24	0.38	0.19	0.44	0.34	0.32	0.46	0.39	0.29	0.41	0.10	0.35 /11/
Ivano-Frankivsk oblast	0.33	0.11	0.28	0.37	0.24	0.25	0.40	0.43	0.38	0.33	0.34	0.26	0.37	0.31 /20/
Kyiv oblast	0.40	0.32	0.36	0.42	0.46	0.24	0.45	0.32	0.49	0.47	0.34	0.39	0.33	0.41 /7/
Kirovohrad oblast	0.30	0.18	0.27	0.30	0.23	0.32	0.38	0.24	0.43	0.37	0.35	0.23	0.28	0.35 /12/
Luhansk oblast	0.38	0.31	0.26	0.23	0.21	0.32	0.01	0.14	0.29	0.04	0.19	0.27	0.36	0.21 /25/
Lviv oblast	0.37	0.24	0.28	0.35	0.27	0.39	0.45	0.33	0.53	0.49	0.47	0.36	0.19	0.47 /2/
Mykolaiv oblast	0.36	0.25	0.24	0.25	0.27	0.37	0.37	0.21	0.43	0.38	0.27	0.39	0.30	0.42 /5/
Odesa oblast	0.40	0.32	0.36	0.45	0.37	0.49	0.50	0.24	0.54	0.41	0.38	0.41	0.08	0.42 /6/
Poltava oblast	0.35	0.33	0.34	0.46	0.35	0.43	0.50	0.30	0.47	0.32	0.24	0.20	0.10	0.36 /10/
Rivne oblast	0.28	0.14	0.20	0.29	0.36	0.32	0.32	0.28	0.33	0.12	0.28	0.25	0.17	0.24 /23/
Sumy oblast	0.35	0.21	0.19	0.34	0.18	0.38	0.44	0.21	0.42	0.33	0.11	0.30	0.32	0.29 /21/
Ternopil oblast	0.32	0.34	0.25	0.36	0.30	0.34	0.38	0.38	0.45	0.37	0.27	0.16	0.20	0.34 /14/
Kharkiv oblast	0.45	0.31	0.34	0.35	0.33	0.52	0.54	0.30	0.57	0.52	0.38	0.49	0.32	0.45 /4/
Kherson oblast	0.34	0.28	0.31	0.28	0.26	0.36	0.45	0.30	0.40	0.39	0.16	0.32	0.23	0.31 /19/
Khmelnyskyi oblast	0.27	0.13	0.18	0.29	0.22	0.33	0.30	0.33	0.38	0.27	0.27	0.33	0.33	0.34 /13/
Cherkasy oblast	0.34	0.19	0.28	0.27	0.18	0.37	0.38	0.29	0.36	0.18	0.35	0.31	0.10	0.32 /17/
Chernivtsi oblast	0.31	0.20	0.31	0.33	0.32	0.32	0.34	0.29	0.39	0.37	0.39	0.28	0.07	0.25 /22/
Chernihiv oblast	0.33	0.22	0.30	0.10	0.25	0.35	0.37	0.34	0.42	0.41	0.32	0.34	0.32	0.32 /18/
Kyiv, the city	0.86	0.76	0.81	0.63	0.57	0.80	0.75	0.59	0.79	0.71	0.68	0.64	0.38	0.57 /1/
Autonomous Republic of Crimea (ARC)	0.38	0.33	0.29	0.35	0.20	0.42								
Sevastopol, the city	0.47	0.51	0.22	0.46	0.40	0.28								
<b>Sub-indices by groups of indicators: average in the oblasts, ARC, and cities of Kyiv and Sevastopol</b>														
Quality of jobs	0.53	0.54	0.53	0.55	0.49	0.48	0.69	0.64	0.57	0.51	0.48	0.54	0.57	0.53
Intellectual-human resources	0.29	0.28	0.17	0.24	0.36	0.32	0.31	0.31	0.34	0.33	0.31	0.29	0.31	0.32
Labor motivation	0.48	0.56	0.43	0.39	0.20	0.38	0.54	0.21	0.48	0.42	0.25	0.35	0.17	0.52
Employment and labor market efficiency	0.44	0.52	0.42	0.32	0.48	0.52	0.35	0.51	0.49	0.39	0.50	0.31	0.43	0.43
Institutional capacity of the labor market	0.27	0.14	0.29	0.48	0.33	0.35	0.42	0.50	0.43	0.36	0.41	0.40	0.49	0.28
<b>Composite indices: average in the oblasts, ARC and cities of Kyiv and Sevastopol</b>														
	0.38	0.27	0.30	0.35	0.30	0.38	0.39	0.31	0.44	0.37	0.33	0.33	0.23	0.35

## APPENDIX C

**Table C1.** Distribution of weighting coefficients (weights in composite indices) by groups of indicators of labor market competitiveness in the oblasts of the Carpathian region of Ukraine (%), 2008, 2014 and 2021

Source: Assessed using formula (3).

