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Labour Market Regime Shift in Ukraine, 2020–2024: Structural Evidence of a War-Induced Supply Shock

Abstract

The purpose of the paper is to analyse structural changes in Ukraine's labour market during the period 2020–2024, with particular emphasis on the transition from cyclical fluctuations to a potential labour market regime shift induced by the full-scale invasion of 2022. The study aims to identify whether observed post-2022 dynamics reflect a temporary disequilibrium or a persistent supply-side structural transformation. *Methodology.* The empirical analysis is based on a macro-level comparative and econometric approach using annual labour market indicators for the period 2020–2024. The study integrates data from official statistical sources, including employment, labour force participation, unemployment rates, wage dynamics, vacancy indicators, and regional labour distribution. Structural break analysis is applied to detect potential regime changes in labour supply dynamics, complemented by sectoral and regional decomposition to capture heterogeneous adjustment patterns across the economy. *Results.* The findings indicate that the COVID-19 shock of 2020–2021 primarily reflects a cyclical, demand-driven contraction with relatively stable labour force participation and gradual wage adjustment. In contrast, the 2022 full-scale invasion represents a significant structural shock characterised by a marked decline in labour supply, increased labour market fragmentation, and rising mismatches between labour demand and supply. Empirical evidence suggests the presence of a statistically significant structural break in labour force dynamics after 2022. Post-shock adjustments reveal a transition towards a labour-scarcity regime, accompanied by rising vacancies, sectoral reallocation of employment, and pronounced regional disparities in labour market outcomes. *Practical implications.* The results imply that labour market policy in Ukraine should shift from short-term stabilisation measures towards long-term structural reconstruction strategies. Priority should be given to labour force reintegration, reduction of spatial mismatches, reskilling and upskilling programmes, and institutional strengthening of labour market matching mechanisms. Policies focused solely on demand stimulation may be insufficient under conditions of persistent labour supply constraints. *Value / originality.* The study contributes to the literature on labour market adjustment under extreme shocks by providing empirical evidence of a conflict-induced structural transformation in a middle-income open economy. Unlike traditional recessionary frameworks, the Ukrainian case demonstrates how armed conflict simultaneously affects labour supply, spatial allocation, and institutional efficiency, resulting in a hybrid labour market regime characterised by coexistence of labour shortages and unemployment.

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Keywords

labour market transformation, war-induced shock, labour supply contraction, structural break, labour scarcity, post-war reconstruction

JEL: J21, J61, J64, E24, R23



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1 Introduction

The full-scale invasion of Ukraine in 2022 generated a profound macroeconomic shock, fundamentally altering the country's institutional, demographic, and productive foundations. Territorial occupation, large-

scale internal displacement, mass external migration, and capital destruction have simultaneously altered labour supply, labour demand, and the institutional mechanisms governing employment relations. Unlike conventional downturns, the Ukrainian case reflects a

compound shock where demographic contraction and production disruption interact in mutually reinforcing ways.

Prior to 2022, Ukraine's labour market already exhibited persistent vulnerabilities: long-term demographic decline, high informal employment, and acute occupational mismatches. The COVID-19 pandemic of 2020–2021 introduced a temporary demand-side contraction; however, the 2022 war shock differed qualitatively, intensifying distortions while generating severe labour force contraction, spatial reallocation of employment, and institutional reconfiguration under martial law.

The core objective of this study is to distinguish between cyclical volatility and structural transformation in Ukraine's labour market over the period 2020–2024. Identifying whether post-2022 dynamics reflect temporary instability or a deeper structural shift in equilibrium conditions is essential for evidence-based reconstruction policy. Cyclical disturbances require countercyclical stabilization instruments, whereas structural breaks demand human capital restoration, educational restructuring, and institutional modernization.

To construct a rigorous analytical foundation for this investigation, the subsequent section establishes the theoretical benchmarks of labor market adjustments under crisis and specifies the time-series econometric model used to isolate the structural break.

