İktisat Politikası Araştırmaları Dergisi
Journal of Economic Policy Researches
JEPR 2024, 11(1): 76–85
DOI: 10.26650/JEPR1232910

RESEARCH ARTICLE / ARAŞTIRMA MAKALESİ

The Relationship Between Unemployment and Economic Growth in Selected Large Emerging Countries: A Revisit Using Threshold Regression Analysis

Seçilmiş Gelişmekte Olan Büyük Ülkelerde İşsizlik ve Ekonomik Büyüme Arasındaki İlişki: Eşik Regresyon Analizi Kullanılarak Yeniden Bir İnceleme

Mustafa Şit[1]

[1]Assoc. Prof., Harran University, Faculty of Tourism, Macro Economy, Şanlıurfa, Turkiye

Sorumlu yazar /
Corresponding author: Mustafa Şit
E-mail / E-posta : msit@harran.edu.tr

ABSTRACT

This study aims to estimate the minimum rate of economic growth required to reduce unemployment in the large emerging markets economies of the Fragile Five (i.e., Brazil, India, Russia, South Africa, and Türkiye). As proposed by Hansen (1999), the study conducts a panel threshold analysis based on Okun's law to determine threshold effects. This paper presents new evidence regarding Okun's law over the past three decades for five large emerging markets. The findings suggest the relationship between the cyclical components of unemployment and GDP growth to be characterized by non-linearities. In particular, unemployment will fall if economic growth exceeds an average threshold of 5.5%. This result proves the validity of Okun's Law regarding the threshold for the country group under investigation. This study has also proven that economic growth must exceed a certain level in order to reduce the unemployment rate in these economies. Policymakers in the Fragile Five should consider a minumum of 5.50% as an economic growth target to provide employment. When considering the unstable economic performance of the Fragile Five's economies, structural reforms should be made to ensure adequate economic growth and increase employment. To address the problem of poor growth, this study can propose economic measures such as reducing employment taxes, producing investment and employment-based policies, and increasing the effectiveness of private employment offices.

Keywords: Okun's law, Nonlinearities and asymmetries, Panel threshold model, the Fragile five, Economic growth

Jel Code: C23, E24, O11

Submitted / Başvuru : 11.01.2023
Revision Requested / Revizyon Talebi : 07.12.2023
Last Revision Received / Son Revizyon : 20.01.2024
Accepted / Kabul : 30.01.2024

ÖZ

Bu çalışma, Kırılgan Beşlinin gelişmekte olan büyük ekonomilerinde (Brezilya, Hindistan, Rusya, Güney Afrika ve Türkiye) işsizliği azaltmak için gereken minimum ekonomik büyüme oranını tahmin etmeyi amaçlamaktadır. Çalışmada Hansen (1999) tarafından önerildiği gibi eşik etkilerini belirlemek için Okun kanununu temel alan bir panel eşik analizi yapılmaktadır. Bu makale, gelişmekte olan beş büyük pazar için son otuz yılda Okun yasasına ilişkin yeni kanıtlar sunmaktadır. Bulgular, işsizliğin döngüsel bileşenleri ile GSYİH büyümesi arasındaki ilişkinin doğrusal olmama durumuyla tanımlanabileceğini öne sürüyor. Özellikle ekonomik büyüme ortalama %5,5 eşiğini aşarsa işsizlik azalacaktır. Bu sonuç, incelenen ülke grubu için eşik değere ilişkin Okun Yasasının geçerliliğini kanıtlamaktadır. Kırılgan Beşli'deki politika yapıcılar, istihdam sağlamak için en az %5,50'yi ekonomik büyüme hedefi olarak görmelidir. Kırılgan Beşli ekonomilerinin istikrarsız ekonomik performansı göz önüne alındığında, yeterli ekonomik büyümeyi sağlamak ve istihdamı artırmak için yapısal reformlar yapılmalıdır. Zayıf büyüme sorununu ele almak için bu çalışma, istihdam vergilerinin düşürülmesi, yatırım ve istihdama dayalı politikalar üretilmesi ve özel istihdam bürolarının etkinliğinin artırılması gibi ekonomik önlemler önerebilir.

