

## COMPARATIVE ANALYSIS OF CURRENT TRENDS IN WAGE DYNAMICS IN UKRAINE AND IN THE EUROPEAN UNION

*The purpose of the current research is the systematic analysis of the current state of the labor market in Ukraine in the context of the regional wage formation. Detailed literature reviews indicated lack of research on wage dynamics in Ukraine, which determines the relevance of the conducted study. During the research, the following methods have been used: general scientific methods of system analysis and synthesis; generalization, systematization, and grouping of data; modern statistical and mathematical instruments, in particular, methods of the system dynamics.*

**Study results.** *The comprehensive empirical assessment of the wage dynamics revealed the presence of the significant gap in the labor market development between Ukraine and European countries. Similar findings were also confirmed by the estimation and realization of the elaborated system dynamic model of the Ukrainian labor market. Overall, there are several possible explanations of the occurred regional wage divergence in the labor market. On the one hand, it may be caused by the huge variation in housing costs between regions. The cost of living in metropolitan areas, innovation centers and business areas are much higher than in the periphery in Ukraine. On the other hand, not all factors are appeared to be mobile across regions. Moreover, it was also interesting to analyze structural changes in employment across all Ukrainian regions. Calculation of the CSC correlation value indicated that Ukrainian regions have experienced different scale of structural shifts in employment affected by macroeconomic and financial instability.*

**Conclusions.** *An empirical assessment of the wage dynamics over the years and testing of the wage convergence hypothesis showed that EU members demonstrate income converging pattern: those with the lowest initial net income level (Romania, Bulgaria, Baltic states, Hungary, etc.) demonstrated the highest growth rate in wages. In contrary, regional wage analysis revealed that in Ukraine the highest growth rates are presented in the most industrially developed regions, such as Kyiv, Zaporizhzhia, Dnipropetrovsk, Donetsk, Luhansk (before ATO), Mykolaiv, etc. Such the pattern is called wage divergence and it is not a favorable phenomenon in the context of the sustainable regional development of the country. This trend only exacerbates existing internal imbalances in the regional development of Ukraine: highly developed regions and agglomeration continue to develop at a rapid pace, while the periphery is in a situation of economic and demographic stagnation. Consequently, the main goals of the state policy in the field of labor market stabilization should be enhancing wage bargaining by efficient activity of the trade unions; advanced revision of the tax legislation in order to formalize the shadow share of the labor market; the reduction of unemployment through the efficient use of labor resources and the creation of new jobs, which will favorably contribute to the country's economic growth in the future.*

**Keywords:** labor market, market equilibrium, wage convergence, structural changes, employment, system dynamics methods.

**JEL classification:** E24, C19, C46

**Introduction and research problem.** The state of the labor market is one of the important socio-economic parameters that have a significant effect on the social development and competitiveness of the national economy of the country. Labor market plays a leading role in ensuring the success of market reforms, especially in the emerging economies. It is important to highlight the fact that the current state of the Ukrainian labor market is affected by the complex political and economic situation. State of the national labor market is generally characterized by a

continuous recession, the ongoing decline in production, financial imbalances in the economy, high external and internal migration flows in the context of the military conflict in the east region and temporary occupation of the Autonomous Republic of Crimea. This leads to the rapid development of negative destabilizing processes on the labor market: excessive differentiation in the income level of the population; increase in unemployment; "brain drain"; population ageing; growth of emigration flow, especially among young people in the country, etc.

Considering above mentioned unfavorable aspects of labor development in Ukraine, the main aim of this research is to conduct the in-depth analysis of the main areas of the labor market destabilization in response to internal shocks. In particular, the main focus of the conducted analysis was to evaluate the impact of the crisis on wage dynamics and to check the relevance of the wage convergence hypothesis in Ukraine.

**Recent publications analysis.** The literature review shows that numerous scientific works of Ukrainian and foreign scholars are devoted to the investigation of the current state, development level and organizational structure of the labor market; assessment of its impact on socio-economic development and macroeconomic stability; determining the main risks of the labor market destabilization; the simulation of processes characterizing the dynamics of the labor market during different periods of economic development and other relevant issues. The problems of theoretical and methodological foundations of the functioning of the national labor market as well as the definition of its main structural elements, an overview of the modern problems and trends for the further development of the domestic labor market has been reflected in the scientific developments of O. Vorontsova [1], S. Grinkevich [2], O. Grishnova [3], T. Klebanova, L. Guryanova [4], V. Onikiyenko, L. Tkachenko, L. Emelyanenko [5], and others.

