

THE SPECIFICS OF OKUN’S LAW IN THE ROMANIAN ECONOMY BETWEEN 2007 AND 2013

PITORAC RUXANDRA

POSTDOCTORAL RESEARCHER, WEST UNIVERSITY OF TIMISOARA

e-mail:ruxandrapitorac@gmail.com

Abstract

The objective of this article is to study the Romanian economy after 2007 and to identify its main characteristics related to the GDP and unemployment sector. The research starts with a brief theoretical review on Okun's coefficient and presents two approaches identified in the literature, used in the study of Okun's law: the "first-difference model" and the „gap model”. In this paperwork we have chosen the second approach on Okun's law to determine the specific of Romanian economy after integration in the European Union. Thus, was performed the quantitative analysis of the two macroeconomic indicators, with the help of the Hodrick-Prescott filter, the output gap and the unemployment gap were calculated, and by empirical analyzing the correlations between them with the help of a single factor regression model, the Okun's law for Romanian economy was obtained. The research results revealed that, in the analyzed period, fiscal and monetary policies were not sufficient to reduce unemployment, therefor other types of policies had to be implemented.

Keywords: GDP, unemployment rate, Okun's law, HP Filter

JEL Codes: E24, J64

1. Introduction

The Okun's Law (1962) says that there is a negative empirical relationship between the unemployment rate and GDP, and Okun's coefficient is considered a "rule of thumb", used in assessing the dynamics of unemployment using the GDP forecast, but also in the elaboration of economic policies.

Recently, there have been numerous studies that have investigated the validity of this law, and the results were largely positive: Zanin (2014), Ball, Jalles and Loungani (2014), Villaverde and Maza (2009), Guisinger and Sinclair (2014) analyzed Okun's law in countries of the Organization for Economic Cooperation and Development (OECD), Lucchetta and Paradiso (2014) empirically investigated the relationship between GDP and the unemployment rate in the context of economics crisis of 2008; through the study of the characteristics of Okun's law for the US economy and the Romanian economists, like Anghelache, Isaic-Maniu, Mitruț and Voineagu (2006), Turtorean (2008), Gheorghe (2010), Boldea, Oțil, Părean (2010) and Gibescu (2013) studied the applicability of Okun's Law in the Romanian economy.

With Okun's coefficient one can determine the causes of the discrepancies between the GDP and unemployment rate, which can be cyclical or structural, which is particularly important in economic policies: if these causes are cyclical, the fiscal and monetary policies should be sufficient to reduce unemployment, and if they are structural in nature, other policies will be implemented, such as worker retraining programs and programs promoting mobility to areas where there are vacancies. [8]

2. Methodology

There are two approaches to the study of Okun's Law: through the first-difference model and the gap model.

According to the first approach, Okun's law is given by the relationship between the change of the natural logarithm of real GDP observed (ΔY) and the change of unemployment rate (ΔU) and has the following form:

$$\Delta Y = \alpha + \beta \Delta S, \quad (1) \quad \beta < 0 \quad \text{or}$$

$$Y_n - Y_{n-1} = \alpha + \beta (S_n - S_{n-1}) + \varepsilon, \quad (2) \quad \beta < 0 \quad \text{where,}$$

- n is the number of observations
- α is the intercept of the model
- β is Okun's coefficient which measures the GDP changes when the unemployment rate changes
- ε is the residual or disruptive variable

According to the second approach, using the gap model, this has the following form:

$$Y_n - Y_n^* = \alpha + \beta (S_n - S_n^*) + \varepsilon, \quad (3) \quad \beta < 0 \quad \text{where,}$$

- Y_n^* is the potential GDP log, so $Y_n - Y_n^*$ is the output gap (production deviation regarding the stochastic long-term trend [7]), more specifically, the cyclical component of GDP
- U_n^* is the natural rate of unemployment, so $U_n - U_n^*$ is the unemployment gap, more specifically the cyclical unemployment rate.

These two indicators are not observable and they can be estimated by generating trend data series, and for this purpose we used Hodrick-Prescott filter (HP). It extracts a component of long-term data series by minimizing the variance of the trend, considering the magnitude of the trend and it is calibrated with a multiplier λ , which sets their relative weights.

The first approach is used when the natural rate of unemployment (U_n^*) is considered constant and the potential GDP (Y_n^*) increases at a constant rate, which is why in this paper we have chosen the second approach, using the gap model to determine the specifics of Okun's law in the Romanian economy.

