INVESTIGATING THE EXISTENCE OF THE OKUN'S LAW IN NORTH MACEDONIA

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ABSTRACT

Unemployment is one of the most prominent issues being faced by developing countries such as North Macedonia. Unemployment indicates that productive resources are not being used properly, resulting in a low rate of real GDP growth. In macroeconomics, this relationship is known as the Okun's Law. The main aim of this study is to empirically examine and test the relationship between the unemployment rate and economic growth within the Macedonian economy over the period (1991-2019) using secondary data collected from the World Bank database. To examine the validity of Okun's law, which suggests a negative relationship between the unemployment rate and economic growth, The Auto-regression Distributed Lags Model is employed. The econometric analysis suggests that there is a statistically significant long-run relationship between the GDP growth and total unemployment in North Macedonia, at the 10% level of probability. In particular, the findings show that a 1% increase in the total unemployment will lead to a decrease of the GDP growth of 8.02%. This relationship in the opposite direction does not correspond since GDP growth affects total unemployment only in the short-term, with a positive sign, which is not in line with Okun's law. No long-run relationship between GDP growth and youth unemployment was detected as well, only positive short-term relationships.

KEYWORDS
OKUN'S LAW, UNEMPLOYMENT, GDP GROWTH, NORTH MACEDONIA

JEL CLASSIFICATION CODES
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1. INTRODUCTION

One of the key macroeconomic goals is to achieve economic growth while keeping unemployment low. Furthermore, unemployment is frequently used to assess the state and the health of the economy. The Bureau of Labor Statistics (BLS) defines unemployment as people who are without a job and have actively looked for a job in the previous four weeks. The unemployment rate is calculated by dividing the number of people who are unemployed by the total number of people in the labor force, where the labor force includes both employed and unemployed people.

The relationship between unemployment and economic growth was first investigated by Okun in 1962, which later became known as Okun's Law. The Okun's law argues that there is negative relationship between GDP growth rate and unemployment rate, which is a key theoretical and empirical concept in

macroeconomics. Theoretically, Okun's law is the link between the aggregate supply curve and labor employment. This law intends to tell us how much of output we can lose if the unemployment rate is above its natural rate (potential level of output). A lot of researchers have looked into this link. Some of them favor Okun's law, while others reject it.

2. LITERATURE REVIEW

There is a broad scientific literature that investigates the link between the total unemployment rate and the economic growth. Lee (2000) observed the link between these two variables in the OECD countries and found different level of relationship between the countries. Zagler (2003) investigated this relationship in France, United Kingdom, Germany and Italy, and found that the Okun's law is valid only at short-run, while on a long-run, the relationship between economic growth and total unemployment is positive. Javeid (2005) observed the validity of this law in Pakistan, and found that a 1% increase in GDP will lead to 2.8% decrease in the total unemployment rate. Arshad (2010) proved the existence of the Okun's law in Sweden, estimating that a 1% in GDP will lead to 2.2% decrease in the unemployment. Ting and Ling (2011) investigated the validity of the Okun's law in Malaysia and found a significant coefficient of -1.8%. Akeju and Olanipekun (2014) looked at the economic output and unemployment in Nigeria. Using the Error Correction Model, they found a weak link between the two variables: 1% change in unemployment will lead to 0.097% increase in the economic output. Dare and Hek (2016) using the ARDL model found that on a long-run, a 1% increase in the real GDP growth leads to a 2.3% decrease of unemployment rate in Curacao. On short-run, the effect is a bit smaller and leads to a 1.9% decrease in unemployment rate.

There is also literature which investigates the relationship between the youth unemployment and the economic output. Gocer and Erdal (2015) estimated the relationship between these two variables in 18 Central and Eastern European countries, and found that 1-point decrease above average economic growth rate is associated with a 1.13% decrease in youth unemployment. Zyra (2013) observed this relationship in Poland, and found out that an increase of the output growth for 1 percentage points contributes to a 0.37 percent decrease in youth unemployment rate. Furthermore, Zyra also found that the youth unemployment is closely associated to the general unemployment in Poland, and that an increase of a percentage point in the general unemployment will result in 0.46 percent higher youth unemployment.

The literature in North Macedonia offers diverse conclusions regarding the Okun's law validity in the country. For example, Unevska Andonova and Petrovska (2018) prove the existence of the link between unemployment and economic growth, however suggesting that the relationship has been somewhat weaker in the recent years, which might be related to the recent job-intensive growth in the wake of structural reforms before and during the global financial crisis and particularly the subsequent European debt crisis. Tumanoska (2019) using the ARDL model also confirms that there is a statistically significant long-run relationship between the GDP growth and total unemployment in North Macedonia, at the 1% level of probability. On the other side, studies like Sadiku at al. (2014) using quarterly data based on the VAR methodology and Engel-Granger cointegration test, show that there is no causal relationship between these two variables and a change in the growth rate of real GDP doesn't cause a change in the rate of unemployment and vice-versa. In terms of the link between youth unemployment and economic growth in North Macedonia, there seems to be a gap in the available literature.