The application of mathematical methods and modeling tools to the empirical study of complex interactions between the labor market and other sectors of the economy as well as connections between the structural elements of the labor market itself (in particular the impact of macroeconomic shocks on the functioning of the labor market and a wide range of other problems) have been reflected in scientific papers of O. Blanchard, J. Wolfers [6], I. Lukianenko, M. Olishevych [7], A. Novik [8], H. Ohlsson [9], K. Forni, F. Furlanetto [10], and others.

The question of internal labor inequality and regional wage convergence has been addressed in the

analytical papers conducted by G. Borjas [11], P. Ganong and D. Shoag [12]. In this context a critical open research question is whether a strong negative relationship between the rate of wage growth and the initial wage level exist in developed as well as developing regions, for instance, in Ukraine.

**Unsolved parts of the problem.** In spite of a sufficiently wide range of studies and a large number of works related to the analysis of the labor market stability, most papers in this field have only been on descriptive nature and more focused on the statistical analysis of the state of the labor market in Ukraine. Nevertheless, the dynamic nature of both the labor market itself and socio-economic stability of Ukraine, as well as ongoing integration to the European Union, require to conduct comprehensive research on wage dynamics in Ukraine and the EU, define its main trends and patterns.

**Research goal and questions.** Thus, the major objective of this study was to develop a systematic analysis of the current state of the labor market and to analyze wage dynamics in Ukraine in comparison with the European Union. This paper also provides an insight on the scale of the structural changes in employment from the regional perspective in Ukraine during the recent decade.

**Main findings.** According to the last published Global Wage Report 2018 by ILO, overall wage growth in 2017 was not only lower than in 2016 but fell to its lowest growth rate since 2008, remaining far below the levels obtaining before the global financial crisis. Considering sluggish wage growth, the acceleration of economic growth in high-income countries in 2017 was driven mainly by higher investment spending, rather than by private consumption [13].

On the other hand, in Ukraine, the average wage has demonstrated significant growth of 24 % in 2018 compared to the previous year. Table illustrates the dynamics of average monthly wages in Ukraine by types of economic activity during the last 9 years.

Table. Dynamics of average monthly wages by types of the economic activity in 2010–2018 years, UAH per employee

Economic activity	2010	2011	2012	2013	2014	2015	2016	2017	2018
<b>Total</b>	2250	2648	3041	3282	3480	4195	5183	7104	8865
<i>Agriculture, Forestry and Fisheries</i>	1467	1852	2094	2344	2556	3309	4195	6057	7557
<i>Industry</i>	2578	3119	3497	3774	3988	4789	5902	7631	9633
<i>Construction</i>	1777	2294	2543	2727	2860	3551	4731	6251	7845
<i>Wholesale and retail trade; repair of motor vehicles and motorcycles</i>	1898	2371	2739	3049	3439	4692	5808	7631	9404
<i>Transport, warehousing, postal and courier activities</i>	2648	3061	3405	3582	3768	4653	5810	7688	9860
<i>Food supply</i>	1424	1750	2020	2195	2261	2786	3505	4988	5875

Table (cont'd)

Economic activity	2010	2011	2012	2013	2014	2015	2016	2017	2018
<b>Total</b>	2250	2648	3041	3282	3480	4195	5183	7104	8865
<i>Information and telecommunications</i>	3185	3705	4360	4659	5176	7111	9530	12018	14276
<i>Finance and insurance</i>	4695	5433	6077	6326	7020	8603	10227	12865	16161
<i>Real estate</i>	1864	2184	2384	2786	3090	3659	4804	5947	7329
<i>Professional, scientific and technical activities</i>	2914	3575	4287	4505	5290	6736	8060	10039	12144
<i>Administrative and auxiliary services</i>	1826	2162	2298	2546	2601	3114	3995	5578	7228
<i>State administration and defense; compulsory social insurance</i>	2735	3049	3432	3719	3817	4381	5953	9372	12698
<i>Education</i>	1884	2077	2532	2696	2745	3132	3769	5857	7041
<i>Health care and social security</i>	1616	1762	2186	2351	2441	2829	3400	4977	5853
<i>Art, sport, entertainment</i>	2129	2394	3017	3343	3626	4134	4844	6608	7612
<i>Other services</i>	1742	2062	2601	2738	3361	3634	4615	6536	8132

Source: by authors based on the data from [14]

From the table below it could be clearly seen that the financial sector produces the highest level of average wages. By contrast, the average wage for health care workers is 2,76 times lower than for the financial sector employees. It is worth noting that this disproportion creates additional conditions for the shadowing of sectors of the economy where the lowest wage level is observed such as health care, education, food supply, etc.