2 Theoretical and Methodological Framework

Labour market adjustment under severe macroeconomic shocks is a central topic in macroeconomics. Classical approaches, such as the hysteresis hypothesis (Blanchard & Summers, 1986), suggest that temporary disturbances generate persistent increases in equilibrium unemployment through scarring and institutional inertia. This is supported by evidence that output losses following major crises exhibit limited convergence toward pre-crisis trajectories (Cerra & Saxena, 2008), a phenomenon amplified in transition economies by structural reforms (Svejnar, 2002). Human capital theory (Becker, 1964) links labour market vulnerability to reductions in productive capacity via labour force withdrawal, skill depreciation, and migration. These mechanisms align with worker displacement theory (Topel, 1990), which highlights persistent earnings losses following involuntary job separation, as documented in conflict-affected economies (Akresh et al., 2011; Brück et al., 2010).

Conversely, search-and-matching models (Mortensen & Pissarides, 1994; Pissarides, 2000) and Beveridge curve analysis (Blanchard & Diamond, 1989; Elsby et al., 2010) focus on efficiency rather than aggregate employment. Here, the coexistence of vacancies and unemployment reflects matching

frictions. Outward shifts of the Beveridge curve signal structural mismatches – driven by geographic displacement, occupational restructuring, or institutional rigidities – rather than cyclical weakness (Akerlof & Yellen, 1990; Boeri & Ours, 2013; Hobijn & Şahin, 2013). Economic shocks also affect labour market segments unevenly. Segmentation theory (Dustmann et al., 2016) posits that vulnerable groups experience disproportionate losses, often absorbing shocks through informal employment expansion (Bosch & Maloney, 2010; Loayza & Rigolini, 2011). In Ukraine, these dynamics interact with historically high informality and non-standard employment (Eichhorst & Marx, 2015; Kupets, 2016). Furthermore, spatial economics highlights regional asymmetries in employment recovery driven by migration flows, relocation costs, and uneven capital distribution (Autor et al., 2013; Dustmann, et al., 2016; Fujita et al., 1999; Ibáñez & Vélez, 2008; Kondylis, 2010; Krugman, 1991).

Armed conflict represents a distinct category of macroeconomic shock, causing long-lasting consequences through demographic losses, physical capital destruction, and institutional disruption (Bellows & Miguel, 2009; Collier, 1999). Endogenous growth theory suggests that human capital depletion weakens long-term growth prospects (Lucas, 1988; Romer, 1990), while institutional quality determines post-conflict reconstruction success (Acemoglu & Robinson, 2012). Recent studies indicate a substantial contraction of Ukraine's labour supply following the 2022 invasion (Libanova, 2022; Centre for Economic Strategy, 2024; International Labour Organization, 2023; Ministry of Economy of Ukraine, 2024; National Bank of Ukraine, 2024; Organisation for Economic Cooperation and Development, 2024; State Statistics Service of Ukraine, 2024; World Bank, 2023, 2024). However, literature remains focused on migration and immediate losses rather than structural regime shifts. This study addresses three research gaps: unconfirmed equilibrium mechanisms under wartime conditions, unformalized distinctions between cyclical and structural shifts, and scarce quantitative evidence on supply-driven transitions to labour scarcity.

Using annual data (2020–2024) from the State Statistics Service of Ukraine, the National Bank of Ukraine, and the ILO, this study combines comparative statistical analysis with econometric structural break assessment. To identify structural transformation, the baseline model is specified as:

$$\ln L_t = \beta_0 + \beta_1 \ln W_t^{\text{real}} + \beta_2 \ln f_t + \beta_3 D_t^{\text{war}} + \varepsilon_t \quad (1)$$

where L_t is the economically active labour force; W_t^{real} is the real wage index; $\ln f_t$ is the informal employment share; D_t^{war} is a binary war dummy (1 for 2022–2024, 0 otherwise); β_0 is the intercept; and ε_t is the error term. The structural break is identified via coefficient β_3 . The interpretation relies on a macroeconomic regime framework (Rscarcity), formalised in Table 1.

TABLE 1 Methodological matrix for identifying the labour-scarcity regime($R_{scarcity}$)

Economic Indicator	Mathematical Criterion	Empirical Marker (Post-2022)	Structural Regime Implication
Labour Force (L_t)	$\Delta L_t < 0$	Absolute contraction of the economically active population	Irreversible demographic and migration-driven supply shock
Job Vacancies (V_t)	$\Delta V_t > 0$	Intensified vacancy pressure and acute recruitment bottlenecks	Transition to a severe job-seeker's market across industries
Unemployment (U_t)	$\Delta U_t < 0$	Rapid post-shock decline in active job-seekers	Depletion of the available active civilian labour reserve
Real Wages (W_t^{real})	$(\Delta W_t^{real}) > 0$	Wage growth occurring despite GDP and output compression	Wage-push mechanisms decoupling from actual productivity

Source: Developed by the authors

The simultaneous presence of all four conditions in Table 1 indicates structural supply constraints rather than cyclical demand weakness, serving as the empirical foundation for distinguishing a permanent transformation.

