



THE IMPACT OF ECONOMIC INTEGRATION ON LABOR PRODUCTIVITY IN UKRAINIAN REGIONS

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Abstract: The article investigates the disparities in spatial regional economic structure of Ukraine based on comparison of indexes of regional employment diversification in different types of economic activity, indexes of geographical attractiveness of regions and regional indexes of economic integration with European countries and the CIS. An econometric model of regional labor productivity dependence on the level of economic integration and a number of factors based on panel data for 2008 and 2013 is constructed. Elasticity of labor productivity by regional indexes and the share of employees in services is estimated. A significantly positive impact of diversification of economic activities in the economic structure of the region is detected. The advantages, feasibility and perspectives of economic integration of Ukraine with the European Union are substantiated.

Keywords: economic integration, labor productivity, diversification index, sectors of economy, employment, geographic attractiveness index, econometric model, elasticity, empirical analysis, Ukraine.

Introduction

Globalization of the world economy, which is caused by increased international cooperation, scientific and technological achievements, changes in the nature of human labor takes place rather quickly and intense. The intensification of economic integration processes taking place in the global economy in general and in Ukraine in particular requires a deepening of scientific researches of their impact on effective functioning of national economy and resolving the existing in Ukraine problem of development imbalances in separate regions. Overcoming disparities in regional development and rise in the competitiveness of domestic labor market will allow increasing rates of economic growth and labor productivity.

In Ukrainian scientific literature many works are dedicated to problems of regional unevenness. In particular, Klebanova et al. (2011) proposed their author algorithm for evaluation and analysis of regional development unevenness and implemented it for the Ukrainian regions. Simkiv (2013) studied the asymmetry of Ukrainian regional development and suggested ways of its overcoming. A number of Ukrainian scientists use mathematical and econometric methods of modeling in their works for studying regional convergence processes and differentiation of spatial patterns. Guryanova et al. (2013) used the Baumol model, spatial lag model and model of conditional convergence with spatial error. Ukrainian scientists also indicate that unevenness and disparities in socio-economic development of Ukrainian regions is one of the obstacles to the deepening of integration processes (Ortina, 2014). Foreign scientists Gangl (2002), Niebuhr and Stiller (2006), Obradovic (2008) investigate problems of integration and regional unevenness and their works show that each country differently adapts to the integration processes in economic activity. In particular, Buccella (2011) conducted a review of theoretical and empirical results which estimate the impact of economic integration and internationalization on the European labor market. Maes and Quaglia (2003) substantiate the benefits of European integration in the field of monetary policy. Kallioras and Petrakos (2010) by using econometric models examined the impact of economic integration on the growth of industrial employment in the new member states of the European Union and the relationship between their structural characteristics and geographical attractiveness of the regions.

Data and Indexes

Study of unevenness in the spatial regional structure of Ukrainian economy requires an analysis of the features of economic activity spatial distribution. Empirical research of nominal employment in different regions of Ukraine for the past 10 years detects significant regional differences in the dynamics of a

percentage change in the total number of employees and number of people employed in various sectors. Particularly, in half of the regions a growth in nominal employment can be observed despite the fall in population although in some regions the rate of nominal employment decreased. At the same time the number of employed in industry is characterized by negative growth rates in all regions of Ukraine, which is an average of 17.5%. Percentage change of employees in the regional agriculture is characterized by higher variation than in general or industrial employment, and a large left-sided asymmetry.

To measure the unevenness in allocation of economic activity in the Ukrainian regions it is necessary to calculate the value of regional Theil index $T_r = \sum_{i=1}^m (e_{ri} / e_r) \log(e_r / e_{ri})$, where e_{ri} – share of employed in the i -sector of the r -region in the national economy, e_r – total share of employed in the r -region. Calculations show that different regions of Ukraine can be characterized by a various degree of specialization by sectors of economy that moreover shows different trends over time. Should be noted that in most regions sectoral diversification strengthened over time for the entire period from 2004 to 2013. In particular the areas where Theil-index in 2004 was higher than the average in Ukraine by 2013 showed its relative diversification decrease, while those areas that were characterized by relatively low Theil-index at the beginning and thus a higher degree of sectoral specialization, on the contrary increased their relative diversification (Fig. 1).

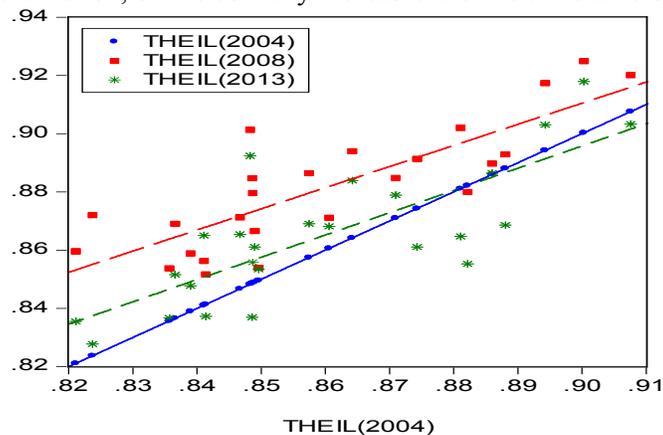


Fig. 1. Change of sectoral diversification indexes for 2004 - 2013.
Source: evaluation of the authors.