Despite the fact that the average wage in Ukraine has a tendency to grow significantly during last periods, at the same time, we should keep in mind that at the beginning of 2017 the minimum wage in Ukraine was doubled in size compared to the previous year. Such administrative influence reflected on the average wage amount across different sectors of the economy.

Figure 1 summarizes the fluctuations of the most influential factors for the observed average

wage changes. On the graph dynamics of the inflation rate in comparison with average and minimum wage growth in Ukraine is presented. From the figure below we can see that average growth precisely follows the pattern of the minimum wage up to 2017 when the government increased the minimum wage by 100 %.

If we look at the inflation curve, dotted line, it becomes obvious that an administrative decision was taken to balance the negative effects of the 2013 crisis: a significant increase in inflation and a devaluation of the national currency. The rapid rise in the minimum wage increases the total cost for entrepreneurs spend on the wage fund. The main burden falls on the shoulders of small and medium-sized businesses, which is not able to pay for work for the number of employees that it had before. For instance, over the past 3 years, there has been a drop in the total number of enterprises in Ukraine,

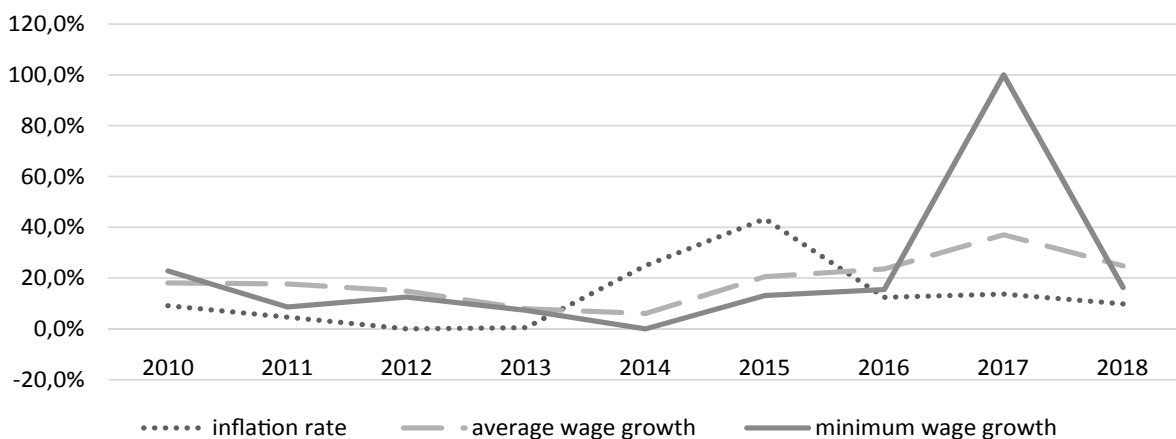


Fig. 1. Dynamics of the inflation rate in comparison with average and minimum wage growth in Ukraine, %

Source: by authors based on data from [14; 15]

according to the data provided by the State Statistics Service. Thus, the establishment of wages is an extremely powerful mechanism which may determine labor market stability.

The balanced labor market appears when the supply of potential employees is equal to the demand of the needed workforce. Hence, labor market equilibrium occurs when neither a labor excess nor a labor deficit is observed in the job market. This equality becomes possible due to an efficient allocation of the desired amount of labor resources to firms that maximizes the total gains from trade in the labor market. Namely, the *competitive equilibrium* is that state of the market when it produces an efficient allocation of labor resources. Moreover, wages stabilized on the equilibrium level and stayed constant. Interestingly, in a competitive equilibrium, the wage equals the value of the marginal product of labor. Therefore, workers of given skills have the same value of the marginal product of labor in all regional job markets [16].

However, a modern industrialized economy is continually subjected to many shocks that affecting both the supply and demand sides of the system. It is unlikely, therefore, that the labor market actually ever reaches a stable equilibrium – with wages and employment remaining at a constant level for a long-run period. Nevertheless, the concept of labor market equilibrium remains useful to focus on because it helps to reach a better understanding of the reasons why wages and employment fluctuate in response to particular economic or political events. As the labor market reacts to a particular shock, wages and employment will tend to move toward their new equilibrium level.