Anahtar Kelimeler: Okun yasası, Nonlineer ve asimetriler, Panel eşik modeli, Kırılgan beşli, Ekonomik büyüme

Jel Sınıflaması: C23, E24, O11

1. Introduction

Okun's law postulates a negative relationship to exist between the cyclical components of unemployment and GDP growth and was initially detected in the United States. On average, if actual GDP growth exceeds its long-run expansion path by one percentage point, unemployment is expected to fall by approximately 0.5 percentage points. In combination with the Phillips curve, the Okun equation constitutes the aggregate supply curve for an economy. As such, it is a cornerstone of many modern macroeconomic models. The law should be noted as an empirical regularity that ties labor market development to the business cycle. Since the seminal work of Arthur Okun in the 1960s, many studies have investigated the relationship between different advanced countries through a variety of econometric methods.

One of economists' most debated issues regarding Okun's law is the extent of growth needed to reduce unemployment. This is particularly evident in fragile economies characterized by unstable growth rates. The reason for examining the economies of the Fragile Five (i.e., Brazil, India, Russia, South Africa, and Türkiye) is that they have common economic characteristics. According to Stanley (2013), these countries are defined as the Fragile Five for the following reasons: their large current account deficit, high inflation rates, and poor growth performance. In addition to these common features, the study will discuss the impact these countries' unstable economic growth rates have on unemployment, as well as the threshold of economic growth needed to reduce unemployment. These countries had an average growth rate of 4.17% during the analyzed period. In contrast, their average unemployment rate was 10.69%. Analyzing the Fragile Five in terms of the high risk in combating unemployment will also have significance for developing countries.

The outline of this paper is as follows. The next section will review the literature and provides arguments for the existence of nonlinearities regarding Okun's law. The third section will discuss the study's empirical approach, which involve tests for poolability and non-linearities. The fourth section will present the data and an estimation of the growth threshold. The final section will then conclude with policy recommendations.

2. Literature Review

The findings from past studies can be categorized into three main strands of literature. The first strand of literature focuses on the validity of Okun's law. Caraiani (2006a) found Okun's Law to hold in Korea over the 1994-2004 period. Moreover, Gali et al. (2013) also supported Okun's law and added that the Okun coefficient is stable. Meanwhile, Friedman (1988), Altig et al. (1997), and McKinsey (2011) argued the Okun coefficients to lack robustness. Most studies have shown Okun's law to have different parameters. Prachowny (1993) found the marginal contribution of a one percentage point decrease in the unemployment rate to be only 1.66%. Attfield and Silverstone (1997) found the Okun coefficient value to be closer to -2.25. Caraiani's (2006b) results indicated an Okun coefficient of about -0.17, which suggests some rigidity in the labor market. Furthermore, Daly et al. (2012), Owyang et al. (2012), and Meyer et al. (2012) found Okun's coefficients to be unstable and to change over time.

The second strand of literature investigated the possibility of an asymmetrical link between output growth and unemployment rate. Courtney (1991) and Palley (1993) are among those who have contributed to the idea that the Okun coefficient may differ with regard to economic growth and contraction. Researchers have often reported asymmetries between the cyclical components of both variables. Lee (2000) added that the type of asymmetry depends on the method used, while Virén (2001) presented a model in which short-term changes in unemployment are based on changes in economic growth. Jula and Jula (2013) determined an asymmetric relationship to exist between growth

and recession with regard to regional employment. Phiri's (2014) empirical analysis of South Africa found significant asymmetric co-integration to occur with unemployment when output growth is the dependent variable.

The third strand of literature has extended the analysis toward the threshold (i.e., non-linearity) of Okun's law. Fouquau (2008) indicated the null hypothesis to be rejected regarding a linear relationship between cyclical output and cyclical unemployment with all specifications applied. Flaig & Rottmann (2001) derived short- and long-run employment thresholds from an input demand system and empirically showed these to depend on factor prices and capital accumulation. Bod'a and Považanová (2021) showed Okun's law to be asymmetric and non-linear for 21 OECD countries.

Kosfeld and Dreger (2006) estimated the respective output growth thresholds for creating employment and reducing unemployment, stating that, while the average employment threshold amounted to 1.4% over the 1993-2000 sample period, the average unemployment threshold had an average value of 2.8%. Azorín and De La Vega (2017) stated employment and unemployment to clearly show differentiated responses to changes in output during boom and recession periods. Their results showed that for the overall period of 2001–2011, a threshold of 0.7% was enough for employment to increase, while a threshold of 2.5% was enough for unemployment to fall. Aydın and Esen (2017) investigated the role the inflation threshold effect has on the relationship between unemployment and economic growth for Türkiye. They determined an inverse linear relationship to exist between growth and unemployment when the inflation rate is below the threshold value.

