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OKUN'S LAW: ECONOMIC GROWTH AND UNEMPLOYMENT

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ABSTRACT:

Our article examines Okun's law, which describes the relationship between the unemployment rate and the growth rate of gross domestic product (GDP). It shows an analysis of why this law does not work in some countries, and also discusses the limitations of the law, that is, the variability of the coefficient and the influence of long-term factors on economic growth.

INTRODUCTION. Globally, many economy scientists of numerous countries expressed their thoughts and opinions on how to deal with unemployment and what measures should be taken to reduce unemployment around the world. Also, many economists led many discussions, making efforts on finding the connection between economic growth and unemployment rate. However, the first person to work on this issue of the connection between unemployment and GDP was economist and Professor of Yale University named Arthur Okun starting from 1960s.[42]

[42] http://www.econlib.org/library/Enc/bios/Okun.html

Economist and professor of Yale University Arthur Okun was born in November 1928 and passed in March 1980, at the age of 51. Starting with A. Okun's 1963 study in the United States, a rich empirical literature has demonstrated the existence of a negative and stable relationship between the aggregate demand conditions of an economy and its overall unemployment rate. This empirical law, known as Okun's law, is usually expressed as a negative linear relationship between the cyclical component of the unemployment rate (the difference between the actual and natural unemployment rates - the unemployment gap) and the output gap (the difference between the log level of actual output and the log potential output). Oaken saw this relationship as a natural consequence of employers adjusting employment levels in response to changes in aggregate demand. If the work force is more stable, changes in employment rate, in turn, will lead to the same actions in unemployment rate. The law of Okun has been discovered to be mostly related to the economy, but was proven to be a better use for developing markets and economies.[43]

A.Okun proved that when the unemployment rate consists of 4 %, N coefficient would be equal to 3. This indicates that each percentage point of unemployment reduces the country's actual GDP by 3% compared to full employment. According to the beliefs of the economist, scientist, due to the competition in the market, it showed that the unemployment looked like this:

- All the hired workers who have been fired from their jobs are not registered as unemployed;
- Some of the employees who continued to work would be transferred to a reduced working day or week;
- Due to the hidden unemployment in the manufacturing, average labor productivity has decreased.

According to the Okun’s law, when the natural rate of unemployment raises above 1,0%, Gross Domestic Product is reduced by 2,5% or 2,5% of it is lost. Thus, accordingly their ratio equals to 1:2,5. Based in this ratio, it is possible to determine the value of the lost gross domestic product.[44]

[43] Okun's Law, Development, and Demographics: Differences in the Cyclical Sensitivities of Unemployment Across Economy and Worker Groups by Zidong An, John Bluedorn, and Gabriele Ciminelli
[44] Kalandar Abdurahmonov Mehnat iqtisodiyoti: Nazariya va amaliyot / Darslik. Kalandar Abdurahmonov. Qayta ishlangan va to‘ldirilgan 3-nashri. T.: 0 ‘zbekiston Respublikasi Fanlar akademiyasi «Fan» nashriyoti davlat korxonasi, T.: 2019.-544 b.

As a result of the increase in the unemployment rate, economy will not be able to acquire the potential volume of the GDP. Because of that, it is important to keep the natural unemployment rates stable and regulate them economically. The higher the actual unemployment rate is than its natural rate, the greater the GDP gap. Therefore, potential GDP* is greater than actual GDP. The quantitative relationship between the unemployment rate and the GDP gap was mathematically proven by the English economist Arthur Okun. Therefore, this law is called **Okun's law.**[45] The essence of the law is that if the actual unemployment rate exceeds its natural rate by one percentage point, that is, cyclical unemployment is 1 percent, the national economy will generate two and a half percentage points less GDP. A lower level of GDP, in turn, means that the incomes of manufacturers will be relatively lower and the opportunities for investing in the future development of the economy will be reduced.[46]

In its most basic form, Okun's Law examines the statistical relationship between a country's unemployment rate and the growth rate of its economy. The Economic Research Department of the Federal Reserve Bank of St. Louis explains that Okun's Law "is intended to tell us how much of a country's gross domestic product (GDP) is lost when unemployment exceeds its natural rate.".[47]