The research of G. Borjas [11] summarizes the key data underlying the study of wage convergence across states in the United States in 1950–1990. The main outcome of the paper was the presence of a strong negative relationship between the rate of wage growth and the initial wage level. Such behavior is caused by the rapid wage growth of those states with the lowest wages in 1950. It has been estimated that about half the wage gap across states disappears in about 30 years. The evidence indicates, therefore, that wage levels do converge over time, but it may take some time before wages are equalized across markets.

However, now economists observe the growing divide between the higher-skilled, more educated workers and the lower-skilled, less educated workers in the USA. This phenomenon is increasingly referred to as the Great Divergence. As the previous study illustrates, the wage divergence was not a common pattern for the US economy during the

20<sup>th</sup> century (the incomes of workers actually converged, both across skill groups and across regions of the country), but things have changed dramatically in just the past few decades. Economists P. Ganong and D. Shoag [12] were challenging the issue of the Great Divergence across states. Their findings proved that convergence slowed to less than half its historical pace between 1990 and 2010. That means a weakening of the correlation between the initial wage level of the state and the scale of its further growth. As long as growth no longer did correlate with lower wages to encourage economic growth in the USA, socio-economic inequality will develop across the country.

Overall, there are several possible explanations of regional wage divergence in the labor market. Let us review the main reasons for wage divergence. Firstly, it is further magnified by the huge variation in housing costs between states. The cost of living in metropolitan areas, innovation centers and business areas is much higher than in the periphery. The result is a sorting process by which knowledge workers concentrate in large, dense, more innovative and productive locations, while service workers are relocated to other parts of the country with lower housing costs. Secondly, not all factors are mobile across regions. Workers and firms interact in regional labor markets, determining wages and prices. Although firms and their employees may respond quickly to changes in local market conditions, some factors that are unique to a region, such as geographic and climatic characteristics, remain the same. These immobile, site-specific features are referred to here as *amenities*: consumptive amenities apply to households and productive amenities apply to firms. A few examples of potential sources of consumptive and productive amenities indicate their conceptual breadth and complexity. The prototypical consumptive amenity includes familial or historical ties to an area, region-specific recreational activities, community spirit, and the quality and age of the housing stock. Port facilities are an excellent example of a productive amenity since they can lower transportation costs for firms located nearby. Productive amenities also include low-cost distribution channels, informational advantages provided by firms' proximity to other similar producers or suppliers, and state or local government protections or restrictions pertaining to local businesses [17]. Interpreting regional wage divergence is a complex process. Another possible source of apparent convergence or divergence in regional wages and prices is the economy's constant adjustment to a stream of shocks. The demand for and supply of labor in an area may be radically altered by technological changes or shifts in consumer

preferences. Although households and businesses are mobile, adjustment delays may result in temporary periods of divergence. Studies by Eberts and Stone (1992) and Blanchard and Katz (1992) suggest that the adjustment period to a local labor-market shock may be as long as 10 years. At the same time, G. Borjas in his paper states that it takes around 30 years for the equilibrating flows to cut interstate income differentials by half.

Below figure 2 presents the results obtained from the preliminary analysis of wage dynamics across the regions of Ukraine over the 16-year span. Here horizontal axis represents initial average wage level (base year – 2002) and the vertical axis refers to income growth across all regions of Ukraine (excluded the Autonomous Republic of Crimea) during 2002–2018.

The most striking result to emerge from the data is that in Ukraine the similar trend (wage divergence) is observed as in the USA during the past few decades. Despite the fact that Kyiv remains to be an outlier, the highest value of initial income (average wage level) and growth rates are demonstrated by the most industrially developed regions of Ukraine, such as Zaporizhzhia, Dnipropetrovsk, Donetsk, Luhansk (before ATO), Mykolaiv, etc. On the other side, Western regions of Ukraine show a slow growth of the income level. Hence, it could conceivably be hypothesized that there is a weak business activity which resulted in low demand for skilled labor and creates a high stimulus for the well-educated workers to migrate to the neighboring EU countries (Poland, Hungary). Wage divergence is not a favorable phenomenon in the context of sustainable development of all regions of the

country. This trend only exacerbates existing imbalances in the regional development of Ukraine: highly developed regions and agglomeration continue to develop at a rapid pace, while the periphery is in a situation of economic and demographic stagnation.

