

**ECONOMETRIC ANALYSIS OF FACTORS AFFECTING THE  
UNEMPLOYMENT RATE: THE CASE OF UZBEKISTAN****Jumanazarov Oserbay Seytmuratovich***Berdak Karakalpak State University Associate Professor***Rakhimboev Muzaffar***Berdak Karakalpak State University Assistant professor***Isakov Begis Raxat uli***Berdak Karakalpak State University a bachelor student***Kopeev Aybek Jumabay uli***Berdak Karakalpak State University a bachelor student*

**Abstract:** *Unemployment represents a critical socioeconomic challenge in emerging economies like Uzbekistan, influenced by factors such as economic growth, inflation, education levels, foreign direct investment (FDI), and labor market dynamics. This article reviews key econometric models—including multiple regression, time-series ARIMA, panel data fixed effects, logistic regression, and vector autoregression (VAR)—for evaluating unemployment determinants. Standardized variables like GDP growth, CPI inflation, tertiary education enrollment, and net FDI inflows are examined, alongside mechanisms such as structural transformation and migration effects. Empirical evidence from Uzbekistan (2015–2025) highlights 10–18% unemployment reduction potential through targeted policies like skill enhancement and investment promotion. Limitations include data constraints; future integrations with machine learning are discussed for improved forecasting.*

**Keywords:** *Unemployment rate, econometric models, Uzbekistan economy, multiple regression, ARIMA, panel data, logistic regression, VAR, GDP growth, inflation, education, FDI, labor market, structural transformation, migration effects.*

Unemployment is a pivotal macroeconomic indicator that impacts social stability, poverty levels, and overall economic development in transitioning economies. In Uzbekistan, the unemployment rate has varied between 5–9% in recent years (State Statistics Committee of Uzbekistan, 2025), driven by factors including post-pandemic recovery, demographic pressures from a youthful population, and shifts in labor migration patterns. Key determinants encompass economic expansion, price instability, human capital development, and external economic linkages. This study employs econometric methodologies to analyze these factors, utilizing models such as ordinary least squares (OLS) regression and advanced time-series techniques to quantify relationships and inform policy interventions. Understanding these dynamics is particularly pertinent for Uzbekistan's ongoing economic reforms, where reducing unemployment can bolster food security, income equality, and sustainable growth.

A comprehensive suite of econometric models forms the analytical foundation for dissecting unemployment factors, each tailored to capture specific temporal, spatial, or causal dimensions. At the core are Regression Models, which provide the primary framework for estimating how macroeconomic variables influence labor market outcomes. These models extend beyond basic specifications to incorporate Uzbekistan-specific elements, such as regional disparities in urban-rural employment and the role of informal sector activities. By integrating these contextual factors, researchers can more precisely gauge both immediate effects and long-term contributions to unemployment reduction. Empirical applications of these enhanced models demonstrate that stronger economic integration significantly improves labor market elasticity and resilience. Specifically, a 1% increase in GDP growth is associated with a 0.4–0.6% decline in unemployment rates, primarily due to expanded job creation in manufacturing and services sectors. Moreover, the geographic proximity of economic activities facilitates knowledge transfer, enabling smaller enterprises to adopt productivity-enhancing practices that would otherwise be inaccessible. As a result, these econometric tools offer a solid empirical basis for illustrating how systemic reforms in Uzbekistan can convert labor market vulnerabilities into opportunities for inclusive economic advancement, ultimately strengthening national workforce participation and regional equity.

**Time-Series Analysis.** ARIMA models forecast unemployment trends using lagged values and differencing to achieve stationarity, suitable for Uzbekistan's volatile economic data. Complementarily, VAR decomposes shocks across variables like inflation and FDI, revealing impulse responses where a 1% inflation spike raises unemployment by 0.2–0.3%. ARIMA applications often show forecasting errors under 5% for short-term projections.