3. PROBLEM STATEMENT

The main aim of this study is to empirically examine and test the relationship between the total unemployment rate and GDP growth in North Macedonia over the period of time (1991-2019), in order to examine the validity of the Okun's law. Moreover, the study also looks at the relationship between the youth unemployment level and the GDP growth for the same time period.

4. LIMITATIONS

Before the study dwells into deeper analysis, we should point out as limitation that it uses annual data for the empirical analysis, hence the number of observations is low. For further analysis, this empirical analysis with quarterly data is suggested to be done in order to check if the results correspond with the ones received with annual data.

The calculations of the unemployment rates have some limitations as well, considering the fact of the changes in size of informal sector and the emigration problem. To avoid such limitations, further research should also investigate the link between economic growth and the total employment level, which might reveal different conclusions.

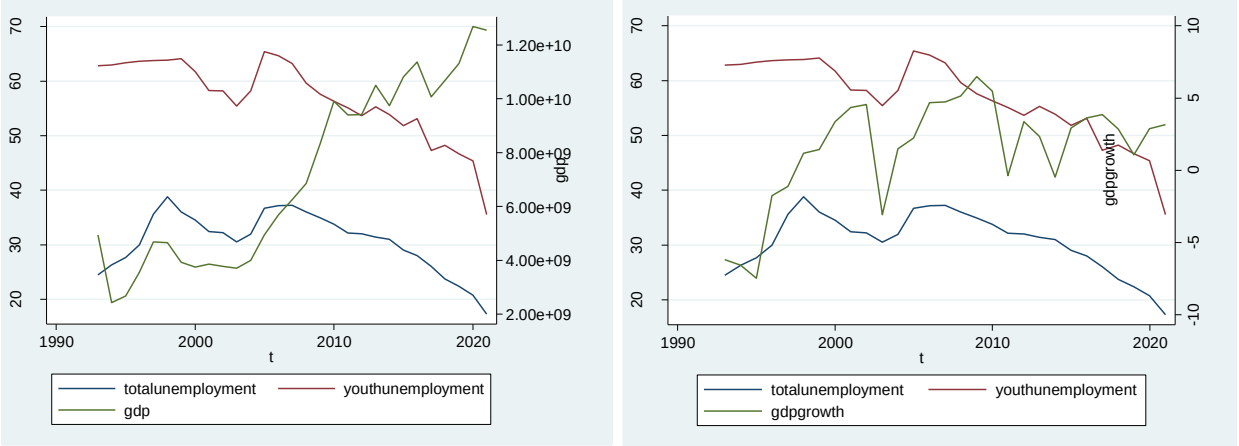
5. UNEMPLOYMENT AND ECONOMIC GROWTH IN NORTH MACEDONIA

The labor market in North Macedonia has varied significantly through the last thirty years. The total unemployment rate started with a low level of 24.5% in 1991, only to increase by 10 percentage points in the following fifteen years, reaching an all-time high level of 37.25% in 2005. The last fifteen years this situation has improved reaching an all-time low level of total unemployment of 17.26% in 2019.

The status of youth unemployment aged 15-24 followed another trend. It started out in 1991 with a seriously high level of 62.83%, reaching an all-time high level in 2004 of 64.69%, followed by a gradual decline until 2018 and reaching an all-time low level of youth unemployment in 2019 of 35.55%. Nevertheless, this rate is still high compared to the total unemployment level, and continues to be a serious societal problem. The current rate of youth unemployment is far above the EU-28 average and world-average levels of youth unemployment as well.

Another concern is the low activity rate of these persons, which deteriorated from 35.9% in 2007 by 32.8% in 2017. According to the Ministry of labor and social policy, main reasons for such situation are: increased time spent in education, reduced employment opportunities, difficulties during the school to work transition process, mismatch between the skills supply and demand at the labor market and the reluctance of the employers to cover the costs for initial on-the-job training of the young employees.

