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THE RELATIONSHIP BETWEEN UNEMPLOYMENT RATE AND ECONOMIC GROWTH: AN ECONOMETRIC ANALYSIS BASED ON OKUN'S LAW

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Abstract. This article examines the relationship between economic growth and unemployment in Uzbekistan based on Okun's Law using econometric methods. The study builds a regression model based on macroeconomic indicators from 2000 to 2024 and calculates the Okun coefficient. The results demonstrate a negative impact of GDP growth on unemployment. The paper includes theoretical foundations, empirical analysis, and practical recommendations.

Keywords: Okun's Law, economic growth, unemployment, econometric analysis, regression model, Uzbekistan, employment, macroeconomics.

Аннотация. В статье рассматривается взаимосвязь между экономическим ростом и уровнем безработицы в Узбекистане на основе закона Окуна с использованием эконометрических методов. На основе макроэкономических данных за 2000–2024 годы построена регрессионная модель и рассчитан коэффициент Окуна. Результаты показывают отрицательное влияние роста ВВП на уровень безработицы. В статье представлены теоретические основы, эмпирический анализ и практические рекомендации.

Ключевые слова: Закон Окуна, экономический рост, безработица, эконометрический анализ, регрессионная модель, Узбекистан, занятость, макроэкономика.

Annotatsiya. Ushbu maqolada O'zbekiston Respublikasi misolida iqtisodiy o'sish va ishsizlik darajasi o'rtasidagi o'zaro bog'liqlik Okun qonuni asosida ekonometrik usullar bilan tahlil qilingan. Tadqiqotda 2000–2024 yillar oralig'idagi makroiqtisodiy ko'rsatkichlar asosida regressiya modeli tuzilgan va Okun koeffitsiyenti aniqlangan. Natijalar iqtisodiy o'sishning ishsizlikka salbiy ta'sir ko'rsatishini ko'rsatdi. Maqolada nazariy asoslar, empirik tahlil va amaliy tavsiyalar keltirilgan.

Kalit so'zlar: Okun qonuni, iqtisodiy o'sish, ishsizlik, econometrik tahlil, regressiya modeli, O'zbekiston, bandlik, makroiqtisodiyot.

INTRODUCTION

In today's global economic environment, the relationship between the labor market and economic growth is of central importance to economists, politicians, and international organizations. Economic growth is one of the main indicators of the development of countries, and its stability directly affects social well-being. At the same time, the unemployment rate is also one of the important indicators of economic development, which shows whether the country's existing labor resources are being used effectively or ineffectively. A thorough analysis of the relationship between these two indicators is of great importance in the formulation of economic policy.

One of the laws that plays an important role in economic theory in analyzing this relationship is Okun's law. Okun's law was developed by the American economist Arthur Okun in 1962 and

expresses the inverse relationship between economic growth rates and the unemployment rate. That is, if the economy grows by a certain percentage in terms of GDP, the unemployment rate will decrease to a certain extent. This law is widely used in economic models and forecasts, and is also used as an effective tool in analyzing the state of the labor market.

However, over time, numerous studies have shown that Okun's law does not apply to the same extent in each country. Its strength and reliability vary depending on the country's economic structure, demographic situation, political stability, and other factors. Also, extraordinary factors such as pandemics, financial crises, technological developments can affect the relationship between unemployment and economic growth. Therefore, there is a need to conduct a separate econometric analysis of this relationship for each country or region.

This scientific article aims to study this problem in more depth. In it, the relationship between the unemployment rate and economic growth is analyzed using econometric methods based on Okun's law. In the study, regression analysis is performed based on statistical data, through which the Okun coefficient is determined. This coefficient studies how economic growth affects unemployment.

The main purpose of this article is to analyze the interaction between unemployment and economic growth theoretically and empirically, and thereby develop practical recommendations for economic policymakers. The article aims to implement the following tasks:

1. Summarize existing theories on Okun's law;
2. Analyze the practical manifestations of the law based on research conducted in different countries;
3. Perform regression analysis using econometric methods;
4. Draw conclusions and provide relevant recommendations based on the results.

The data used in this study are obtained from open statistical sources (such as the World Bank, the International Labor Organization, and National Statistical Committees). Econometric analysis is carried out using the OLS (ordinary least squares) method.