3 Research Results and Discussion

The empirical evolution of Ukraine’s labour market (2020–2024) reveals a clear boundary between the demand-driven pandemic crisis and the supply-driven wartime structural shock. The trajectory is divided into four distinct phases: pandemic contraction (2020), reconstruction stabilization (2021), war-induced structural rupture (2022), and adaptive reconstruction under acute labour scarcity (2023–2024). The pandemic period (2020–2021) displayed typical cyclical characteristics. In 2020, the labour force remained stable at 17.6 million persons and real wages grew (index 107.4%), proving the shock was demand-driven and successfully absorbed via corporate labour hoarding. In 2021, economic reconstruction strengthened: unemployment stayed below the 10% threshold, real wages expanded by 110.5%, and Ukraine remained a structurally labour-surplus economy characterized by frictional unemployment and inertial sectoral labour allocation.

The full-scale invasion of February 2022 caused an abrupt structural rupture, generating a simultaneous supply, capital, and demographic collapse. Data for 2022–2024 are derived from consolidated multi-institutional assessments of the National Bank of Ukraine, the ILO, and leading analytical economic research centres due to the suspension of regular official

surveys. The core parameters of this evolutionary trajectory are compiled in Table 2.

Table 2 demonstrates that the post-2022 contraction reflects an absolute, permanent destruction of labor supply (falling by more than 5.5 million economically active persons compared to 2020), driven by massive external migration, internal displacement, mobilization, and territorial losses. By 2023–2024, a highly atypical stabilization pattern emerged: the unemployment rate declined from its 18.5% peak down to 14.3% and real wages recovered, but the labour force continued its persistent contraction, reaching a historical low of 12.1 million in 2024. The simultaneous presence of falling unemployment, record-high job vacancies (rising to 115,000), and a shrinking labor supply confirms a structural transition toward a labour-scarcity equilibrium ($R_{scarcity}$).

This overarching structural shift triggered intensive intersectoral reallocation, visibly altering the economy's productive specialization. While the sectoral composition of employment remained highly stable during 2020–2021 (with services absorbing 65.9% and industry 24.1% of total employment), the war-driven shock forced a major restructuring. By 2024, the services sector expanded its share significantly to 68.5% (+2.6 percentage points), while industrial employment contracted markedly to 21.9% (-2.2 percentage points). This trend is duplicated within the specific segment of paid employees, where services grew to 61.9% (+1.5 percentage points) and industry shrank to 26.9% (-1.5 percentage points). Agricultural staff distribution experienced a modest relative expansion from 7.1% in 2020 to 7.6% in 2024 (+0.5 percentage points), driven by business relocation and internal displacement into western regions. These

TABLE 2 Key indicators of the Ukrainian labour market (2020–2024)

Indicator	2020	2021	2022	2023	2024
Labour force (million persons)	17.6	17.3	14.7	12.5	12.1
Employment rate (%)	56.2	56.7	45.2	48.5	50.8
Unemployment rate (ILO) (%)	9.5	9.9	18.5	17.4	14.3
Number of vacancies (average on Work.ua/DCZ, thousand)	45	85	25	92	115

Source: Author’s calculations based on official statistics [30; 32–33; 36]

findings reveal an intensive, service-biased restructuring paired with a systemic narrowing of Ukraine's industrial core, raising long-term productivity and de-industrialization risks.

Concurrently, the balance between formal and informal labor underwent unexpected changes. Total employed persons fell sharply from 15.9 million in 2020 to a bottom of 11.2 million in 2022, recovering partially to 12.3 million by 2024. Surprisingly, the absolute share of informal employment decreased continuously, falling from 20.8% in 2020 to 19.8% in 2021, 18.7% in 2022, and hitting a historical low of 17.9% in 2024. From a methodological standpoint, this decline reflects shock-driven structural factors rather than institutional progress: the war caused a near-total collapse of small-scale retail, hospitality, and construction activities in eastern and southern Ukraine – sectors that historically anchored informal labor. Furthermore, state-mandated mobilization processes heavily reinforced formal registration frameworks, while large corporate employers in the formal sector demonstrated much higher resilience to the conflict than vulnerable informal setups.

