

Marta Martincová¹

THEORETICAL ASPECTS OF CORRELATION BETWEEN ECONOMIC GROWTH AND UNEMPLOYMENT²

Abstract

Labour is a production factor that has a crucial effect in economic growth. Therefore, a correlation exists between the amount of work (employment) and the size of gross domestic product (GDP). It can be assumed that an increase in GDP is accompanied by an increase in employment rate, while its decrease by a fall in unemployment. This relationship between changes in GDP growth and changes in the rate of unemployment has been researched and quantified by the American economist Arthur Okun. He explained the following two empirical relationships: the correlation between the unemployment rate and the real economic product, and the correlation between the divergence of the unemployment rate from its natural rate (NAIRU) and the output gap, i.e. a divergence of real output from potential output. He noted that the unemployment rate is a decreasing function of the performance growth rate of an economy (measured by GDP). Nevertheless, in the 1980s and 1990s the relationship was considered unstable. This was mainly because the causes of unemployment were attributed to an inflexible labour market, and excessive wages and unemployment benefits. However, outsourcing and off-shoring began to significantly affect the link between production capacities, the national labour market and the overall impact of transnational corporations on the global economy.

Key words: unemployment, employment, output, economic growth, potential product, Okun's law, Okun's coefficient

KORELACJA MIĘDZY WZROSTEM GOSPODARCZYM A BEZROBOCIEM – ASPEKTY TEORETYCZNE

Streszczenie

Praca jest znaczącym czynnikiem produkcji, mającym wpływ na wielkość wytwarzanego PKB w gospodarce. Zatem nie bez znaczenia jest poziom zatrudnienia i bezrobocia w gospodarce. Korelacja między zmianami tempa wzrostu PKB a zmianami stopy bezrobocia została zbadana przez amerykańskiego ekonomistę Arthura Okuna. Na podstawie opracowania danych kwartalnych gospodarki USA w 1960 roku Okun stwierdził, że stopa bezrobocia jest malejącą funkcją stopy wzrostu wydajności gospodarki (mierzoną wielkością PKB). W teorii ekonomii związek ten jest znany jako prawo Okuna.

Słowa kluczowe: bezrobocie, zatrudnienie, wydajność, wzrost gospodarczy, potencjał produktu, prawo Okuna, współczynnik Okuna

¹ Marta Martincová, PhD, Eng. – University of Economics in Bratislava, The Faculty of National Economy, Department of Economics

² The report was written as part of research project VEGA, number 338, entitled “Contradiction of Creating Human Capital in New Economy”.

Introduction

The level of output that an economy reaches at the natural rate of unemployment, and given full utilization of the factors of production, can be designated as a potential product. At the same time, such a state of the economy is regarded as optimal, which is the aim of governmental economic policies. The performance of every economy tends to fluctuate, and is reflected in the real economy as the economic cycle – periods of more rapid growth are alternated with those of slowdown.

If the expansion is so great that the level of real GDP exceeds the potential output, unemployment falls below its natural level. In this case, it is necessary to employ more labour in order to produce more output. Conversely, in times of recession, output decreases below the level of potential output and unemployment rises above its natural level, leading to a lower demand for manpower.

The above-mentioned correlation between changes in GDP growth and changes in the unemployment rate was examined by the American economist Arthur Okun. Having studied the development of quarterly data on the U.S. economy in the 1960s, Okun detected a correlation between the GDP and unemployment figures, which can be also quantified. He stated that the unemployment rate was a decreasing function of the performance growth rate of the economy (measured by GDP). In economic theory and practice, this relationship is known as Okun's law, and has become one of the essential implications for macroeconomic policy.

1. Okun's Law

In his article, A. Okun explained two empirical correlations: (i) between the unemployment rate and the real product, and (ii) between the divergence of the unemployment rate from its natural rate (NAIRU) and the output gap, i.e. a divergence of the real output from the potential one.³

Knotek refers to the first relationship as a *growth rate* or a *difference version*, and to the second version as a *gap version*.⁴

The first version of Okun's Law (difference version) has the following form⁵:

$$(\text{delta}) U = a + b \times (\text{gGDP}).$$

³ A. M. Okun, *Potential Output: Its Measurement and Significance*, Cowles Foundation, Yale University, New Haven 1962, <http://www.cowles.econ.yale.edu/P/cp/p01b/p0190.pdf>, retrieved 18.04.2014.