3. Results and discussions

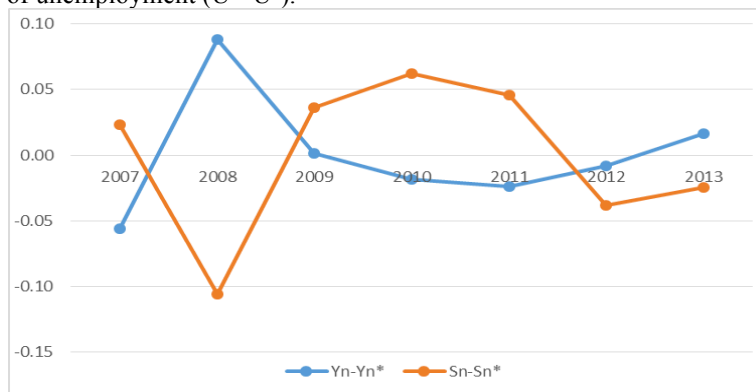
Data series of indicators analyzed (GDP and unemployment) were taken from the website of the National Institute of Statistics (www.insse.ro) 2007-2013. Nominal GDP was converted to real GDP using the consumer price index (CPI), with reference year 2013.

Table no.1. GDP and unemployment rate in Romania, 2007-2013

Year	REAL GDP (Y) mill. RON	Y	Y*	Y - Y*	Unemployment rate %	U	U*	U - U*
2007	574393,57	13,26	13,32	-0,06	6,4	1,86	1,83	0,02
2008	667756,57	13,41	13,32	0,09	5,8	1,76	1,86	-0,11
2009	615690,50	13,33	13,33	0,00	6,9	1,93	1,89	0,04
2010	606862,65	13,32	13,33	-0,02	7,3	1,99	1,93	0,06
2011	607196,94	13,32	13,34	-0,02	7,4	2,00	1,96	0,05
2012	620429,42	13,34	13,35	-0,01	7	1,95	1,98	-0,04
2013	639271,90	13,37	13,35	0,02	7,3	1,99	2,01	-0,02

Source: INS, www.insse.ro

In the first stage, the values of the GDP were logarithmically processed (Y) to obtain the percentage deviations from the trend of the series of its flat (smooth) and a linear time series, not from the exponential one, then applied the HP filter to give the stochastic trend on a long term (Y^*), calibrated with the λ with value 100, process specific to the annual data series and thus we obtained the output gap ($Y - Y^*$). The same method was used for the unemployment rate to obtain the cyclic rate of unemployment ($U - U^*$).



Source: made by the author based on data from Table no.1

Figure no. 1. The output gap and unemployment in Romania, 2007-2013

The negative relationship between GDP and the unemployment rate between 2007 and 2013 is clear and can be seen in Figure no.1, so we can say that Okun's law applies to the Romanian economy.

We can observe the economic boom period between 2007 - 2008, when the GDP increase by 16% and the unemployment rate hit its highest decrease of 10% and the economic crisis between 2008-2011, characterized by high levels of unemployment and declines in GDP. The year 2011 was a turning point marking the economic recovery, characterized by increases in GDP and unemployment decreases. An unusual phenomenon can be observed in 2013, when GDP and the unemployment rate increases by 3%, respectively 4%.

By applying the gap-model on the data series above, through a unifactorial regression, we obtained Okun's coefficient, specific to the Romanian economy, β , as -0.61.

<i>Regression Statistics</i>	
Multiple R	0,807843269
R Square	0,652610747
Adjusted R Square	0,485944081
Standard Error	0,026529874
Observations	7

Source: made by the author, in Excel, using data from Table no.1

Figure no.2. The unifactorial Regression model

The multiple correlation coefficient, Multiple R is 0.80, which indicates a strong link between the output gap and the unemployment rate, while the coefficient of determination, R Square is 0.65 shows that 65% of the variation in the output gap can be explained the influence exerted by the unemployment rate. (Figure no.2)

To test our hypothesis we used „Student test”, that showed that the t Stat parameter of α (1.48) was lower than the critical t (2.44), so it was remove from the model and rebuilt.