A critical dimension of this transformation is its highly pronounced spatial asymmetry. Prior to the full-scale war (2020–2021), regional unemployment variations were relatively tight, moving within a narrow 8.5% to 11.2% band across all macro-regions. The 2022 shock completely severed this spatial equilibrium. Unemployment escalated everywhere but manifested an extreme geographical polarization: while the West and Centre registered post-shock peaks of 15.5% and 17.0% respectively, the South surged to 25.0% and the front-line East breached the critical 30.0% boundary due to systemic industrial destruction. By 2024, deep territorial cleavages persist: the West (11.5%) and Centre (12.8%) have actively transitioned into operational growth poles with severe labor shortages, whereas the East (24.0%) and South (19.5%) face persistent structural unemployment, cementing a path-dependent geographic fragmentation.

To capture wage adaptations within the emerging growth poles, institutional wage and demand parameters provide crucial insights. Average nominal wages maintained an uncompromised upward

trajectory, moving from 11,591 UAH in 2020 to 14,014 UAH in 2021, 14,847 UAH in 2022, 17,442 UAH in 2023, and reaching 21,800 UAH in 2024. In the shock year of 2022, the real wage index bottomed out at 88.2%, reflecting severe inflation pass-through and purchasing power degradation. However, by 2023–2024, real wages recovered strongly, expanding by 103.5% and 108.0% respectively, actively outstripping background inflation. Simultaneously, wage arrears, which spiked to approximately 5.9 billion UAH in 2022 due to immediate corporate asset destruction, dropped back to 3.8 billion UAH by 2024 (compared to 3.1 billion UAH in 2020 and 3.9 billion UAH in 2021). Combined with explosive vacancy expansion, this wage resurgence confirms that corporate entities are forced to engage in aggressive nominal and real wage competition to secure highly scarce human capital, creating an intensive wage-push mechanism that operates independently of underlying labor productivity.

To formally and quantitatively test whether the post-2022 labor supply displacement represents a statistically significant structural break rather than an ordinary price-driven adjustment, a time-series Ordinary Least Squares (OLS) regression model was estimated using long-horizon annual data spanning 2007–2024. The dependent variable is specified as the total labour force size (in million persons), tracked against the real wage index (X_1), the informal employment share (X_2), and an exogenous binary war dummy variable (D^{war}) that takes the value of 1 for the 2022–2024 wartime window and 0 otherwise. The empirical regression outputs are detailed in Table 3.

The empirical econometric outputs organized in Table 3 provide powerful mathematical support for our core hypothesis. The war dummy variable is statistically significant ($p = 0.021$) and carries a massive negative coefficient of (-5.904). This proves that the post-2022 reality is marked by an exogenous downward shift of approximately 5.9 million labor participants that cannot be explained by standard economic incentives. Crucially, both the real wage index ($p = 0.942$) and the informal employment share ($p = 0.544$) are completely statistically insignificant within the model. This statistical irrelevance strongly reinforces our theoretical

TABLE 3 Structural break regression results (Labour force model, 2007–2024)

Variable	Coefficient	Std. Error	t-stat	p-value
Constant	14.259	13.099	1.089	0.295
Real wage index (X_1)	0.005	0.062	0.074	0.942
Informal employment share (X_2)	0.233	0.375	0.621	0.544
War dummy (2022–2024)	-5.904	2.277	-2.593	0.021*
R^2	0.645			
Adjusted R^2	0.568			
F-statistic	8.463			(Sig. 0.001)
Observations	18			

*Note. Dependent variable: Labour force size (million persons). * $p < 0.05$.

Source: Author's calculations based on the provided regression output

positioning: the current contraction is driven entirely by an inelastic demographic-institutional supply shock rather than a price-driven or voluntary market adjustment. While the model demonstrates robust overall significance (F -statistic = 8.463, p = 0.001), important methodological limitations must be stated. Given the limited sample size (N = 18 annual observations), these regression results should be interpreted as indicative structural markers rather than definitive long-term forecasting coefficients.