⁴ S. E. Knotek, *How Useful is Okun's Law?*, Federal Reserve Bank of Kansas City, Kansas City 2007, <http://www.kc.frb.org/PUBLICAT/ECONRE/PDF/4q07Knotek.pdf>, retrieved 18.04.2014.

⁵ Košta et al., *Current problems of the labour market in the Slovak Republic after joining the European Monetary Union*, Institute of Economic Research, Bratislava 2011, p. 83.

This equation illustrates a quarterly change in the unemployment rate in correlation to real GDP growth, where:

- b is the value of Okun's coefficient, which reflects the intensity of the correlation between economic growth and unemployment; this value is usually negative because GDP growth is typically accompanied by a fall in unemployment;
- the proportion $-a/b$ expresses the growth rate of GDP at a constant rate of unemployment, thus it indicates the pace of economic output to achieve a constant level of unemployment.

Based on quarterly data on the U.S. economy from 1948 to 1960, which were available at the time when Okun published his paper, the following equation can be derived:

$$(\text{delta}) U = 0.3 - 0.07 \times (\text{gGDP}).$$

Based on this estimation, he then infers that at zero GDP growth, the unemployment rate would increase by 0.3%. The GDP growth rate at which the unemployment rate would not change amounts to a little more than 4%. In other words, the value of Okun's coefficient indicates that for every increase of 1% in real GDP (which is higher than 4%), the unemployment rate would fall by 0.07%.

The second version of Okun's Law (gap version) can be expressed as follows:

$$(\text{delta}) U = c + d \times (yp - ys).$$

Okun's second law expresses the relationship between the unemployment rate and the gap between the potential and the real product, where:

- c expresses the natural rate of unemployment;
- $yp - ys$ expresses the size of the output gap; however, this value is not directly observable, so the first version is more often used.

2. Different views on Okun's Law

While in the 1960s, Okun's law was considered one of the most important macroeconomic correlations, in the 1980s and 1990s, it came to be regarded as unreliable. This was mainly because the inflexible labour market and too high wages and unemployment benefits were believed to be the principal causes of unemployment. Economists used the argument that even at GDP growth of 2%, unemployment kept rising. At the same time, there were concerns that higher GDP growth rates could lead to higher inflation.

Okun's law was therefore subjected to criticism. One of the major points of criticism was the argument that in the real economy, any change in the unemployment rate in response to the output growth occurs with long delays. Dorbusch and Fischer,

meanwhile, discovered that the estimates of potential output, as well as the correlation of unemployment and GDP gap, do not change in the long term⁶.

Empirical research suggests that if the unemployment rate is higher than the natural rate, it is more likely that the growth of economic product will have a greater impact on reducing unemployment. This happens because there is a surplus of workers ready to accept the existing wage rates. However, if the real output exceeds the potential one, the growth in the real GDP will have a rather weaker effect on the unemployment rate. Employers would prefer to use the already employed staff and require them to work overtime rather than take on additional workers.

From the perspective of Keynesian economics, the explanation of Okun's law is quite simple⁷. Changes in production based on changes in aggregate demand lead to changes in the demand for labour and thus affect unemployment. Nevertheless, the problem with this approach is that it assumes a rigidity of prices and wages. Neo-classical economics is convinced that the labour market cleanses itself and that only frictional and structural kinds of unemployment exist. Therefore, the explanation of Okun's law is much more complicated as it is necessary to explain why frictional and structural unemployment reduces the time of expansion and increases in periods of recession.

One explanation is offered by Soegner and Stiassny⁸. They argue that even in times of expansion, people still have low wage expectations and therefore they are willing to accept a job opportunity at a lower wage, which shortens the periods of job-seeking.

The correlation between unemployment and the size of product also explains the endogenous models, although taking the long-term aspect into account, which is not in accordance with the assumptions adopted by A. Okun. The economists Aghion and Howitt⁹ examine two different effects. On the one hand, higher economic growth caused by higher technological progress causes structural changes and higher unemployment rate. On the other hand, output growth increases the demand for labour and also shortens job-seeking periods.

3. Okun's coefficient

As a general rule, the higher Okun's coefficient (i.e. the elasticity between employment rate and GDP growth), the stronger the assumption that unemployment is

⁶ R. Dornbusch, S. Fischer, *Macroeconomics*, SPN and the Foundation of Economics, Prague 1994.