Mentioning neighboring countries which are EU members, it is encouraging to test the hypothesis of income divergence for the EU applied the same methodology as for Ukrainian regions case study. The scatterplot below (see figure 3) illustrates the results obtained from the net income analysis over a 4-year period.

The horizontal axis represents the initial average net income level (base year – 2014) and vertical axis refers to income growth during 2014–2018 for all members of the EU. It could be clearly seen that EU members demonstrate income converging pattern: those with the lowest initial net income level (Romania, Bulgaria, Baltic states, Hungary, etc.) showed the highest growth rate in wages at the same time in the highly-developed countries (Denmark, the United Kingdom, Luxembourg, etc.) the income growth slowed down and even a slight reduction in wages has occurred.

To understand the wage convergence observed in EU during the recent periods let's look at the annual GDP per capita growth of one of the countries which demonstrate the biggest surplus in wages (Romania, Latvia, Hungary), the smallest (the UK, Denmark) and the overall EU level (see figure 4).

The graph above illustrates that economic growth creates possibilities for wage convergence. These countries were chosen, due to its obtained maximum and minimum surpluses in previous

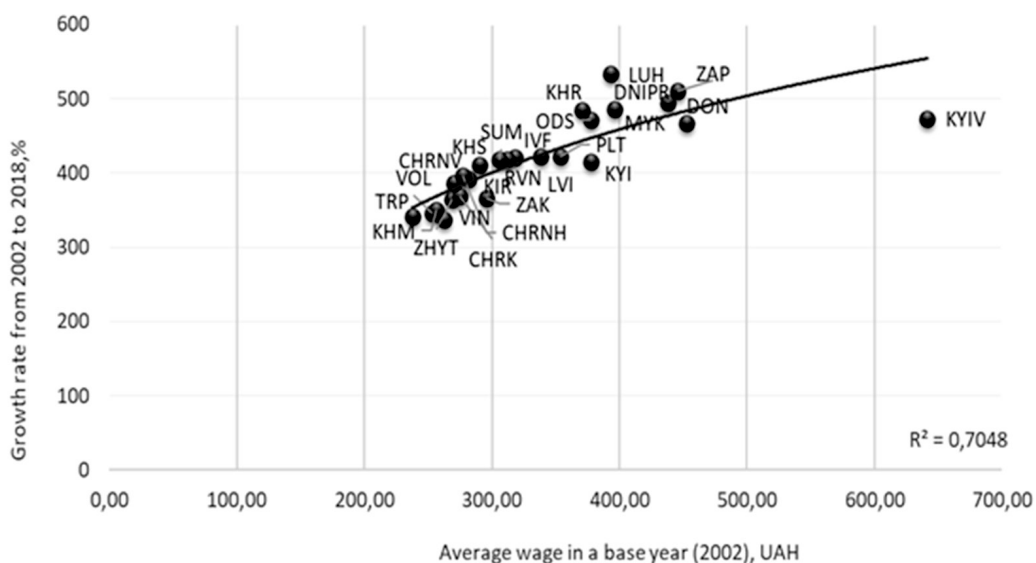
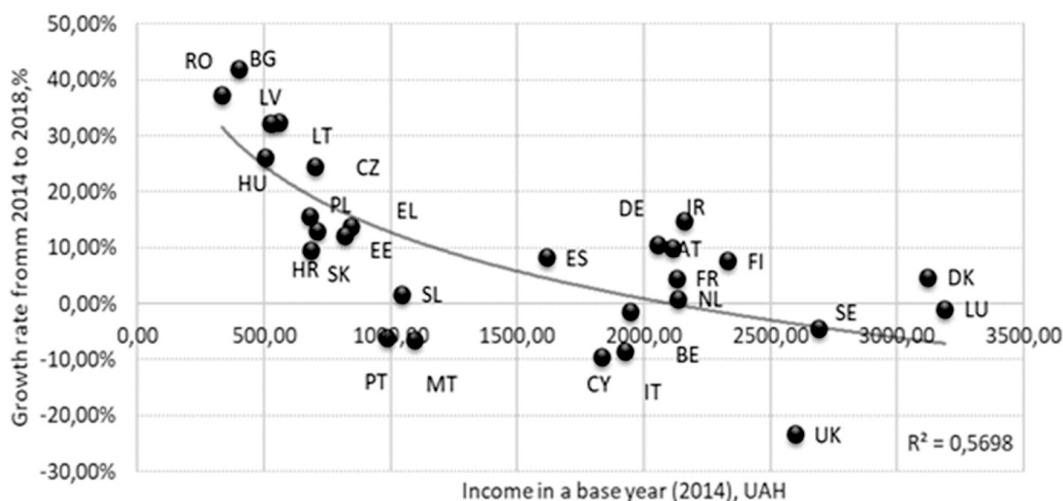
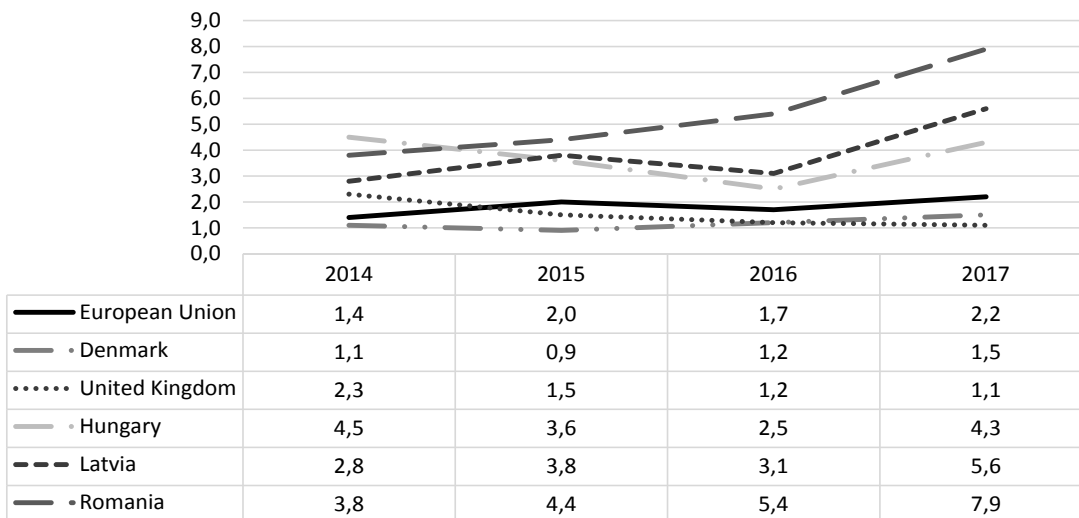