Literature review. In his speech, former Federal Reserve Chairman Ben Bernanke briefly explains the basic concepts of Okun's Law as such:[48] "This basic rule describes the observed relationship between changes in the unemployment rate and the growth rate of real gross domestic product (GDP). Okun argues that, due to the constant growth of the labor force and productivity, real GDP growth must generally be close to its potential growth rate to keep unemployment stable. Thus, to reduce unemployment, the economy must grow above its potential. Specifically, according to currently accepted versions of Okun's law, in order to achieve a one-percentage-point reduction in unemployment over a year, real GDP must grow about two percentage points faster than the growth rate of potential GDP over that same period. For example, if the potential growth rate of GDP is 2%, Okun's law states

[45] N. Gregory Mankiw. Macroeconomics. 8 th edition. Harvard University. (NY.: Worth Publishers, 2013): 277
[46] Makroiqtisodiyot. Dasrlik. G'.E.Zaxidov, M.T.Asqarova, Z.A. Djumayev, L.F.Amirov, H.A. Hakimov. - T.: 2019. - 290 bet.
[47] Okun's Law: A Meaningful Guide for Monetary Policy? Yi Wen, Vice President and Economist Mingyu Chen, Research Associate
[48] Brittanica. "Arthur M. Okun."

that in order to reduce the unemployment rate by one percentage point, GDP must grow by about 4% in one year."[49]

Mankiw believes that this law may attract other economists with its simplicity, namely that Okun's empirical rule is closer to two than to three. But why was it called an "empirical rule"?[50]

Knotek noted that unemployment rates, like growth rates, vary greatly over time in business cycles. But he said Okun's law can be used effectively for forecasting purposes over time. He further argued that Okun's law is in fact a "direct statistical relationship" rather than a "structural feature of the economy."[51]

Knotek noted that Okun's conclusion is based on the assumption that more labor is needed to produce more goods and services in an economy. However, more labor can also mean that employees work longer hours, not just hiring more workers. Here, we recall that there is evidence to support Okun's law in the long run. However, in the short run, a loss in total output does not necessarily lead to an (immediate) increase in unemployment.[52]

Lee (eng. . OECD- - Organisation for Economic Cooperation and Development) conducted his analysis in 16 OECD member countries (Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Italy, Japan, the Netherlands, Norway, Sweden, Switzerland, the United Kingdom, and the United States). He examined data from 1955 to 1996, for which he found significant differences in the value and significance of the estimated coefficients.[53]

The author believes that the reason for such differences in coefficients should be sought in the level of flexibility of the labor market, for example, in the level of legal guarantees for workers.

Viren studied 20 OECD countries between 1960 and 1997 and concluded that real GDP growth is significantly affected by low unemployment and high real GDP. According to the author, the consequences of asymmetry in relations are more relevant for countries

[49] Board of Governors of the Federal Reserve System. "Recent Developments in the Labor Market
[50] Mankiw, Gregory N. (1994): Macroeconomics, Worth Publishers, New York.
[51] Knotek, Edward S. (2007): How useful is Okun´s law? in: Economic Review, No. Q IV, Federal Reserve Bank of Kansas City, pp. 73-103
[52] Knotek, Edward S. (2007): How useful is Okun´s law? in: Economic Review, No. Q IV, Federal Reserve Bank of Kansas City, pp. 73-103
[53] Lee J. (2000), The Robustness of Okun's Law: Evidence from OECD Countries, in Journal of Macroeconomics, 22, 2, pp. 331-356

that are part of the European Monetary Union, and this is because these countries differ significantly from each other in terms of their economic cycles.[54]

Balakrishnan and Michelacci included parameters in their estimates of unemployment dynamics that are able to handle shocks to the unemployment rate as the labor force changes. This is because the same unemployment rate can occur because the forces of workers engaged in labor activities differ in different degrees.[55]

Villaverde and Maza worked on estimating differences between regions within a country. Specifically, they worked on regions in Spain and found that for the period 1980-2004, the coefficients were lower than the ones originally estimated by Okun.