In addition, some papers have stated the business cycles impact on unemployment to differentiate with regard to age and gender (Hutengs & Stadtmann, 2014; Marconi et al., 2016; Dunsch, 2017; Blázquez-Fernández et al., 2018; Butkus & Seputiene, 2019).

This study proceeds to fill the gap by investigating the threshold. Non-linearities have critical relevance in this article due to how they affect the appropriate size of stabilization policies. This paper presents new evidence regarding Okun's law over the past three decades for five large emerging markets (e.g., Brazil, India, Russia, South Africa, and Türkiye).

These five economies are of interest because they share common characteristics. According to Stanley (2013), they are classified as fragile due to having a large double deficit in the current account and public budget, their strong dependence on foreign direct investment flows, high inflation, government debt, weak institutions, and low weight of their industrial sectors, thus implying a lack of competitiveness in many parts of the economy. Compared to other emerging markets (e.g., Argentina, Egypt, Pakistan), their poor economic records are striking, particularly in terms of GDP growth and unemployment. The average growth rate in these countries barely exceeds 4%, while their unemployment rates persistently remain above 10%. Thus, the basic problem here involves how to stimulate higher growth that might reduce unemployment.

The analysis of Okun's law reveals strong non-linearities between the cyclical components of GDP and unemployment at the unique threshold value of 5.1%. In other words, if economic growth exceeds this value, a decline in the unemployment rate can be expected. The threshold value is uncovered by the panel threshold approach as suggested by Hansen (1999). The main contribution of this study apart from its selection of the large and fragile emerging markets is the application of the econometric method.

3. Method

Okun's law refers to the empirical order between cyclical unemployment and cyclical output. Weber (1995) used the following equation to express this relationship:

$$y_{it}^{c} \equiv y_{it} - y_{it}^{n}$$

$$u_{it}^{c} \equiv u_{it} - u_{it}^{n}$$

$$u_{it}^{c} = \alpha u_{it}^{c} - \varepsilon_{it} \qquad \alpha < 0 \tag{1}$$

where i indexes the country and t indexes time; y_{it}^{c} represents the periodic economic growth level (output gap), y_{it} represents the logarithm of real growth, and y_{it}^{n} represents the potential (i.e., trend level) of growth. Similarly, u_{it}^{c} represents the periodic unemployment rate (unemployment gap), u_{it} represents the observed unemployment rate, and u_{it}^{n} represents the natural unemployment rate. Furthermore, ε_{it} is the stochastic error term. Okun's coefficient (α parameter) is considered to be negative.

One important issue regarding Okun's law involves taking into account the asymmetry in employment dynamics for data decomposition procedures, with Harris and Silverstone (2001) pointing to four elements: capacity constraints,

signal extraction, cost adjustments, and downward nominal wage rigidity. Therefore, this study uses the panel threshold model developed by Hansen (1999) to test the relationship between economic growth and unemployment. The α_i model is as follows:

$$U_{it}^{c} = \mu_i + \beta_0^{'} y_{it}^{c} II(q_{it} \leq c) + \beta_1^{'} y_{it}^{c} II(q_{it} > c) + \varepsilon_{it} \quad (2)$$

where q_{it} is the threshold variable, and c is the threshold parameter. U_{it}^{c} indicates the transition function, which equals 1 when the threshold conditions in the parentheses are met, otherwise it equals 0. In this model, observations are divided into two regimes. These regimes depend on whether the threshold variable is less than or greater than the value of c. Regimes are distinguished using different regression slopes (e.g., $\beta_0^{'}$ and $\beta_1^{'}$). The advantages of this model are that it allows parameters to vary among countries (heterogeneity problem) and time (stationarity problem), depending on the number of regimes (Fouquau, 2008, p. 3). This study also adds inflation and nominal interest rates, which are thought to be related to economic growth and unemployment, to the model as control variables, similar to Aydın and Esen (2017).

In the panel threshold regression model, the variables included in the model must not contain a unit root (be stationary) in order to avoid a false regression. Therefore, the stationarity of the series was primarily determined using the panel unit root tests developed by Levin et al. (LLC; 2002) and Im et al. (IPS; 2003).