Fig. 2. Wage divergence across the regions of Ukraine 2002–2018  
 Source: by authors based on data from [14]



**Fig. 3.** Wage convergence across the EU members in 2014–2018  
 Source: by authors based on data from [18]



**Fig. 4.** Annual GDP per capita growth across the chosen EU members in 2014–2017, %  
 Source: by authors based on data from [19]

wage convergence analysis (see figure 3). Romania, Latvia, and Hungary have an annual growth rate of GDP per capita was higher than the average EU level during the last years. Denmark and the United Kingdom, on the contrary, demonstrates lower GDP growth compared to the average EU rate over the last periods. Nevertheless, it could be clearly seen that regional equalization is impossible without overall economic development both in the labor and capital markets.

Considering labor market indicators dynamic from the local perspective, it is interesting to analyze structural changes in employment across all Ukrainian regions. I. Lukianenko and M. Olishevych [20] in 2017 as well as D. Kallioras, G. Petrakos in 2010 examined regional fluctuations in employment in Ukraine and the EU respectively

by estimation of the coefficients of structural change (CSC) proposed by P. Havlik [21]. The formula for calculation of the CSC for each region of Ukraine is presented below:

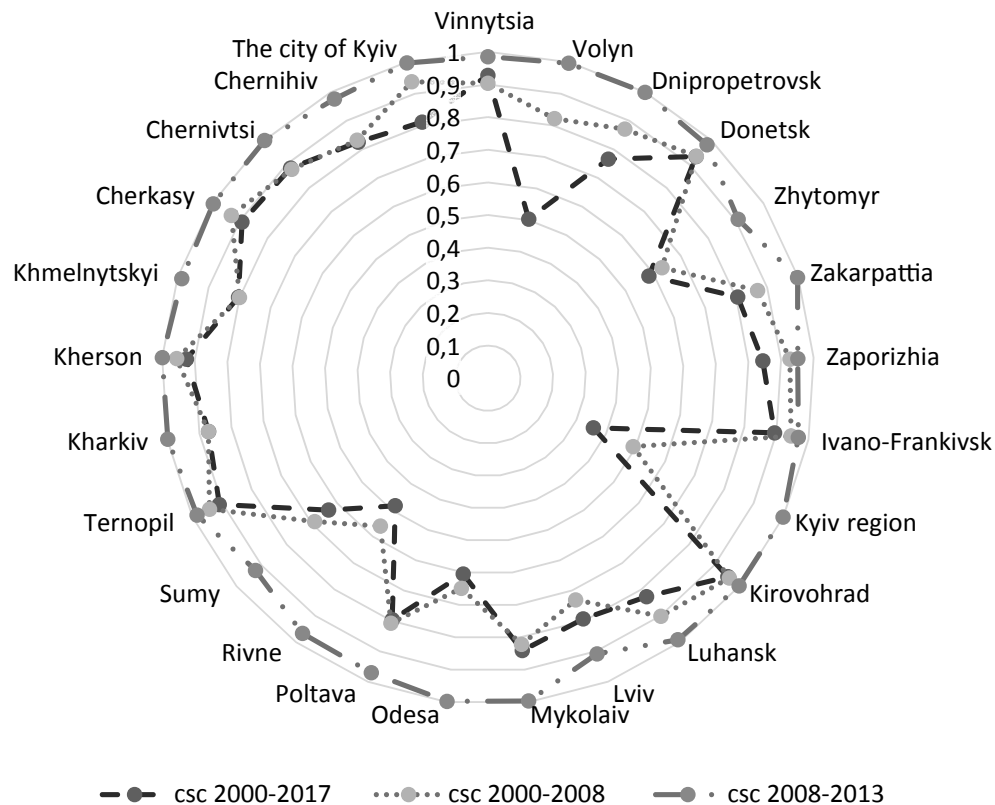
$$CSC = (X_{i,t}, X_{i,t+k}),$$

where  $X_i$  – number of employees in i-sector of economy,

$t$  – the base year,

$k = 1, 2, 3, \dots, T$  years after the base year.

Values may vary from 0 to 1. High values of the CSC indicate that the sectoral distribution of employment in the current and the base year is very similar, whereas respective low values of the CSC indicate that significant structural changes have taken place. Figure 5 below represents the calculated values of the CSC.



**Fig. 5.** Coefficients of Structural Change (CSC) for the various periods (2000–2017, 2000–2008, 2008–2013) across the regions of Ukraine  
*Source:* by authors based on data from [14]

The lowest value obtained was 0.35 and the highest 0.99. Time horizon under study is 17 years from 2000 to 2017 and it was divided into three periods:

- Before world crisis of 2008 (2000–2008);
- Between two crises of 2008 and 2013 (2008–2013);
- Overall 17-year span (2000–2017).

Naturally, the longer the period under study the more structural changes have occurred and vice versa. It becomes more interesting to look at the regional differences:

- Regions with significant structural changes in employment: Volyn, Zhytomyr, Kyiv (as region), Odesa, Rivne, and Sumy;
- Regions with minor structural changes in employment: Ivano-Frankivsk, Kirovohrad, Ternopil, Kherson, Cherkasy, Vinnytsia. Although Donetsk and Luhansk also demonstrated weak changes in employment, data for these regions may not be reliable due to anti-terrorist operations (ATO).

However, obtained results indicate that the speed of structural change cannot be considered as a priori positive or negative condition for industrial performance. The levels of CSC are not able to reveal the way that each region responded to the pressures

received through their contact with the destabilizing factors, business conjuncture forces, and international environment. What could be clearly seen, in contrary, is that Ukrainian regions have experienced the different scale of structural shifts in employment affected by macroeconomic and financial instability. Hence, to ensure steady economic development we should take into account existent labor market patterns and adapt the socio-economic policy to the existent regional divergence in Ukraine.

#### **Conclusions and further research proposals.**

Our research provides a comprehensive analysis of the impact of economic development on wage dynamics as well as overall labor market stability. In particular, we tested the hypothesis of the internal and external wage convergence across European countries and Ukrainian regions. The results of this study indicate the presence of wage divergence among the Ukrainian regions: such a trend only exacerbates existing imbalances in the regional development of Ukraine. Highly developed regions and agglomeration continue to develop at a rapid pace, while the periphery experiences an economic and demographic stagnation. Regional wage imbalances negatively influence various aspects of the labor market, which reflects in the continuous trends such as the following:

- diminishing labor participation rate;
- presence of the large share of the informal economy;
- low productivity level;
- rising migration outflow;
- inefficient workforce distribution across sectors of the economy.