Figures 1 and 2. Trends of total unemployment, youth unemployment and GDP/GDP growth (1991 – 2019)



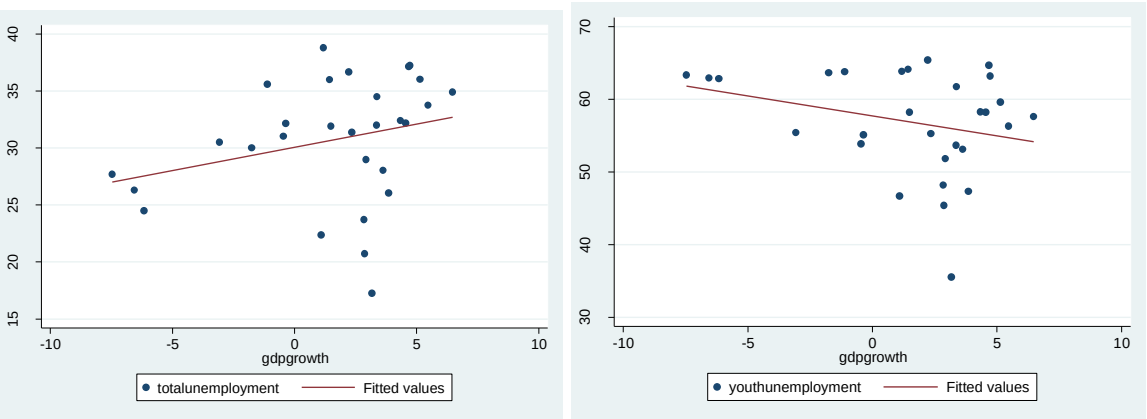
Source: World Bank database

Figures 1 and 2 represent the trends of the total unemployment rate, youth unemployment rate, GDP and GDP growth rate in the period 1991-2019. It shows that the youth unemployment is twice as the

total unemployment rate. This gap is only starting to decrease in the recent years, however the reasons behind it can be an issue of discussion as well. The trend in the GDP is witnessing a significant increase in the period 2002-2008, which is the period right after the armed conflict in 2001, and before the 2008 world financial crisis. The period which comes after 2008 is witnessing oscillations especially in the years when after effects are happening after the world financial crisis and the European debt crisis. The situation with the GDP growth also follows the political and economic crisis in the country: the ethnic conflict in 2001, the aftereffects of the global financial crisis in 2009 and the aftereffects of the European debt crisis in 2012.

Figures 3 and 4 show if there is some relationship between the variables, however no potential relationship or correlation among the variables can be detected from the scatterplot.

Figures 3 and 4. Relationship between GDP growth and unemployment rates



Source: World Bank database

6. DATA AND METHODOLOGY

This study tries to investigate the relationship between the economic growth and the unemployment rates (of total population and of youths) in Republic of North Macedonia for the period 1991 – 2019. The study uses annual data for the unemployment rate, youth unemployment rate and economic production collected from the World Bank database. Total unemployment refers to the share of the labor force that is without work but able for and seeking employment. Youth unemployment refers to the share of the labor force ages 15-24 without work but able to work and actively seeking employment. The GDP growth rate (annual %) is expressed at current US dollars' market prices.

The study employs an auto-regressive distributed lag model (ARDL) to estimate the β coefficient. There are several reasons behind the choice of ARDL instead of other techniques. First, ARDL is preferred for observations when variables are integrated of mixed orders. Second, the bounds testing procedure of the ARDL technique is more efficient for small and finite data series. Third, this technique generates unbiased estimates for the long-run model. The generalized ARDL (p, q) model is specified as:

$$Yt = \Upsilon ot + \Sigma pi=1\ \delta jYt\text{-}1 + \Sigma qi=1\ \beta jXt\text{-}1 + \varepsilon jt \ \ldots\ldots\ldots(1)$$

Where Yt is a vector, β and δ are coefficients, Υ is the constant, j = 1….k, p and q are optimal lag orders where p is used for the dependent variable and q is used for independent variable, εjt is a vector of error terms. It means that the dependent variable is a function of its lagged value, the current and lagged values of the exogenous variables in the model.

The ARDL technique is a three-step process. The first step is an estimation of the optimal lag length chosen according to the Akaike Information Criteria (AIC). The second step is a bound cointegration test

where the null hypothesis being that there is no co-integration between the GDP growth and the unemployment is conducted. The estimated value is compared with the critical value from Pesaran, Shin and Smith (2001), and the null hypothesis is rejected if the test statistics is above the upper critical value. If the results suggest that there seems to be a long-run relationship, the third step uses the Error Correction Model (ECM) to provide the speed of adjustment back to long-run equilibrium after a short-run shock.

$$\Delta Yt = \alpha 1 + \Sigma \delta i \, \Delta Yt\text{-}I + \Sigma \omega \, \Delta Xt\text{-}I + \rho 1 ECTt\text{-}1 + \varepsilon t \ldots\ldots\ldots\ldots (2)$$

7. EMPRICAL RESULTS

First, the study examines the integration characteristics of the main variables, i.e. if they contain a unit root. Datasets with unit roots follow a stochastic trend, and are non-stationary. Non-stationarity implies that data series do not have constant mean, constant variance and constant co-variance over time. To test the stationarity of our variables, we are employing two stationarity tests, Augmented Dickey-Fuller and Phillips-Perron tests, which are often applied and details on them can be found, for example, in Wooldrige (2007). The null hypothesis in both tests is that the series is non-stationary, i.e. contains unit root.