The LLC unit root test offers a more robust panel unit root test procedure than tests that perform individual unit root tests for each horizontal section unit. The test can be used for medium-sized panels with a horizontal cross-sectional dimension (n) of 10-250 and a time dimension (t) of 25-250. The hypotheses of this test are as follows (Levin et al., 2002, p. 4; Baltagi, 2013, pp. 278–279).

$H_0 : \lambda = 0$ The series is not stationary,

$H_1 : \lambda \neq 0$ The series is stationary.

The basic equation of this test, which applies the augmented Dickey-Fuller (ADF) regression for each horizontal cross-section, is shown in Equation 3.

$$\Delta y_{it} = \Delta y_{it-1} + \Sigma_{L=1}^{P_i} \varphi_{IL} \Delta y_{it-L} + \alpha_{mi} \alpha d_{mt} + \varsigma_{it} m \quad (3)$$

Equation 3 represents the vector of the deterministic variables, with representing the lag length (Levin et al., 2002, pp. 4–5). The IPS test was developed by Im, Peasaran, and Shin (2003) to test the unit root hypothesis in heterogeneous panels. They proposed a test based on the ADF statistics for each group in the panel, called the t-bar ($\bar{t}$) test. This test is related to the different series correlation properties of the error term in Equation 3 regarding the basic equation of the LLC unit root test among the horizontal cross-sections. Therefore, the ADF averages test statistics. The Monte Carlo methods examine the small sample properties of the IPS test. In cases where no relationship exists between successive values of the error term, even for small time dimensions (e.g., t = 10), these methods allow the test to demonstrate good performance (Im et al., 2003, pp. 54–73).

Is regression the same among all the observations of a sample or can it be classified into different categories? This question can be addressed using threshold regression techniques. Hansen (1999) proposed an estimation strategy for $y_{it}, q_{it}, x_{it}, k_{it} : 1 \leq i \leq n, 1 \leq t \leq$balanced panels with individual specific effects and observations. Here, i represents individual effects, represents time, y_{it} represents dependent variable, q_{it} represents threshold variable while x_{it} represents a vector of external regressors with k dimensions. Threshold regression models indicate that individual observations can be classified based on the value of an observed variable.

$$y_{it} = \mu_i + \beta_1^{'} x_{it} I(q_{it} \leq \gamma) + \beta_2^{'} x_{it} I(q_{it} > \gamma) + \varepsilon_{it} \quad (4)$$

where $I(.)$ denotes the indicator function, and γ is the threshold value. When q_{it} is smaller or greater than γ , the equation is divided into two regimes with slope parameters β_1 and β_2, with q_{it} being assumed to not change over time. Alternatively, Equation 4 may be rewritten as follows:

$$y_{it} = \mu_i + \beta_1^{'} X_{it} + e_{it}, q\_it \leq \gamma, @\mu_i + \beta_2^{'} x_{it} + e_{it}, q\_it \leq \gamma.)$$

$$y_{it} = (\mu_i + \beta_1' X_{it} + \varepsilon_{it}, q_{it} \leq \gamma, @\mu_i + \beta_2' x_{it} + \varepsilon_{it}, q\_it \leq \gamma)$$

The equation above can be manipulated and established in a different form. In the case of

$$x_{it} = (\gamma)\begin{pmatrix} x_{it} I(q_{it} \leq \gamma) \\ x_{it} I(q_{it} > \gamma) \end{pmatrix}$$

and $\beta = (\beta_1' \beta_2')$, Equation 4 can be rewritten as Equation 5 (Hansen, 1999, p. 347).

$$y_{it} = \mu_i + \beta' x_{it}(\gamma) + \varepsilon_{it} \tag{5}$$

4. Data

The data used in the analysis were obtained from the World Bank database. The data covers the period of 1990-2017. Table 1 shows the descriptive statistics for the variables. The minimum unemployment rate is seen to be 2.26% and the maximum to be 33.43%. The average unemployment rate during the period is 10.69%.

Table 1. *Definitions and Descriptive Statistics of Variables*

Variable	Explanation	Observation	Mean	Std. Dev.	Min.	Max
Growth(grw)	Change of real GDP in percentage (i.e.	140	4.173494	3.555515	-13.12673	11.11350
Unemployment(unemp	GDP (million dollars)	140	10.69750	9.121413	2.268000	33.47300
Inflation(inf)	Consumption Price Index	140	70.17971	44.38511	0.000893	174.9687
İnterest(int)	Average interest rate (long term)	140	162.0048	950.4448	-1.983849	93.94293

5. Results

5.1. *Unit Root Test Results*

The results from the unit root tests regarding the variables are shown in Table 2. According to the LLC panel unit root test results, the hypothesis is rejected. The growth rate (*grw*) series is seen to be stationary in both the constant as well as the constant plus trend models at a 1% level of significance level [$I(0)$] . The other series are stationary at the [$I(1)$] level. The results obtained from the IPS test resemble those from the LLC test.