It is worth mentioning that comparison with the EU demonstrates a significant gap between the level of labor market development in Ukraine and in

European countries. Consequently, the main goals of the state policy in the field of the labor market stabilization should be enhancing wage bargaining by the efficient activity of the trade unions; advanced revision of the tax legislation in order to formalize the shadow share of the labor market; the reduction of unemployment through the efficient use of labor resources and the creation of new jobs, which will favorably contribute to the country's economic growth in the future.

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## ПОРІВНЯЛЬНИЙ АНАЛІЗ СУЧАСНИХ ТЕНДЕНЦІЙ ДИНАМІКИ ЗАРОБІТНОЇ ПЛАТИ В УКРАЇНІ ТА ЄВРОПЕЙСЬКОМУ СОЮЗІ

Метою цього дослідження є системний порівняльний аналіз сучасного стану ринку праці в країнах Європейського Союзу та в Україні в контексті особливостей формування заробітної плати на регіональному рівні. Детальний огляд літератури виявив незначну кількість досліджень за цією тематикою та дав змогу обґрунтувати її актуальність та важливість, зокрема в частині визначення особливостей сучасних тенденцій динаміки заробітної плати в Україні в регіональному розрізі. У процесі дослідження використовувалися такі методи: загальнонаукові методи системного аналізу та синтезу; узагальнення, систематизація та групування даних; сучасні статистичні та математичні інструменти, зокрема методи системної динаміки.



Комплексна емпірична оцінка динаміки заробітної плати виявила значний розрив у рівні розвитку ринку праці в Україні та в країнах Європейського Союзу. Аналогічні висновки також були підтверджені оцінкою та аналізом результатів розробленої системної динамічної моделі українського ринку праці. Загалом, існує кілька можливих пояснень спостережуваної регіональної дивергенції заробітної плати на ринку праці України. З одного боку, регіональна асиметрія оплати праці може бути спричинена різницею у вартості життя. Вартість проживання в мегаполісах, інноваційних центрах та сферах бізнесу значно вища, ніж на периферії України. З іншого боку, значна кількість бар'єрів може ускладнювати процес релокації трудових ресурсів у межах країни. Крім того, було проаналізовано зміни у структурі зайнятості в усіх регіонах України. Розрахунок значення кореляції (CSC) показав, що українські регіони зазнали різного масштабу структурних змін у сфері зайнятості, що є ознакою нерівномірного розвитку регіонів країни і впливає на макроекономічну та фінансову стабільність.

Емпіричний аналіз динаміки заробітної плати та тестування гіпотези щодо наявності конвергенції заробітної плати показав, що країни-члени ЄС демонструють конвергентний дохід: ті, що мають найнижчий початковий рівень чистого доходу (Румунія, Болгарія, країни Балтії, Угорщина та ін.), наприкінці досліджуваного періоду продемонстрували найвищі темпи зростання заробітної плати. Натомість регіональний аналіз заробітної плати показав, що в регіонах України простежується дивергенція заробітної плати: найвищі темпи зростання спостерігаються в більшості промислово розвинених регіонів, як-от Київ, Запоріжжя, Дніпропетровськ (Дніпро), Донецьк, Луганськ (перед АТО), Миколаїв та ін. Така структура оплати праці в країні не є сприятливим явищем у контексті сталого регіонального розвитку. Ця тенденція лише посилює регіональні дисбаланси в регіональному розвитку України: високорозвинені регіони швидко розвиваються, а периферія перебуває в стані економічної та демографічної стагнації. Отже, основними цілями державної політики у сфері стабілізації ринку праці має стати підвищення ефективності діяльності професійних спілок; вдосконалений перегляд податкового законодавства з метою формалізації частки ринку тіньової праці; скорочення безробіття через ефективне використання трудових ресурсів та створення нових робочих місць, що сприятиме економічному зростанню країни в майбутньому.

**Ключові слова:** ринок праці, ринкова рівновага, конвергенція заробітної плати, структурні зміни, зайнятість, методи системного аналізу.

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