Oblasts	Years	Weights of groups in composite indices ( $\tilde{w}_i^{kr}$ )				
		Quality of jobs (group $k_1$ )	Intellectual- human resources (group $k_2$ )	Labor motivation (group $k_3$ )	Employment and labor market efficiency (group $k_4$ )	Institutional capacity of the labor market (group $k_5$ )
Zakarpattia	2008	24.4%	13.3%	21.6%	18.8%	21.8%
	2014	18.8%	17.1%	15.0%	30.7%	18.4%
	2021	20.0%	11.4%	27.5%	13.5%	27.7%
Ivano-Frankivsk	2008	22.0%	17.7%	24.5%	16.3%	19.4%
	2014	17.3%	14.6%	17.8%	24.7%	25.7%
	2021	17.5%	17.8%	28.0%	15.9%	20.9%
Lviv	2008	19.4%	22.6%	17.5%	18.2%	22.4%
	2014	16.0%	24.9%	11.9%	33.0%	14.3%
	2021	24.2%	22.6%	16.3%	21.7%	15.2%
Chernivtsi	2008	18.1%	15.8%	21.0%	18.1%	27.0%
	2014	13.1%	16.8%	15.6%	34.9%	19.6%
	2021	13.3%	13.5%	20.8%	18.3%	34.1%

## APPENDIX D

**Table D1.** Outcomes of composite assessment of the labor market competitiveness of the Carpathian region of Ukraine, 2008–2021

Source: Statistical data from the State Statistics Service of Ukraine and the State Employment Service of Ukraine. Sub-indices and composite indices of regional labor market competitiveness are assessed using formulas (1-6).