Table 2. *Panel Unit Root Test Results*

	LLC		IPS	
	Intercept	Trend-Intercept	Intercept	Trend-Intercept
grw	-3,585 (0,000)***	-2,781 (0,002)***	-4,339 (0,000)***	-3,015 (0,001)***
unemp	-0,951 (0,170)	-0,429 (0,333)	**-1,418 (0,078)***	-0,665 (0,252)
Δ unemp	-4,595 (0,000) ***	-3,445 (0,000)***	**-4,049 (0,000)*****	-2,636 (0,004)***
inf	3,705 (0,999)	-0,597 (0,275)	5,842 (1,000)	0,635 (0,737)
Δ inf	-1,475 (0,070) *	-1,417 (0,078)*	**-1,952 (0,025)****	-1,969 (0,024)**
int	-0,396 (0,345)	-0,288 (0,386)	-1,156 (0,123)	-2,604 (0,004)***
Δ int	-5,663 (0,000) ***	-3,459 (0,000)***	**-9,038 (0,000)*****	-7,607 (0,000)***

Note: The delay length was automatically selected based on the Schwarz Information Criteria. Values in parentheses represent the probability value. ***, ** and * indicate the significance levels of 1%, 5%, and 10%, respectively.

5.2. *Panel Threshold Analysis: Estimation Results*

The study conducts the threshold value analysis to determine an estimate of the relationship between economic growth and unemployment using the least squares method. The least squares method (LSM) is the most widely used method in regression analysis and has much sought-after statistical properties under certain assumptions that will be discussed below. The study uses LSM to express as realistically as possible the mathematical connection between two interdependently varying physical quantities in an equation. Firstly, Table 3 presents the test results for the model with a single threshold value as explained in Equation 7 regarding the growth series.

Table 3. *Test Results for Single Threshold Effect*

Threshold Value	F-Statistic	P-Value	Critical Values		
(γ_1)			%10	%5	%1
5,501	7.79	0.046	6.3239	7.7332	11.1441

Note: 300 bootstrap replication was used in the model.

Table 3 shows the *p*-value of the threshold value parameter to have been estimated as $p = 0.046$. As for the *F* statistic, it exceeds the critical value of 5%. This result rejects the hypothesis at the 5% level. Therefore, no linear relationship is indicated to be present between economic growth and unemployment; however, this indicates the presence of a threshold effect. The next step tests the multiple threshold model to determine more than one threshold for the growth variable. Table 4 shows the three different threshold value parameters estimated in the model as γ_1, γ_2, and γ_3; the F statistics regarding these parameters; and the respective likelihood and critical values.

Table 4. *Test Results for Multiple Threshold Effects*

Threshold Value	F-Statistic	P-Value	Critical Values		
			%10	%5	%1
(γ_1) **5,501**	7.79	0.046	6.3239	7.7332	11.1441
(γ_2) **6.640**	-1.74	1.0000	6.7309	8.5055	12.4917
(γ_3) **6.3450**	4.33	0.4367	8.1676	9.6216	12.1576

Note: 300 bootstrap replication was used in the model.

Table 4 shows the F statistic of the first threshold parameter to be greater than the 5% critical value, with the p-likelihood value being 0.046. The F statistics for the second and third threshold parameters are smaller than all three critical values and have respective p-probability values of 1,000 and 0.436. The findings reveal the threshold parameters of γ_2 and γ_3 to not be significant according to the *F* statistics and *p*-likelihood values in the model. Thus, the model is proven to have a single threshold effect. The estimates for the single threshold level in Table 3 indicate a change in regime when the growth rate exceeds a certain level.

As a function of the growth threshold, the LR statistic is used to determine confidence intervals in threshold estimation. The 95% confidence interval in the model is [5,482, 5,557]. The least squares threshold estimation that minimizes the LR (γ) function is γ = 5,501. This result indicates that the threshold estimates are very precise. Therefore, Figure 1 provides strong evidence that support single threshold in the relationship between economic growth and unemployment.