In her scientific work, A. Dobrazhinskaya noted that: "In his law Arthur Okun expressed the mathematical relationship between the unemployment rate and the lag of GDP. According to Rosstat, as of February 2018, the labor force equaling to 72.7 million people was divided into 71.5 million people employed in economic activity and 3.6 million unemployed. The difference between real unemployment and natural unemployment is the market rate of unemployment. The presence of this type of unemployment means underutilization and loss of production capacity.[56]

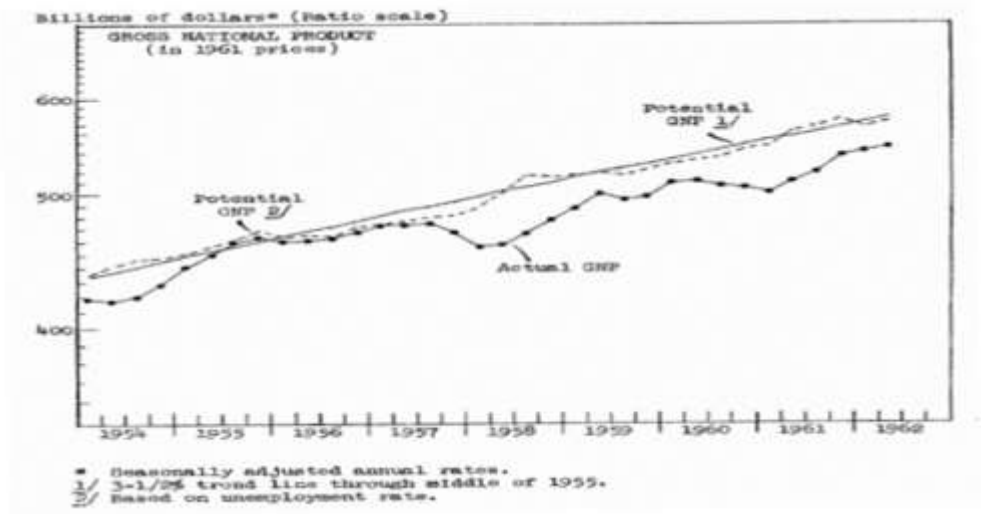
The Law of Okun - the law that determines the connection between short term growth in unemployment rate and the loss of production capacity. It was discovered by Arthur Okun American economist (1929-1979). According to this law, when annual increase of the gross domestic product reaches 2,5 %, the unemployment rate will become constant. The elasticity of real GDP to potential GDP with changes in unemployment is constant and approximately 3%. For example, a 1% increase in unemployment leads to a 3% decrease in real output, and vice versa. Due to that, the preservation and regulation of the natural rate of unemployment in countries is extremely important. Since certain national economy is unable to provide workplaces for volunteers to work and able-bodied people, economy will not be able to realize the whole potential of the goods and services production. Okun's law plays an important role in regulation of the countries' unemployment rate.[57]

[54] Virén M. (2001), The Okun's Curve Is non Linear, in Economics Letters, 70, pp. 253-257.
[55] Balakrishnan R. - Michelacci C. (2001), Unemployment Dynamics across OECD Countries, in European Economic Review, 45, pp. 135-165.
[56] Villaverde J. - Maza A. (2007), Okun's Law in the Spanish Regions, in Economics Bulletin, 18, 5, pp. 1-11
[57] Доброжинская А.А. Закон Оукена и современная Российская экономика

Methods. The article studies the theoretical and methodological foundations of the Okun's law of unemployment and GDP, and also uses data from the United States, European countries and other countries for comparative, structural and comparative analysis. In the process of study, methods of analysis, contrast and comparison of statistical data, as well as scientific observation and comparative analysis were used.

Analysis and results. « How far we are from achieving full employment is an important indicator of how well fiscal and monetary policy is shaping up. »[58]

When Arthur Okun developed the concept of the Law of Okun in 1962, he tried to explain the connection between the unemployment rate and the change in the production volume.