Groups	Region/oblasts	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
<b>Sub-indices of groups of labor market competitiveness</b>															
Quality of jobs	Carpathian region	0.531	0.532	0.528	0.540	0.443	0.479	0.731	0.649	0.555	0.585	0.543	0.593	0.582	0.572
	Zakarpattia	0.560	0.598	0.543	0.592	0.451	0.491	0.791	0.685	0.648	0.756	0.699	0.730	0.652	0.656
	Ivano-Frankivsk	0.499	0.512	0.501	0.491	0.382	0.419	0.679	0.569	0.474	0.464	0.454	0.508	0.503	0.507
	Lviv	0.541	0.520	0.528	0.536	0.475	0.502	0.693	0.677	0.567	0.558	0.523	0.610	0.700	0.581
	Chernivtsi	0.523	0.499	0.541	0.539	0.462	0.506	0.759	0.666	0.532	0.562	0.496	0.526	0.472	0.544
	oblasts' average*	0.531	0.541	0.532	0.554	0.486	0.483	0.686	0.639	0.566	0.508	0.477	0.542	0.574	0.532
Intellectual-human resources	Carpathian region	0.234	0.224	0.154	0.200	0.312	0.249	0.268	0.269	0.312	0.294	0.282	0.272	0.280	0.275
	Zakarpattia	0.165	0.157	0.145	0.149	0.263	0.202	0.196	0.200	0.247	0.198	0.201	0.215	0.197	0.191
	Ivano-Frankivsk	0.154	0.154	0.117	0.156	0.248	0.116	0.180	0.187	0.233	0.224	0.207	0.182	0.206	0.165
	Lviv	0.377	0.353	0.202	0.307	0.456	0.416	0.429	0.419	0.459	0.446	0.442	0.415	0.441	0.455
	Chernivtsi	0.237	0.232	0.151	0.188	0.279	0.261	0.268	0.270	0.311	0.306	0.277	0.274	0.278	0.288
	oblasts' average*	0.291	0.280	0.167	0.242	0.355	0.321	0.307	0.313	0.339	0.328	0.306	0.286	0.314	0.317
Labor motivation	Carpathian region	0.475	0.572	0.436	0.355	0.196	0.356	0.589	0.293	0.557	0.519	0.425	0.377	0.264	0.474
	Zakarpattia	0.450	0.507	0.367	0.283	0.168	0.313	0.560	0.246	0.646	0.766	0.491	0.672	0.546	0.355
	Ivano-Frankivsk	0.532	0.633	0.460	0.372	0.155	0.330	0.579	0.565	0.526	0.336	0.284	0.271	0.439	0.308
	Lviv	0.465	0.511	0.401	0.328	0.128	0.358	0.598	0.179	0.436	0.473	0.351	0.309	0.239	0.534
	Chernivtsi	0.453	0.637	0.518	0.436	0.335	0.423	0.621	0.184	0.618	0.502	0.575	0.255	0.033	0.701
	oblasts' average*	0.476	0.555	0.428	0.390	0.205	0.376	0.541	0.211	0.481	0.418	0.252	0.353	0.167	0.523
Employment and labor market efficiency	Carpathian region	0.389	0.537	0.323	0.310	0.476	0.486	0.343	0.484	0.425	0.351	0.460	0.205	0.278	0.306
	Zakarpattia	0.381	0.583	0.549	0.355	0.519	0.541	0.412	0.532	0.499	0.456	0.515	0.231	0.115	0.276
	Ivano-Frankivsk	0.412	0.541	0.228	0.459	0.507	0.479	0.404	0.369	0.350	0.255	0.482	0.176	0.252	0.300
	Lviv	0.398	0.555	0.225	0.215	0.526	0.537	0.336	0.594	0.531	0.460	0.562	0.241	0.498	0.431
	Chernivtsi	0.364	0.467	0.289	0.210	0.353	0.386	0.219	0.443	0.319	0.231	0.282	0.171	0.248	0.215
	oblasts' average*	0.437	0.516	0.416	0.315	0.482	0.522	0.346	0.508	0.491	0.394	0.503	0.313	0.434	0.426
Institutional capacity of the labor market	Carpathian region	0.198	0.087	0.275	0.434	0.282	0.288	0.400	0.505	0.418	0.413	0.443	0.421	0.463	0.306
	Zakarpattia	0.219	0.132	0.277	0.414	0.288	0.288	0.424	0.380	0.402	0.358	0.373	0.363	0.380	0.247
	Ivano-Frankivsk	0.181	0.038	0.224	0.477	0.237	0.364	0.349	0.521	0.330	0.408	0.454	0.398	0.453	0.338
	Lviv	0.210	0.091	0.348	0.450	0.337	0.267	0.476	0.657	0.578	0.523	0.567	0.529	0.567	0.434
	Chernivtsi	0.183	0.089	0.252	0.396	0.265	0.233	0.351	0.461	0.364	0.363	0.379	0.394	0.453	0.206
	oblasts' average*	0.266	0.141	0.291	0.483	0.326	0.355	0.425	0.501	0.430	0.364	0.408	0.405	0.493	0.279
<b>Composite indices of labor market competitiveness</b>															
Labor market competitiveness (composite assessment)	Carpathian region	0.338	0.207	0.310	0.347	0.280	0.330	0.406	0.351	0.444	0.410	0.415	0.317	0.208	0.339
	Zakarpattia	0.343	0.283	0.373	0.342	0.292	0.350	0.431	0.356	0.480	0.456	0.458	0.367	0.303	0.330
	Ivano-Frankivsk	0.325	0.106	0.280	0.366	0.239	0.252	0.401	0.427	0.384	0.326	0.340	0.258	0.366	0.305
	Lviv	0.372	0.237	0.277	0.349	0.266	0.393	0.451	0.333	0.527	0.490	0.472	0.364	0.094	0.471
	Chernivtsi	0.312	0.201	0.310	0.330	0.321	0.324	0.341	0.287	0.386	0.367	0.390	0.281	0.070	0.250
	oblasts' average*	0.379	0.271	0.299	0.354	0.297	0.384	0.393	0.313	0.438	0.366	0.327	0.333	0.230	0.354

Note: \* based on the 24 oblasts of Ukraine, the city of Kyiv, the Autonomous Republic of Crimea (ARC), and the city of Sevastopol. Since 2014, it has excluded part of the temporarily occupied territories of Donetsk and Luhansk oblasts, and the temporarily occupied territory of the ARC and the city of Sevastopol (Appendix B).