Table 5 shows the panel threshold regression estimates for the relationship between economic growth and unemployment rate. The regime coefficients indicate no linear relationship to be present between economic growth and unemployment rate. β_1 and β_2 are coefficients that indicate the regime-dependent effect of economic growth on the unemployment rate. β_1 is negative and statistically insignificant, while β_2 is negative but statistically significant at a level of 1%. According to these results, a growth rate above the threshold of 5.5 (grw > 5.501) negatively (β_2 =-0.0107) affects the unemployment rate.

The model also examines the effects the INF and INT control variables, which are frequently used in the literature on empirical growth, have on the unemployment rate. However, the results obtained from these control variables were statistically insignificant.

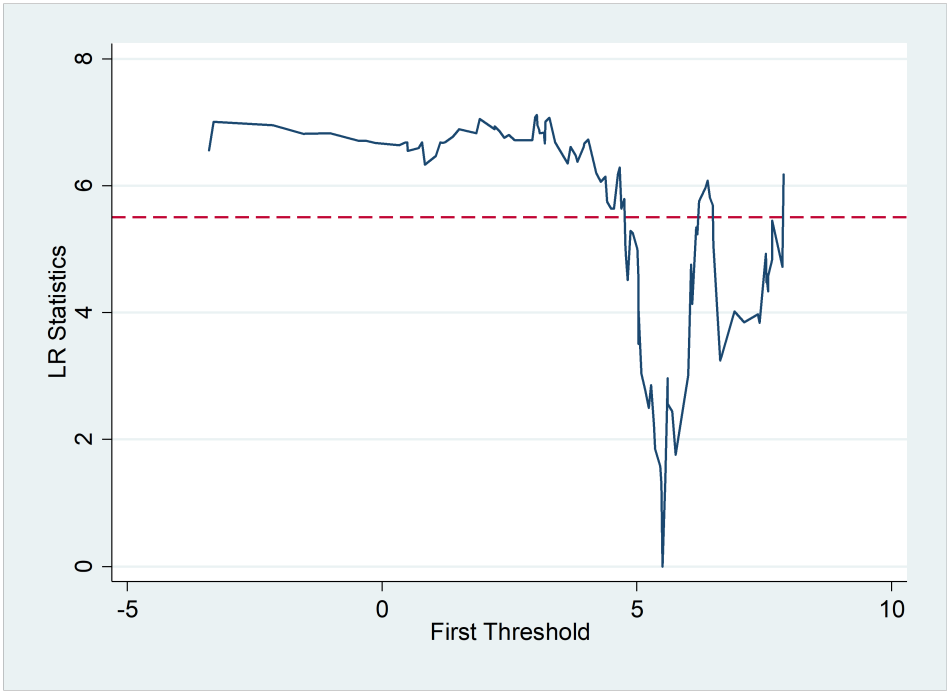

Figure 1. Confidence intervals in the single threshold model.

Table 5. *Growth Threshold Value and Unemployment Rate Model Estimation Results*

Threshold Value Estimation	
Threshold Value Parameter (γ_1)	5,501
p-value	(0,046)
grw Regime Coefficients	
β_1	-0,001
	(-0.45)
β_2	-0.0107 ***
	(-4.08)
Control Variables	
inf	5.88
	(0.03)
Int	-0.01
	(-1,25)

Note: Values in parentheses are the *t*-statistic values.
***, **, and * represent the respective significance levels of 1%, 5%, and 10%.

Table 6 shows the number of countries that fall into both regimes in the 1990-2017 period. Throughout the 19 years included in the analyzed period, the growth rates of many countries are below the threshold level. On the other hand, the rates are above the threshold level regarding the eight-year period (1990-1997). These findings show the Fragile Five's economies are able to achieve a growth potential of 5.50%.

Table 6. *Number of Countries in Each Regime by Year*

Years	$q_{it} \leq \gamma$	$q_{it} > \gamma$	Number of Country (N)
1990	1	4	5
1991	3	2	5
1992	4	1	5
1993	3	2	5
1994	3	2	5
1995	2	3	5
1996	2	3	5
1997	3	2	5
1998	4	1	5
1999	4	1	5
2000	4	1	5
2001	5	-	5
2002	4	1	5
2003	3	2	5
2004	2	3	5
2005	2	3	5
2006	2	3	5
2007	1	4	5
2008	3	2	5
2009	4	1	5
2010	1	4	5
2011	3	2	5
2012	4	1	5
2013	2	3	5
2014	4	1	5
2015	3	2	5
2016	4	1	5
2017	3	2	5
Total	**83**	**57**	**140**

Note: Created by Authors.