1-pic. The analysis of USA's GDP in between 1947-1960s made by A.Okun in his book.[59]

Based on the USA reports, during the 1947-1960s each additional percentage point of unemployment above four percent was associated with a decline in real GDP of about three percent[60]

In this picture, Okun described how potential GDP fluctuated around its trend growth rate between 1954 and 1962. The "gap" between actual and potential GDP can also be derived

[58] Muhammadjon Nig`matiov https://uz.wikipedia.org/wiki/Ouken_qonuni
[59] Okun, Arthur M. (1962): Potential GNP: Its Measurement and Significance, in: Proceedings of the Business and Economics Statistics Section, American Statistical Association, p. 99)
[60]Okun, Arthur M. (1962): Potential GNP: Its Measurement and Significance, in: Proceedings of the Business and Economics Statistics Section, American Statistical Association, pp. 98- 104)

from this diagram. To estimate the growth rates needed to reduce unemployment, one must rely on mandatory macroeconomic statistics and assumptions. Okun's main assumptions were:

1. Absolute employment starts from 4 %;
2. The labor force consists of people who have jobs and are currently looking for work (there are no hidden reserves);
3. The technological knowledge, capital reserves, natural resources, skills, and education available in the workforce are taken.

Apart from that, he stated that the loss of the production equals to 3 % and during the late expansion, recession periods and since beginning the number will be slightly lower than 3%. This loss of production will lead to the belated growth of the unemployment. Furthermore, this is the first causal direction in Okun's logic: unemployment increases since the loss in production causes workers to be laid off. The logic of the reverse direction is that unemployment brings in fewer people, so production follows demand.[61]

Okun's law allows us to determine the size of the output losses at different levels of unemployment. This coefficient, now called the β coefficient, is considered to be in the range of 2 to 3 percent. Okun's law can be expressed in the following formula:

$$Y_{uz} = -2{,}5\,[u - u^*]$$

Here: u* - the natural rate of unemployment; u - the actual rate of unemployment. Generalizing the formula for Okun's law with the formula for the GDP discontinuity, we obtain the following formula:

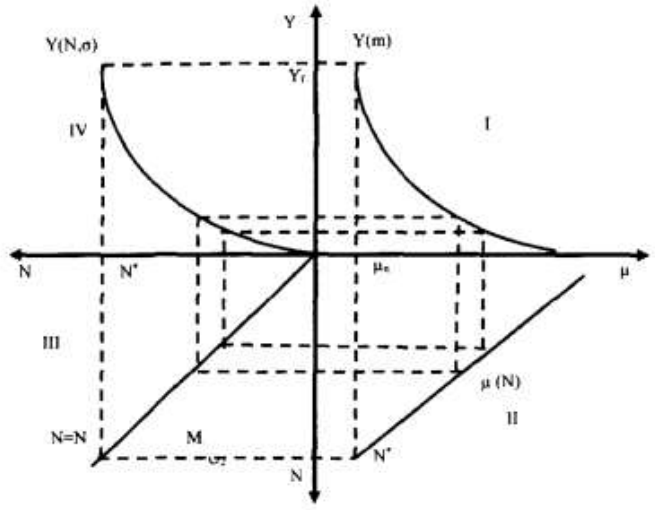
$$\frac{Y_h - Y_p}{Y_p} 100 = -\beta[u - u^*]$$ [62]

First, Okun's difference model describes how the percentage change in real growth over a given period of time (often a quarter in his paper) affects the percentage point change in the unemployment rate over the same period. This assumption can be expressed by the following formula:[63]

$$\Delta U_t = \alpha + \beta \log Y_t + \Delta\varepsilon_t$$

[61]Okun, Arthur M. (1962): Potential GNP: Its Measurement and Significance, in: Proceedings of the Business and Economics Statistics Section, American Statistical Association, p.103.
[62] Makroiqtisodiyot. Dasrlik. G'.E.Zaxidov, M.T.Asqarova, Z.A. Djumayev, L.F.Amirov, H.A. Hakimov. - T.: 2019. - 290 bet.
[63] Knotek, Edward S. (2007): How useful is Okun´s law? in: Economic Review, No. Q IV, Federal Reserve Bank of Kansas City, pp. 73-103

Here Δ denotes the absolute change in the previous period, α is a constant, β is the Okun coefficient, U_t is the unemployment rate in period t, Y_t is the production rate (log since we are talking about percentage changes), and ε_t is the error term.