⁷ Košta et al., op. cit., p. 85

⁸ L. Soegner, A. Stiassny, *A Cross Country Study on Okun's Law*, Working Paper, No. 13, Wirtschaftsuniversität Wien, Vienna 2000, <http://www.wu.ac.at/inst/vw1/gee/papers/gee!wp13pdf>, retrieved 18.04.2014.

⁹ P. Aghion, P. Hovwit, *Growth and unemployment*, "Review of Economic Studies" 1994, Vol. 61, No. 3, <http://www.jstor.org/pss/2297900>, retrieved 18.04.2014.

reduced due to economic policy measures which promote economic growth and aggregate demand. Okun's coefficient relies mainly on the willingness of companies to hire and lay off employees, depending on the phase of the economic cycle. In the 1970s, Okun's coefficient in the European Union countries was equal to 0.2, while in the 1980s and 1990s, it increased to 0.5.

Table 1 shows the values of Okun's coefficient according to Blanchard.¹⁰

Table 1. Okun's coefficient

Country	1960-1980	1981-2003
USA	0.39	0.39
Great Britain	0.15	0.54
Germany	0.2	0.32
Japan	0.02	0.12

Source: O. Blanchard, op. cit.

Throughout the mentioned periods of time, Okun's coefficient was increasing in the UK, Germany and Japan. This can be explained to some extent by the deregulation of the labour market, which took place in these countries.

Hereby, the question arises: Why does a 1% increase in GDP not reduce the unemployment also by 1%. A. Okun indicated two main reasons for this:

- On the labour market, transaction costs are incurred through the recruitment and dismissal of workers (similarly to other markets). Companies wishing to recruit new workers deal with the costs of advertising, possible bankruptcy and other activities. New workers are not fully qualified at the beginning of their employment, and require courses and training.
- Companies that dismiss many employees may be legally obliged to contribute to unemployment insurance funds. Because of these costs, when production declines, companies tend to maintain employment by reducing the number of hours worked or by offering a replacement to their employees. During expansion, companies choose to require their employees to work more than 8 hours per day, even at an increased hourly rate, rather than to recruit new employees.

Other alternative explanations of Okun's law can be derived from the method of calculating the unemployment rate (understood as the ratio of the number of the unemployed to the workforce). In periods of expansion, as firms increasingly create new jobs, some of the previously unemployed have an opportunity to find work. However, it may also be the case that the labour market in these circumstances attracts people who previously did not wish to work at all (were not part of the workforce). The end result is that as output grows, a growing number of employees leads

¹⁰ O. Blanchard, *Macroeconomics*, Upper Saddle River, Prentice Hall International, New York 2006.

to an increase in the workforce. This implies that a 1% increase in the number of jobs tends to be associated with less than a 1% decrease in unemployment.

During the 1990s, the EU tried to maintain the unemployment rate at 1.8% to ensure the required rate of GDP growth¹¹. With the growth of labour supply in the labour market, the rate increased to 2.3%. This can be explained by the improvement of the labour market that attracted not only the unemployed in the country, but also foreign workers. New jobs were partially filled by registered unemployed and by non-work provisions.

Okun's law does not necessarily apply in all circumstances. According to Knotek¹², the value of Okun's coefficient is not stable and relatively sensitive to the phase of the economic cycle. Empirical data suggest that when an economy is expanding, its value is higher and when there is a recession, it is lower. The use of Okun's Law for forecasting unemployment rates is therefore only applicable for the first phase of the economic cycle, but we must also take into account other factors that affect the labour market situation as well as the overall macro-economic developments.

When analyzing GDP growth in Slovakia in 1997-2008, Košta et al.¹³ concluded that it was mainly driven by a growth of labour productivity, as a causal link between GDP growth rate and the change in the unemployment rate could be observed when applying Okun's law. Economic growth and unemployment in Slovakia showed a very strong interdependence¹⁴. A similar correlation was also noted in Ireland, the Netherlands and Spain. Conversely, a low rate dependence could be noticed during the reporting period in countries such as Austria, Greece, Romania, Hungary, Finland and Cyprus. Košta et al. reached the conclusion that the law can be used to explain up to 82% of the variability changes in unemployment. It also indicates that to maintain the unchanging level of unemployment rate in Slovakia a 4.89% growth of GDP is necessary. Okun's coefficient reached 0.61, which means that to achieve a reduction in the unemployment rate by 0.6 percentage points, the required GDP growth rate should equal 5.89%. Of all the EU member states, Slovakia has the highest unemployment rate dependence on the growth rate of GDP. The growth rate needed to maintain a stable unemployment rate is the second highest, and therefore the Slovak economy has achieved a very high rate of economic growth in order to reduce the unemployment rate. The negative change in the unemployment rate at zero GDP growth is also one of the highest in the EU, and Okun's coefficient is high as well. According to several studies, Okun's coefficient should grow to the value of 1. Košta et al. concluded that across the EU, it can achieve a value higher than 1. Differences between countries explain the high demand for