6. Conclusions

The aim of this study has been twofold: to prove the validity and non-linearity of Okun's law, and then to test it using threshold panel data models. The study's findings demonstrate the validity of Okun's law and the relationship of asymmetry in the Fragile Five's economies. Furthermore, a single threshold (grw = 5.501) was found in the relationship between economic growth and unemployment. According to these results, a growth rate above the threshold value (grw > 5.501) negatively (β_2 = -0.0107) affects the unemployment rate. This study's results are consistent with those of Huang and Chang (2005), Fouquau (2008), Jardin et al. (2012), and Wang and Huang (2017). The current study has also proven that economic growth must exceed a certain level in order to reduce the unemployment rate in these economies.

Due to the East Asian crisis of 1997, the growth rates of the Fragile Five's economies experienced instability. The growth rates were determined to be below the threshold until 2004, after which they experienced a recovery. After the 2008 global crisis, however, the growth rates remained below the threshold again. As a result, the growth rates in the analyzed period were generally not above the threshold that is able to reduce unemployment. Unstable growth rates being a common feature of the analyzed country group were reflected in the empirical findings. By taking into account the mean economic growth rate of the Fragile Five (grwm = 4.17), one could argue that these rates are not at a high enough level to reduce unemployment ($4.17 \not> 5.501$).

Kosfeld and Dreger (2006) also stated unemployment and employment to not react too much to changes in economic growth during many periods. Nevertheless, their study revealed the minimum economic growth rate to be well below

the level required for the unemployment rate to drop. According to their paper, the ordering between the thresholds might be related institutional settings regarding the labor market, and these numbers are only rough guidelines for policymakers. The current study's results also resemble those of their study.

In this respect, the current study is expected to be able to contribute to the practices of policy makers in the Fragile Five. These policy makers should consider a minimum maximum of 5.50% as a growth target for providing employment. When considering the unstable economic performance of the Fragile Five's economies, structural reforms should be made to ensure adequate economic growth and increase employment. To address the problem of poor growth, this study can propose economic measures such as reducing employment taxes, producing investment and employment-based policies, and increasing the effectiveness of private employment offices. As Vinayagathasan (2013) pointed out, economic growth can also be increased by reducing trade barriers and motivating investment. In order to create a net job increase, labor market reform policies may be required. However, these policies have to be more flexible and active. In this way, countries can develop policies devoted to boosting GDP.

Of course, this study has limitations. First, owing to the exogeneity restriction, control variable may also be endogenous, our estimated coefficient may be biased. Second, we do not examine the causality relationship, but only a correlation relationship. Third, since each country has a different geopolitical and economic environment, it should not be forgotten that growth targets may be country specific. For further studies, these limitations can be providing direction. The study can be improved with different coefficient estimators and dynamic threshold value analysis techniques.

Hakem Değerlendirmesi: Dış bağımsız.
Çıkar Çatışması: Yazar çıkar çatışması beyan etmemişlerdir.
Finansal Destek: Yazar finansal destek beyan etmemişlerdir.

Peer Review: Externally peer-reviewed.
Conflict of Interest: Author declared no conflict of interest.
Financial Disclosure: Author declared no financial support.

ORCID:
Mustafa Şit 0000-0001-9694-0547

REFERENCES / KAYNAKLAR

Altig, D., Fitzgerald, T. & Rupert, P. (1997). Okun's law revisited: Should we worry about low unemployment. *Federal Reserve Bank of Cleveland Economic Commentary.*

Attfield, C. L. & Silverstone, B. (1997). Okun's coefficient: a comment. *Review of economics and statistics*, 79 (2), 326-329.

Aydin, C. & Esen, Ö. (2017). Inflationary Threshold Effects on the Relationship between Unemployment and Economic Growth: Evidence from Turkey. *International journal of economic perspectives*, 11 (2), 88-97.

Azorín, J. D. B. (2017). Output growth thresholds for the creation of employment and the reduction of unemployment: A spatial analysis with panel data from the Spanish provinces, 2000–2011. *Regional Science and Urban Economics*, 67, 42-49.

Baltagi, B. H. (2013). *Econometric Analysis of Panel Data (Fifth Edition)*. West Sussex: John Wiley and Sons.