2-pic. Okun's Curve

This graph is called the "Okun's curve", where Y is the actual GDP, U is the actual unemployment rate, and N is the percentage of GDP lost. Meanwhile, quadrant II is the relationship between unemployment and employment, quadrant III is an additional 45-degree line representing the employment-employment equation (N=N), and quadrant IV is the production function. Quadrant I is the product of the three quadrants mentioned above and is called the "Okun's curve".[64]

The coefficient N shows how much the volume of GDP decreases with each percentage increase in cyclical unemployment. According to the scientist's calculations, the coefficient A is in the range from 2 < to < 2.5. Scientist's figure show that, at full employment, the volume of production is equal to Y*, and the unemployment rate is - U*. If employment decreases, the volume of production decreases to Y2. Thus, the volume of production is a function that decreases in proportion to the unemployment rate.

The "Okun's curve" shifts in the following cases: - when the national income indicator (Y*) at full employment changes (if U increases, the curve shifts up, if it decreases, it shifts down); - when the natural rate of employment (U*) changes (if it increases, the curve shifts to the right, if it decreases, it shifts to the left).

[64] Kalandar Abdurahmonov Mehnat iqtisodiyoti: Nazariya va amaliyot / Darslik. Kalandar Abdurahmonov. Qayta ishlangan va to'ldirilgan 3-nashri. T.: 0 'zbekiston Respublikasi Fanlar akademiyasi «Fan» nashriyoti davlat korxonasi, T.: 2019.-544 b.

Developed countries effectively use Okun's law, namely the USA, European countries, and Asian countries. In developing countries, due to the lack of statistical data, or rather, the absence of a natural rate of unemployment, Okun's law cannot be used. Thus, quantitatively, full employment in the national economy is ensured when the unemployment rate remains at a natural level, that is, there is no cyclical unemployment. Due to the specifics of the economy of Uzbekistan, the structure of its industry and high rates of population growth, the natural rate of unemployment corresponding to full employment in the country is slightly higher than in Western countries – not by 4-6%, but about by 8%.

Although there are many differences in the relationship between unemployment and economic growth, there is empirical support for the law. A study by the Federal Reserve Bank of Kansas City concluded that "Okun's Law is not a robust relationship," but that it "predicts a slowdown in economic growth that will generally coincide with an increase in unemployment."[65] As for how it fared during the financial crisis, Bernanke said that "the apparent failure of Okun's Law may in part reflect statistical noise."[66]

Conclusion and suggestions. In conclusion, we can say that the fact that the natural rate of unemployment in the economies of developed countries was present suggests that Okun's law was working effectively, that is, it made it possible to measure the relationship between GDP and unemployment. One of the main advantages of Okun's law is its simplicity in stating that when economic growth is about 2% faster than expected, unemployment will fall by 1%. However, it is not a good idea to rely on it to make accurate forecasts of unemployment, given economic growth trends. For example, since it was first studied, we know that it has changed over time and is more affected by unusual economic conditions, including unemployment rebounds and the 2008 financial crisis.

The analysis can be very complex due to the complexity of the underlying input data, the different time periods that can be used, and the uncertainty that comes with economic regressions. Okun's law may not be exactly predictive, but it can help in discussing how economic growth affects employment and vice versa.

In the studied scientific works, we can conclude that A. Okun's law has been studied by many scientists, economists, and many prestigious university professors, and some of their ideas have been effectively applied, while others have been studied but not applied in

[65] How Useful is Okun's Law? By Edward S. Knotek, II
[66] Recent Developments in the Labor Market. Chairman Ben S. Bernanke
At the National Association for Business Economics Annual Conference, Arlington, Virginia

practice. Since it is not possible to use Okun's law in our country, we can see that important measures are being taken in our country to reduce the actual level of unemployment in Uzbekistan. In the future, we believe that we will be able to maintain the unemployment rate at a normal level. Of course, in order to reduce the unemployment rate in our country, we believe that it is necessary to increase the employment rate as well as jobs, the number of qualified personnel, and invest in human capital.

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