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>
Interception	0	#N/A	#N/A	#N/A
Unemployment gap	-0,61220005	0,182347081	-3,357333986	0,015279963
			2,446911851	
			t critical	

Source: made by the author, in Excel, using data from Table no.1

Figure no.3. Student test

The t Stat parameter assigned for β , of -3.35, is greater than the critical t (2.44 is the value of the variable table according to 6 degrees freedom and probability of 5%), which means that the null hypothesis is rejected, thus we can say that there is a 95% probability that the parameter estimate is significant, and the model is statistically correct. Also, the P-value, which expresses the probability of failure of the test is very low 0.015. (Figure no.3)

ANOVA				F critic	
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	0,007933402	0,007933402	11,27169149	0,020166541
Residual	6	0,004223005	0,000703834		
Total	7	0,012156407			
				4,283865714	

Source: made by the author, in Excel, using data from Table no.1

Figure no.4. ANOVA

To test the validity of the model, we used ANOVA and got that: the F is 11.27, a score greater than the critical F (4.28 is the value of the variable table according to 6 degrees of freedom and probability of 5%), which means that the econometric model is good; (Figure no.4)

Using data obtained we can write Okun's law for the Romanian economy in the period 2007-2013: $Y_n - Y_n^* = -0.61 (U_n - U_n^*)$

GDP gap = - 0.61Unemployment gap, i.e. a 1% increase in cyclical unemployment rate leads to decrease by 0.61% of the output gap.

Okun's coefficient (0.61) coincide with those obtained in recent studies in the area who used this method of assessment, even for different countries: for example, Lucchetta and Paradiso (2014) in their study on the US case, Zanin (2014) and Guisinger and Sinclair (2014) in the study by the OECD countries.

Our model considers only the cyclical components of the indicators, which is why there is a difference between the obtained coefficient (-0.61%) and the one known in the literature (-3%). The difference between them can be attributed to structural factors influencing the unemployment rate.

4. Conclusions

Okun's coefficient is of particular importance, as an indicator that quantifies the magnitude and statistical significance of the relationship between changes in the GDP and unemployment rate, two important macroeconomic indicators for economists and government authority to monitor the economic health of a country. [11]

From the quantitative analysis of the two macroeconomic indicators in Romania between 2007 and 2013, a period of major economic fluctuations, we can notice a reverse relation between the GDP and unemployment rates, except for 2013, when there were increases in both indicators.

Using the gap model to determine the coefficient of Okun, we obtained a value of -0.61, for example with a 1% increase in cyclical unemployment rate, the output gap will decrease by 0.61%; the 2.39% average remaining can be attributed to structural factors.

Therefore, in the analyzed period, the fiscal and monetary policies were not sufficient to reduce unemployment, but had to be implemented other policies, as retraining of workers or/and programs promoting mobility to areas where there are vacancies.

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6. References

- [1] **Anghelache Constantin, Isaic-Maniu Alexandru, Mitruț Constantin, Voineagu Vergil**, "Proportii și corelații macroeconomice", *Economie teoretică și aplicată*, nr.2, pp. 101-106, 2006
- [2] **Ball Laurence, Jalles João Tovar, Loungani Prakash**, "Do forecasters believe in Okun's Law? An assessment of unemployment and output forecasts", *International Journal of Forecasting*, Volume 31, Issue 1, pp.176-184, 2015
- [3] **Boldea Monica, Oțil Maria, Părean Mihai**, "Analysis of the effects of unemployment in Romania" *Proceedings of the 5th WSEAS International Conference on Economy and Management Transformation (Volume II)*, ISBN: 978-960-474-241-7, pp.774-779, 2010
- [4] **Gibescu Octavia – Maria**, "Corelația dintre Produsul Intern Brut și șomajul în România, începând din anul 1995", *Revista Română de Statistică*, nr. 7, pp.83-89, 2013
- [5] **Gheorghe Ileana Georgiana**, "Some Considerations on the Application of Okun's Law for Romania during 1999-2010", *Petroleum-Gas University of Ploiesti, BULLETIN*, Economic Sciences Series, Vol. LXII No. 3/2010, pp. 95 – 103, 2010
- [6] **Guisinger Amy Y., Sinclair Tara M.**, "Okun's Law in real time", *International Journal of Forecasting*, Volume 31, Issue 1 pp.185-187, 2015
- [7] **Kiley Michael T.**, "Output gaps", *Journal of Macroeconomics*, 37, pp.1–18, 2013
- [8] **Lucchetta Marcella, Paradiso Antonio**, "Sluggish US employment recovery after the Great Recession: Cyclical or structural factors?" *Economics Letters* 123, pp.109–112, 2014
- [9] **Turturean Ciprian Ionel**, Okun's Law for Romania during 1992-2004, *MPRA Paper No. 10638*, 2008
- [10] **Villaverde José, Maza Adolfo**, (2009), "The robustness of Okun's law in Spain, 1980–2004 Regional evidence", *Journal of Policy Modeling*, 31, pp.289–297
- [11] **Zanin Luca**, "On Okun's law in OECD countries: An analysis by age cohorts", *Economics Letters* 125, pp. 243–248, 2014
- [12] ***www.insse.ro, National Institute of Statistics