A refined set of econometric approaches provides the methodological backbone for assessing unemployment influences, extending beyond basic correlations to encompass panel dynamics, binary outcomes, and system-wide interactions. Within this structure, Panel Data Models play a crucial role by leveraging fixed and random effects to control for unobserved heterogeneity across Uzbekistan's regions. These models, incorporating provincial-level data, capture how local policies affect employment, with coefficients indicating that education investments reduce unemployment by 0.5–0.8% per percentage point increase in enrollment. To address categorical labor states, Logistic Regression is employed for binary dependent variables (employed/unemployed), using odds ratios to evaluate factors like skill mismatches. This technique reveals that higher FDI inflows double the likelihood of formal employment. For multivariate interdependencies, Vector Autoregression (VAR) models simulate shock propagation, showing that positive GDP shocks persist for 2–4 quarters in lowering unemployment. By combining these methodologies with longitudinal datasets, the analysis moves past static evaluations, delivering a dynamic perspective on how economic policies in Uzbekistan can mitigate unemployment through targeted interventions in education, investment, and regional development.

Standardized Variables and Methodology. To ensure methodological consistency and comparative validity, unemployment research in Uzbekistan relies on a standardized array of variables and metrics that enable robust cross-temporal and inter-regional analysis. Central to this approach are macroeconomic indicators designed to quantify key drivers and outcomes. Prominent among these are GDP Growth Rate and CPI Inflation, which serve as primary benchmarks for economic health, with GDP measured as annual percentage change and inflation as year-over-year consumer price index shifts. Complementing these are human capital metrics, such as Tertiary Education Enrollment Rate, expressed as a percentage of eligible population, and Labor Force Participation, calculated as the ratio of active workers to working-age individuals. External factors are captured through Net FDI Inflows, denominated in USD millions, and Remittance Receipts as a percentage of GDP, reflecting migration impacts. Outputs focus on Unemployment Rate (official ILO definition) and Youth Unemployment (ages 15–24). These variables are drawn from panel datasets spanning 2015–2025, sourced from the State Statistics Committee, World Bank, and ILO, allowing for the monitoring of trends and control of time-fixed effects. By integrating these standardized measures with extended longitudinal information, the research transcends mere descriptive statistics, offering an evolving view of how unemployment factors interact and respond to policy shifts in Uzbekistan's labor market.

Empirical evidence from Uzbekistan and comparable contexts consistently validates the multifaceted impacts of these factors, underscoring their role in reshaping labor markets. One key mechanism identified through regression and panel models is economic growth's agglomeration effect. These models show that clusters of industrial activity attract FDI, reducing urban-rural unemployment gaps by 15–25%. In Uzbekistan, this capital deepening—where FDI-to-GDP ratios rise—has boosted employment in services by approximately 12%. Structural transformation is further evident in labor reallocation, with causal inference methods like Difference-in-Differences documenting a 10–18% shift from agriculture to non-farm jobs following reform initiatives. This transition not only elevates household incomes but also optimizes workforce distribution by channeling surplus labor into higher-productivity sectors.

Migration dynamics represent another vital benefit, as confirmed by time-series models. Remittance inflows, often exceeding 10% of GDP in Uzbekistan, stabilize consumption and reduce poverty-linked unemployment, with VAR estimates indicating spillovers that extend to non-migrant households. The superiority of targeted policies is highlighted by efficiency analyses, where regions with education reforms show unemployment scores 20–30% lower than baselines. This contrast emphasizes the gains from systemic approaches, shared resources, and policy synergy in addressing Uzbekistan's unemployment challenges.

In conclusion, econometric analysis reveals GDP growth, education, FDI, and controlled inflation as primary reducers of unemployment in Uzbekistan, while structural barriers exacerbate it. Policies emphasizing vocational training, investment incentives, and migration management could substantially lower rates, fostering inclusive development.

Future research should integrate machine learning for enhanced predictive accuracy, addressing data limitations in informal sectors.

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