Table 1. Unit roots tests

Unit root test		T statistics								
		YU	U	GDPG	YU_D1	U_D1	GDPG_D1	YU_D2	U_D2	GDPG_D2
ADF	t-stat	1.617	0.388	-2.597	-1.900	-1.455	-2.760*	-3.635**	-3.849***	-2.743*
	p-value	0.9979	0.9811	0.0936	0.3322	0.5558	0.0642	0.0051	0.0024	0.0668
PP	t-stat	1.838	0.029	-2.584	-3.137**	-1.846	-3.597**	-6.791***	-5.352***	-5.337***
	p-value	0.9984	0.9609	0.0964	0.0239	0.3580	0.0058	0.0000	0.0000	0.0000

Source: Author's calculations.

Note: *, **, *** signify that the null hypothesis (has unit root) is rejected at the 10, 5 and 1% level. The number of time lags is automatically chosen based on the Schwarz information criterion.

The results of the unit root tests are shown in Table 1. If we analyze the series of total unemployment, youth unemployment and GDP growth, the tests show that all are non-stationary, which is additionally supported with Figure 1. Since the results suggest that the series for total unemployment, youth unemployment and GDP growth are non-stationary, we conclude that variables are non-stationary in levels. After first differencing, series for total unemployment and youth unemployment stay non-stationary, while the Augmented Dickey-Fuller test rejects the null hypothesis of a unit root, but only at the 10% level of probability for the GDP growth variable. The Phillip-Perron test rejects the null hypothesis of a unit root at 5% level for both youth unemployment and GDP growth. After the second differencing, all variables become stationary, which means that they are integrated of order I (2). Under I (2), the Augmented Dickey-Fuller test rejects the null hypothesis of a unit root at the 1% level of probability for total unemployment, 5% level of probability for youth unemployment and 10% for the GDP growth. On the other side, the Phillip-Perron test rejects the null hypothesis of a unit root at 1% for all three variables.

7.1 TOTAL UNEMPLOYMENT AND GDP GROWTH

Before proceeding with the bounds test, we must specify the number of lags to include, given that the F-statistics for co-integration is sensitive to the lag length. The optimal number of lags used in the equation is the one from Akaike Information Criterion (AIC), which is 2 for the total unemployment and 1 for the GDP growth rate. It means that our model is ARDL (2, 1). Next, we proceed with the ARDL bounds test to check if there is a link between GDP growth and total unemployment.

Table 2. ARDL Bounds test (GDP growth and total unemployment)

Test statistic	Value	K
F-statistic	2.450	1
Significance level	I (0)	I (1)
10%	4.04	4.78
5%	4.94	5.73
1%	6.84	7.84

Source: Author's calculations.

The Bounds test, whose results are shown in Table 2, suggests that there is no long-run relationship between the variables, given that F value is not above the upper bound, so it means there is no cointegration among the variables. According to the finding that the variables are not co-integrated on the long run, we are proceeding with estimating of their short-run relationship, using ARDL – auto-regressive distributed lag model. The β coefficient for the short-run relationship is significant at 1% level, however the value is positive which means that it is not in correspondence with the Okun's law.

Now, we try to see if the model is invalid as well in the opposite direction, i.e. does total unemployment has any effect on the GDP growth. The results from the bounds test from this model is represented below:

Table 3. ARDL Bounds test (total unemployment and GDP growth)

Test statistic	Value	K
F-statistic	4.899	1
Significance level	I (0)	I (1)
10%	4.04	4.78
5%	4.94	5.73
1%	6.84	7.84

Source: Author's calculations.

This Bounds test, suggests that there is a long-run relationship between the variables, given that F value is above the upper bound only at 10% level of significance. To check if this correlation is valid at short and long run, we employ the ARDL including error correction model. The results are presented below.

Table 4. Results

Dependent variable GDP growth	
Speed of adjustment coefficient	-0.62 (0.005)
Short run Total unemployment	8.49 (0.123)
Long run Total unemployment	-8.02 (0.473)

Source: Author's calculations.