¹¹ Ch. J. Nelly, *Okun's Law: Output and Unemployment*, "Economic Synopses" 2010, No. 4, <http://research.stlouisfed.org/publications/es/10/ES1004.pdf>, retrieved 18.04.2014.

¹² S. E. Knotek, op. cit.

¹³ Košta et al., op. cit., p. 101.

¹⁴ Ibidem.

production work. The dependence expressed by Okun's law is not exhibited in all the EU countries either, which is mainly due to the fact that unemployment is affected not only by economic growth, but also by other factors. Among the most important ones we can mention the different structures of the economies, wage levels, technological changes and globalization phenomena, such as outsourcing and offshoring.

Conclusions

Okun's law has a theoretical and methodological, as well as a practical, significance – it provides practical guidance for influencing the development of unemployment regulating economic growth. Therefore, it may be a good starting point in formulating specific economic policy measures. At the same time, however, it is necessary to bear in mind that Okun's law is a certain model structure that ignores many real processes taking place in an economy and, as such, it offers a greatly simplified view on the problem of the relationship between unemployment and economic growth. Its use for the formation of detailed economic policy recommendations from this perspective has some limitations. In the 1980s and 1990s, mainly in Western Europe, the relationship was unstable. This was mainly because the causes of unemployment were attributed to an inflexible labour market, and excessive wages and unemployment benefits. Outsourcing and offshoring began to significantly affect the link between production capacities, the national labour market and the overall activity of transnational corporations in the global economy. Several prominent economists, for example, J. Stiglitz and Rogoff, have noted that some changes are currently occurring in the correlation between economic growth and employment. The most important phenomena taking place in the labour market include the difficulty to precisely define the relationship between the national labour market and economic growth. It is preferable to define the total amount of demographic resources affecting overall employment. At the same time, defining the demand for labour at the national level is problematic in terms of the total volume of the structure, due to the action of transnational corporations. Most of the production of these large companies is not tied to sales in the national economy, but depends on the development of global consumption. Although we cannot evaluate economic revival only at the national level, the recovery of the global economy is necessary to generate employment in the national labour market by leading to a growth of the global labour demand.

References

1. Blanchard O., *Macroeconomics*, Upper Saddle River, Prentice Hall International, New York 2006.

2. Dornbusch R., Fischer S., *Macroeconomics*, SPN and the Foundation of Economics, Prague 1994.
3. Košta et al., *Current problems of the labour market in the Slovak Republic after joining the European Monetary Union*, Institute of Economic Research, Bratislava 2011.

Internet resources

1. Aghion P., Howit P., *Growth and Unemployment*, "Review of Economic Studies" 1994, Vol. 61, No. 3, <http://www.jstor.org/pss/2297900>, retrieved 18.04.2014.
2. Knotek S. E., *How Useful is Okun's Law?*, Federal Reserve Bank of Kansas City, Kansas City 2007, <http://www.kc.frb.org/PUBLICAT/ECONREV/pdf/4Q07KNO TEK.PDF>, retrieved 18.04.2014.
3. Nelly Ch. J., *Okun's Law: Output and Unemployment*, "Economic Synopses" 2010, No. 4, <http://research.stlouisfed.org/publications/es/10/ES1004.pdf>, retrieved 18.04.2014.
4. Okun A. M., *Potential Output: Its Measurement and Significance*, Cowles Foundation, Yale University, New Haven 1962, <http://www.cowles.econ.yale.edu/P/cp/p01b/p0190.pdf>, retrieved 18.04.2014.
5. Soegner L., Stiassny A., *A Cross Country Study on Okun's Law*, Working Paper, No. 13, Wirtschaftsuniversität Wien, Vienna 2000, <http://www.wu.ac.at/inst/vw1/gee/papers/gee!wp13pdf>, retrieved 18.04.2014.