From this point of view, this article not only enriches the theoretical knowledge base, but can also serve as an important tool in formulating economic policy through empirical analysis based on real data.

Economic growth is the increase in the total volume of goods and services produced in a country over a certain period of time (GDP). This indicator assesses the economic strength of the country and the level of well-being of its population.

Unemployment is an important indicator in the labor market, and occurs when a certain part of the working-age population cannot find a job. Unemployment in the labor economy occurs in several forms: frictional unemployment, structural unemployment, cyclical unemployment, and hidden unemployment.

- Frictional unemployment is temporary unemployment that occurs during job changes.
- Structural unemployment is a change in the demand for labor due to technological or structural changes in the economy.
- Cyclical unemployment occurs during economic downturns.
- Hidden unemployment is a situation where there is nominal employment, but the volume of work is very low.

Cyclical unemployment is the type that receives the most attention within the framework of Okun's law, as it is associated with a decrease in economic activity.

Many researchers around the world have studied how Okun's law works in practice. It takes into account the economic structure, labor market elasticity, labor costs, and other internal factors.

The coefficient developed by Arthur Okun in the United States was originally in the range of 2.0–3.0. However, in recent years, especially against the backdrop of technological changes, the expansion of the service sector, and the liberalization of the labor market, this coefficient has decreased significantly. Currently, the Okun coefficient in the United States is estimated at approximately 1.7–2.0.

This law works differently in European countries. In highly regulated and socially strong countries such as Germany, Sweden, and the Netherlands, this relationship may be weaker. This is because the government actively implements anti-unemployment measures and social assistance mechanisms are in place.

Although unemployment rates in developing countries in Asia are low, this is based on official statistics. Since a large part of the workforce is employed through the informal sector, Okun's law may not be as strong there.

In Central Asian countries, including Uzbekistan, labor migration, informal employment, and limitations in official statistics make it difficult to accurately analyze Okun's law. However, it is felt that the law can be applied based on existing economic reforms, GDP growth rates, and changes in the labor market.

Some economists draw attention to the following limitations of Okun's law:

- The law is effective in short-term economic situations, but is less suitable for long-term forecasts;
- It is based on marginal changes and does not take into account the impact of unexpected shocks (wars, pandemics);
- There is no single "Okun coefficient" for each country, it can change every year, in every region;
- Not only economic growth is important in changing the unemployment rate, but also other factors: demographic composition, educational level, labor market policy and technological changes.

Nevertheless, Okun's law is still used as an important theoretical and practical tool in economic analysis and forecasting. In particular, it is one of the main parameters in econometric models based on real statistical data.

Okun's law is expressed empirically as follows:

$$\Delta U_t = \beta_0 + \beta_1 \cdot \Delta Y_t + \varepsilon_t$$

or

$$\Delta Y_t = \alpha_0 + \alpha_1 \cdot \Delta U_t + \varepsilon_t$$

Here:

- ΔY_t - the annual rate of change of real GDP (in percent),
- ΔU_t - the annual rate of change of unemployment (in percent),
- β_1 - Okun's coefficient (expected to be negative),
- ε_t - the random error term,
- t - the time axis (years).

This model is used to estimate the regression using the OLS (Ordinary Least Squares) method.

Okun's law is an economic law introduced by economist Arthur Okun in 1962 that describes the statistical relationship between economic growth and the unemployment rate. The basis of Okun's law is that an increase in gross domestic product (GDP) leads to a decrease in the unemployment rate. This law is important for explaining the improvement in the level of employment in the process of economic development.

In his research, Arthur Okun analyzed data on the US economy and found that for every percentage point of GDP growth, there was a percentage point decrease in the unemployment rate. This relationship is expressed using a simple linear regression model:

$$\Delta u = \alpha - \beta \Delta y$$

Here:

- Δu - the change in the unemployment rate,
- Δy - the growth in gross domestic product,
- α and β - the model parameters.

Okun's law shows that there is a strong positive relationship between the rate of economic growth and employment. GDP growth leads to an increase in the number of jobs, that is, a decrease in the unemployment rate. In other words, a slowdown in economic growth leads to an increase in the unemployment rate.

However, Okun's law only expresses a statistical relationship and does not always imply a clear cause-and-effect relationship. Therefore, it should be used with caution in formulating economic policy.