The results suggest that there is a negative long-run relationship between the GDP growth and total unemployment, suggesting that a 1% increase in total unemployment rate leads to 8.02% decrease in the GDP growth. On short-run, the coefficient is positive, meaning that the Okun's law is not valid for short-run. These results are in line with the Okun's law and the literature. The adjustment term is negative and statistically significant. The statistical significance of the adjustment term suggests that unemployment is driven by the economic growth, while the negative adjustment term implies that the imbalance in their relationship is balanced after a shock.

7.2 YOUTH UNEMPLOYMENT AND GDP GROWTH

Next, the study looks at the empirical relationship between the youth unemployment and GDP growth. For this test we are using an optimal lag length of 1 for youth unemployment and 1 for GDP growth, meaning that our model is ARDL (1, 1).

Table 5. ARDL Bounds test (GDP growth and youth unemployment)

Test statistic	Value	K
F-statistic	1.669	1
Significance level	I (0)	I (1)
10%	4.04	4.78
5%	4.94	5.73
1%	6.84	7.84

Source: Author's calculations.

The results of the Bounds test are shown in Table 6. Given that the F value falls below the lower values for I (0) values for all significance levels, we cannot reject the null hypothesis, meaning that there is no long-run relationship between the youth unemployment and GDP growth. According to the finding that the variables are not co-integrated on the long run, we are proceeding with estimating of their short-run relationship, using ARDL – auto-regressive distributed lag model. The β coefficient for the short-run relationship is significant at 1% level, however the value is positive which means that it is not in correspondence with the Okun's law.

To see if the model is valid in the opposite direction, i.e. if youth unemployment affects GDP growth, the study shows the results from the bounds test below:

Table 6. ARDL Bounds test (youth unemployment and GDP growth)

Test statistic	Value	K
F-statistic	3.389	1
Significance level	I (0)	I (1)
10%	4.04	4.78
5%	4.94	5.73
1%	6.84	7.84

Source: Author's calculations.

This Bounds test, suggests that F value falls below the lower values for I(0) values for all significance levels. Therefore, we cannot reject the null hypothesis, meaning that there is no long-run relationship between the youth unemployment and GDP growth.

According to the finding that the variables are not co-integrated on the long run, we are proceeding with estimating of their short-run relationship, using ARDL – auto-regressive distributed lag model. The β coefficient for the short-run relationship is significant at 1% level, however the value is positive which means that it is not in correspondence with the Okun's law.

7.3 GRANGER CAUSALITY

Even though there is no correlation on the long run level, we employ the Granger causality test to see if there is any causality among the variables.

Table 7. Granger causality test

Null Hypothesis	Obs	F-statistic	Prob.
Total unemployment does not Granger cause GDP growth	27	1.714	0.424

GDP growth does not Granger cause total unemployment	27	9.6625	0.008
Youth unemployment does not Granger cause GDP growth	28	0.00883	0.925
GDP growth does not Granger cause youth unemployment	28	1.9512	0.162

Source: Author's calculations.

From the results in the Table 7, we can conclude that only in the case GDP growth does not Granger causes total unemployment, we can reject the null hypothesis. In the remaining three cases, we cannot reject the null hypotheses since the p-values are not lower than 5%, which means that total unemployment does not Granger cause GDP growth and also youth unemployment and GDP growth do not Granger cause each other.

8. CONCLUSION

This paper investigates the relationship between unemployment rates (total and youth) and GDP growth in North Macedonia, in the context of Okun's Law, in the period 1991-2019, using the Auto-regressive Distributed Lag Model (ARDL). The research starts the unit root tests, which show that all three variables are integrated of order two I (2). The Bounds test for the relationship between total unemployment and GDP growth suggest that there is no long-run relationship between these variables. For that reason, we employ the ARDL to see if there is a short-run relationship. The results show that the β coefficient is significant at 1% level, however the value is positive which means that it is not in correspondence with the Okun's law. On the other side, the Bounds test for the opposite direction between GDP growth and total unemployment show that there is a negative long-run relationship between the GDP growth and total unemployment, suggesting that a 1% increase in total unemployment rate leads to 8.02% decrease in the GDP growth.

The Bounds tests for the relationship between the youth unemployment and GDP growth showed that there is no co-integration between the variables in both directions, which was a good ground for estimating only the short-run relationship. However, even though the coefficients for the short-run relationships are significant at 1% level, the coefficients are positive, suggesting that even on short-run, the Okun's law is not valid as well. These findings imply that more focused and youth-specific strategies and initiatives should be implemented to combat young unemployment rates.

The results from the Granger causality tests show that only GDP growth Granger causes total unemployment, while in all other cases we cannot reject the null hypothesis.

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