4 Conclusions

In conclusion, the empirical findings confirm a permanent, war-induced structural regime shift. This transformation is characterized by an inelastic supply contraction, a transition from a labor-surplus to an acute labor-scarcity equilibrium, a service-biased sectoral restructuring that poses de-industrialization risks, intensified regional polarization, and severe wage-push pressures that operate under deeply constrained productive capacity. These post-2022 dynamics cannot be captured or resolved using standard cyclical recovery frameworks, establishing a new macroeconomic reality that will dictate the boundary conditions for Ukraine's future reconstruction strategy. This study provides a comprehensive macroeconomic assessment of the transformation of Ukraine's labour market during 2020–2024 under conditions of overlapping exogenous shocks. By integrating aggregate statistical indicators, sectoral and regional evidence, and time-series econometric estimation, the analysis demonstrates that the Ukrainian labour market has undergone not merely cyclical fluctuations, but a structural regime shift. The empirical results indicate that the COVID-19 contraction of 2020–2021 primarily reflects a conventional demand-driven disturbance. Labour force participation remained relatively stable, while real wages increased, consistent with standard cyclical adjustment mechanisms. In contrast, the full-scale invasion of 2022 generated a multidimensional structural shock. Econometric evidence confirms a statistically significant structural break in labour force dynamics, indicating a persistent decline in labour supply rather than temporary volatility.

The central empirical finding of this study is the definitive transition of Ukraine's labour market from a labour-surplus to a labour-scarcity regime after 2022. The contraction of the labour force by several million individuals, together with rising vacancies and a partial recovery of real wages in 2023–2024, indicates that labour shortages have become a binding constraint on economic activity. The mechanism of adjustment has shifted fundamentally: whereas the pre-war period was characterised by structural unemployment, the post-2022 regime is defined by acute supply constraints and reduced matching efficiency. This overarching

transition is accompanied by severe sectoral distortions, where the expansion of the services sector alongside the contraction of industrial employment reflects conflict-driven restructuring rather than productivity-led structural change. If sustained, such a shift may weaken long-term productivity growth and export capacity, particularly in the absence of capital deepening.

Furthermore, this transformation exhibits profound spatial polarization and wage-productivity decoupling. Western and central regions have acted as relative absorption centres due to internal displacement, while eastern and southern regions continue to experience severe labour market deterioration, creating spatial asymmetries that may become path-dependent if future investment remains uneven. At the same time, the weak statistical relationship between wages and labour force contraction suggests that demographic and mobilisation factors dominate price adjustment mechanisms. Rising nominal and real wages reflect intensified corporate competition for workers rather than underlying productivity gains, which may contribute to persistent inflationary pressures. From a theoretical perspective, the study contributes to conflict economics by showing how armed conflict induces transitions between distinct labour market regimes. Unlike conventional recessions, the Ukrainian case reflects a compound supply shock involving demographic decline, forced mobility, capital destruction, and institutional disruption, creating a highly specific hybrid equilibrium.

However, several methodological limitations must be acknowledged when interpreting these results. First, wartime conditions severely constrain data availability and reporting reliability, meaning that some post-2022 indicators rely on consolidated institutional estimates rather than continuous census tracking. Second, the reliance on macro-level aggregation limits the ability to capture rapid short-term dynamics and heterogeneity across specific skill groups. Finally, the lack of micro-data prevents a granular identification of household migration decisions and firm-level adaptation strategies.

These limitations directly outline the perspectives for future research, which should move in three interconnected directions. Future studies need to conduct granular household analysis to uncover the microfoundations of supply, executing surveys on migration, displacement, and mobilization to assess refugee return choices. Additionally, investigating skill mismatch and search frictions will help identify the exact roots of matching inefficiencies under the labour-scarcity regime, while macro-demographic modeling will allow for the development of long-term simulation models under alternative post-war reconstruction scenarios to evaluate sustainable output growth paths.

In conclusion, Ukraine's labour market transformation during 2020–2024 represents a

structural reconfiguration rather than a temporary cyclical disturbance. The war-induced contraction of labour supply, sectoral reallocation, and intensified regional divergence have fundamentally altered equilibrium conditions. This shift implies a reorientation of policy priorities from short-term stabilisation toward labour force restoration,

human capital recovery, and institutional modernisation. Post-war reconstruction will therefore depend not only on physical capital rebuilding, but also on the strategic recovery and strengthening of labour market institutions capable of functioning under persistent supply constraints.

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