To determine the level of regional economic integration it is necessary to estimate regional economic integration indexes $RIEI_{r,t} = \sum_{i=1}^m (IEI_{i,t} \times LQ_{ri,t})$, where $LQ_{ri} = (EMPL_{ri} / EMPL_r) / (EMPL_i / EMPL)$ – coefficients of regional-sectoral distribution, $IEI_{i,t}$ – indexes of economic integration at the national level for each economy sector (i) and for the year (t). They are defined in particular with European countries as $IEI(EUR)_{i,t} = TRADE(EUR)_{i,t} / TOTALTRADE_{i,t}$, where $TRADE(EUR)_{i,t}$ – volume of trade with European countries in i -sector in t -year, $TOTALTRADE_{i,t}$ – total trade volume of i -sector with the world in the t -year. Fig. 2 shows the calculated indexes of economic integration of agriculture and industry with the economy of European countries and similarly determined indexes of integration with the economies of the CIS in 2013. Analysis of regional integration detects that regional agriculture is integrated with European countries, while the industry is integrated with CIS countries.

The next step is to define the index of geographical attractiveness of each region by means of formula $GRAVITY_r = \sum_j (POP_r \times POP_j / d_{rj})$, where POP_r – population in the r -region for which the index is calculated; POP_j – population in the j -region ($j = 1, \dots, 25, j \neq r$); d_{rj} – distance between the centers of r and j regions. The GRAVITY-index acquire values greater than 0 and reflects the degree of geographical accessibility and market potential of each region (Fig. 3a).

Analysis of regional GRAVITY-indexes shows that the most accessible and geographically attractive as to others are Dnipropetrovsk, Donetsk, Kharkiv, Zaporizhia, Lviv, Odessa, Lugansk and Kiev regions, while the Volyn, Zakarpattia, Sumy, Chernivtsi and Chernihiv regions can be classified as the most peripheral areas of Ukraine.

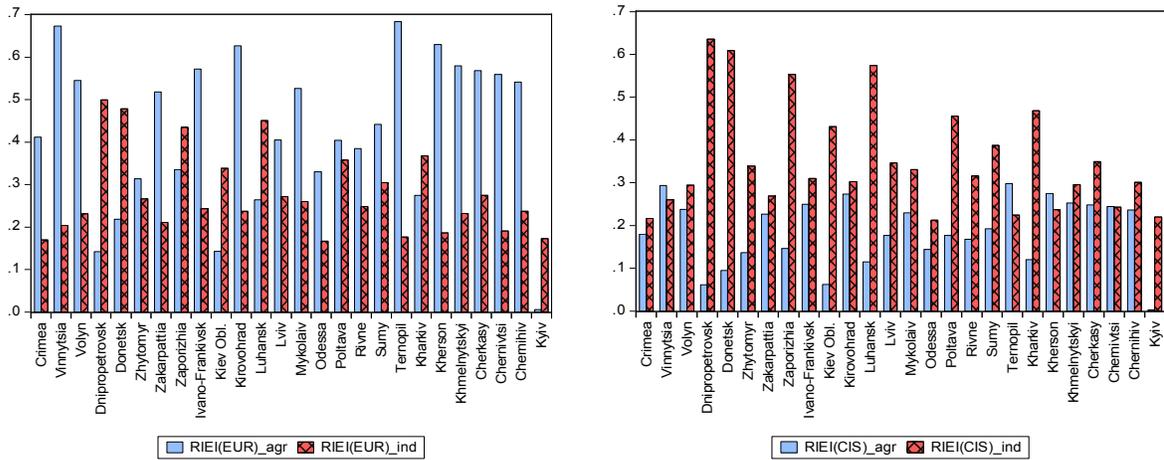


Fig. 2. Indexes of agriculture and industry integration with European countries and the CIS
Source: evaluation of the authors.