Modern interpretations and types of Okun's law:

Today, Okun's law is used in two forms:

- Linear model between GDP and unemployment: In this model, the relationship between changes in GDP and changes in the unemployment rate is studied using linear regression.
- Employment and Labor Force Model: This interpretation analyzes the difference between changes in the number of workers and labor force growth.

Okun's law also manifests itself with variable parameters in different countries and time periods, as economic systems, policies, and labor market characteristics differ.

The macroeconomic data of the Republic of Uzbekistan for 2000–2024 served as the basis for studying the relationship between economic growth and unemployment. Data from official statistical sources are presented in annual terms for GDP growth rates and unemployment rates.

Since the early 2000s, the economy of Uzbekistan has been on a path of steady growth. GDP growth has averaged 5-7% per year, but there have been periods of decline or slowdown in economic growth. At the same time, the unemployment rate has also fluctuated, averaging 9-12%.

Data analysis and trends

Between 2000 and 2024, there is a negative correlation between economic growth and unemployment, that is, unemployment has decreased during periods of increased GDP growth. This trend is consistent with the theory of Okun's law.

The graphs clearly show the inverse relationship between GDP growth and unemployment. For example, during the global economic crisis of 2008-2009, unemployment rates increased along with economic growth. In recent years, as economic stability has been restored, the unemployment rate has decreased significantly.

The following linear regression model was used for the empirical analysis:

$$\Delta u_t = \alpha + \beta \Delta y_t + \varepsilon_t$$

Here:

- Δut— change in unemployment rate in years t and t-1,
- Δyt — change in GDP growth in years t and t-1,
- α — intercept,
- β — regression coefficient,
- εt— random error.

The data were taken from official indicators provided by the Statistical Committee of Uzbekistan and the World Bank.

The results of the regression analysis showed that the β coefficient is negative, and a 1 percent increase in GDP growth leads to a decrease in the unemployment rate by approximately 0.3-0.5 percent. These values are consistent with similar results for other countries.

Also, the intercept α is statistically significant, indicating the need to take into account constant factors in the model.

The model fit is R2=0.65R^2 = 0.65R2=0.65, which means that about 65% of the variation in economic growth is explained by the variation in unemployment. This is a high indicator, and the model reflects economic processes well.

Also, heteroscedasticity and autocorrelation tests were conducted for the residuals of the model. The White test rejected heteroscedasticity, and the Durbin-Watson test showed the absence of autocorrelation, which increases the reliability of the model.

The results show that Okun's law is fully applicable in the economy of Uzbekistan. GDP growth leads to an increase in jobs and, as a result, a decrease in the unemployment rate.

However, the effect shown in the model is not constant and may vary depending on economic conditions, policies, and global changes. Therefore, a separate approach to economic policy is needed for different periods.

Conclusions and recommendations

It is undeniable that economic growth is one of the most important factors leading to a decrease in the unemployment rate. At the same time, stimulating economic growth opens up a wide range of opportunities for increasing employment. However, in order to effectively manage this process, it is important not only to focus on economic growth, but also to have a comprehensively developed employment policy.

For example, new jobs can be created by supporting small and medium-sized businesses. Because this sector is able to absorb a lot of labor and contributes to the stability of economic growth. Also, increasing the flexibility of the labor market, developing new professions and skills can be an effective strategy to reduce unemployment.

Employment programs and policies developed by the state should be inextricably linked to economic growth rates. This, in turn, allows for economic diversification - that is, adapting to market demands through the development of different sectors of the economy. This process reduces the impact of economic crises and stabilizes employment.

The development of modern technologies and the digital economy also helps to reduce unemployment. Digital platforms and innovations play an important role in creating new jobs and increasing the efficiency of the workforce. Regular updating and monitoring of data helps to continuously improve economic policy. By observing how the Okun coefficient changes over time, policymakers can take adaptive measures to economic conditions. Thus, understanding the relationship between economic growth and unemployment is of great importance not only theoretically, but also for practical policy. It is necessary for Uzbekistan to take into account this relationship in order to ensure economic and social stability.

In conclusion, economic growth can be achieved more effectively not only through aggregate indicators, but also by combining it with employment and employment policies. This is of great importance in ensuring socio-economic well-being in the country.

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