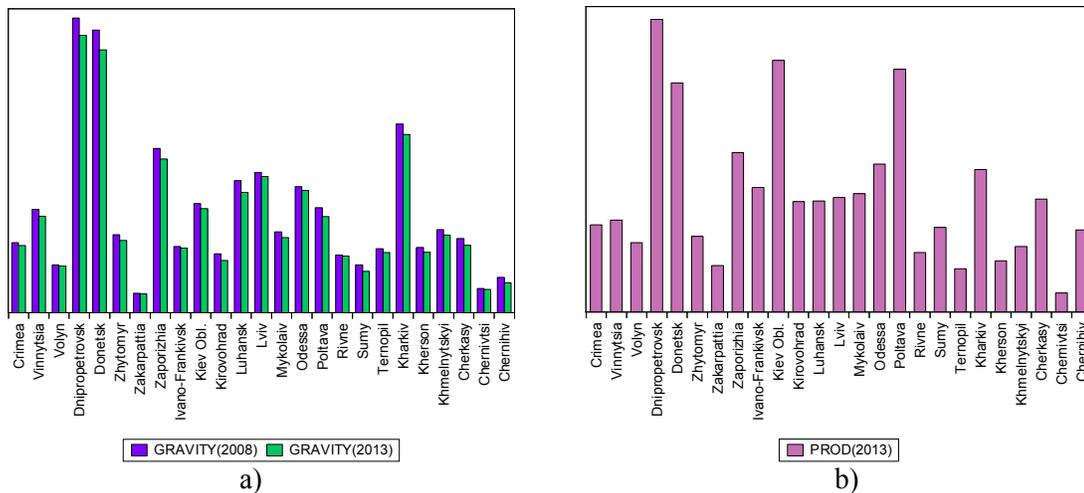


Fig. 3. Regional indexes of a) geographical attractiveness and b) labor productivity.
Source: evaluation of the authors.

Study of productivity in each region shows that in 2013 the highest labor productivity was observed in Dnipropetrovsk, Kyiv and Poltava regions and it was three times higher than the corresponding values in such areas with low productivity as Zakarpattia, Ternopil and Chernivtsi regions (Fig. 3b).

Econometric model and result

Empirical studies of the relationship between labor productivity in regions of Ukraine, uneven development of regions and the level of integration processes is conducted on the basis of econometric model

$$\log PROD_{rt} = \alpha_{1t} + \alpha_{2t} E_serv_{rt} + \alpha_{3t} REIE(EUR)_{rt} + \alpha_{4t} REIE(SND)_{rt} + \alpha_{5t} \log GRAVITY_r + \alpha_{6t} \log T_r + \varepsilon_{rt} \tag{1}$$

where $PROD_{rt}$ indicates labor productivity in the r -region in t -year, $E04_serv_r$ – share of employed of r -region in the service sector in t -year. The estimation of the model parameters for two different years, namely 2008, which preceded the beginning of economic crisis, and 2013 was conducted. Results of the modeling are shown in Table 1. ***, ** and * indicate significance of the coefficients at 1%, 5% and 10% levels; p-value in parentheses ().

Analyzing the results of the model evaluation (1) we get that in 2008 the labor productivity was significantly depended on the geographical location of the region, whereas in 2013 productivity was influenced by indexes of economic integration, Theil-index of unevenness and share of workers employed in services. The estimated of productivity elasticity by Theil-index shows that increase in the regional index of diversification by 1% causes productivity growth of 7.2%.

Table 1

The Results of Evaluation of Labor Productivity Models

Variable	The Equation for			
	log <i>PROD</i> (2008)		log <i>PROD</i> (2013)	
	Coefficient	t-Statistic	Coefficient	t-Statistic
<i>Const</i>	-8.9602	-2.231**	-16.2174	-3.894***
<i>E_serv</i>	3.3615	0.857	0.1188	3.468***
log <i>T</i>	3.0137	1.397	7.2349	3.678***
log <i>GRAVITY</i>	0.3567	3.27***	0.3547	3.668***
<i>REIE(EUR)</i>	-0.0028	-0.429	0.0574	3.209***
<i>REIE(SND)</i>	0.0318	1.841*	0.0174	3.473***
R-squared	0.8206		0.8264	
Adjusted R-squared	0.7734		0.7807	
F – Statistic	17.3829 (0.0000)		18.0887 (0.0000)	
White Statistic	1.6866 (0.1862)		0.8011 (0.5626)	
BPG Statistic	1.8032 (0.1604)		1.1278 (0.3794)	

Conclusions

The obtained modeling results show that the higher degree of diversification of industries in the economic structure of the region determinate much better opportunities for reallocation of existing human resources to existing and safer alternative economic activities, and as a result a decline in some sectors does not leads to a decline in the regional economy as a whole. Furthermore acquired new skills and diversification of employees work experience expand the possibilities for entrepreneurship, especially in regions where the workers move not only between different companies, but also between different sectors of economy. Statistical significance of gravity index indicates that the geographical location has a significant impact on productivity in the region. The positive and stable over time value of the coefficient shows that peripheral areas have less potential for labor productivity growth and require an increased attention to the development and implementation of innovative regional development strategies. The modeling also detects that an increase in the index of regional economic integration with European countries as well as with CIS stimulates labor productivity growth. However coefficients of elasticity for European countries and the CIS are different and accordingly are 5.7 and 1.7, indicating the advantages, feasibility and perspectives of Ukraine's integration with the European Union.

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