Blázquez-Fernández, C., Cantarero-Prieto, D. & Pascual-Sáez, M. (2018). Okun's Law in Selected European Countries (2005-2017): An Age and Gender Analysis. *Economics and Sociology*, 11 (2).

Bod'a, M. & Považanová, M. (2021). Output-unemployment asymmetry in Okun coefficients for OECD countries. *Economic Analysis and Policy*, 69, 307-323.

Butkus, M. & Seputiene, J., 2019. The output gap and youth unemployment: An analysis based on Okun's law. *Economies*, 7 (108).

Caraiani, P. (2006a). The relationship between unemployment and output cycles in Korea. *Romanian Journal of Economic Forecasting*, 1, 51-64.

Caraiani, P. (2006b). Alternative methods of estimating the Okun coefficient. Applications for Romania. *Romanian Journal of Economic Forecasting*, 7 (4), 82-89.

Chan K.S. (1993). Consistency and limiting distribution of the least squares estimator of a threshold autoregressive model. *The Annals of Statistics,* 21, 520-533

Courtney, H.G. (1991). *The Beveridge Curve and Okun's Law: A Re-Examination of Fundamental Relationships in the United States*, Ph.D. thesis, Massachusetts Institute of Technology.

Daly, M. C., G. Fernald, Ò Jordà, & F. Nechio (2012). Okun's Macroscope: Output and Employment after the Great Recession, *Manuscript, Federal Reserve Bank of San Francisco.*

Dunsch, S. (2017). Age- and gender-specific unemployment and Okun's law in CEE countries. *East. Eur. Econ*., 55, 377–393.

Flaig, G., & Rottmann, H. (2001). Input Demand and the Short-and Long-Run Employment Thresholds: An Empirical Analysis for the German Manufacturing Sector. *German Economic Review, 2* (4), 367-384.

Fouquau, J. (2008). Threshold effects in Okun's law: a panel data analysis. *Economics Bulletin*, 5, pp-1-15.

Friedman, B. M. (1988). Lessons on Monetary Policy from the 1980s. *Journal of Economic Perspectives*, 2, 51-72.

Galí, J., Smets, F. & Wouters, R. (2012). Slow recoveries: A structural interpretation. *Journal of Money, Credit and Banking*, 44, 9-30.

Gordon, Robert J. (1998). *Macroeconomics*. New York: Harper Collins.

Göçer, İ. (2015). Okun yasası: Türkiye üzerine bir uygulama. *Uluslararası Ekonomik Araştırmalar Dergisi*, 1 (1).

Hansen, B. E. (1999). Threshold Effects in Non-Dynamic Panels: Estimation, Testing, And Inference. *Journal of Econometrics,* 93, 345-368.

Harris, R. & Silverstone, B. (2001). Testing for asymmetry in Okun's law: A cross-country comparison. *Economics bulletin, 5* (2), 1-13.

Hsing, Y. (1991). Unemployment and the GNP gap: Okun's Law Revisited. *Eastern Economic Journal*, 17 (4), 409-416.

Huang, H. C. & Chang, Y. K. (2005). Investigating Okun's law by the structural break with threshold approach: Evidence from Canada. *The Manchester School*, 73(5), 599-611.

Hutengs, O. & Stadtmann, G. (2014). Age-and gender-specific unemployment in Scandinavian countries: An analysis based on Okun's law. *Comparative Economic Studies*, 56 (4), 567-580.

Im, K.S., Peseran M.H. & Shin Y. (2003). Testing for Unitroots in Heterogeneous Panels. *Journal of Econometrics*, 115 (1), 53–74

Jardin, M. & Gaétan, S. (2012). How Okun's law is non-linear in Europe: a semi-parametric approach. *Rennes, University of Rennes, 16th annual conference on macroeconomic analysis and international finance, April 2012*

Jula, D. & Jula, N. M. (2013). Economic growth and structural changes in regional employment. *Romanian Journal of Economic Forecasting*, 16 (2), 52-69.

Kosfeld, R. & Dreger, C. (2006). Thresholds for employment and unemployment: A spatial analysis of German regional labour markets, 1992–2000. *Papers in Regional Science*, 85 (4), 523-542.

Lee, J. (2000). The robustness of Okun's law: Evidence from OECD countries. *Journal of macroeconomics, 22* (2), 331-356.

Levin, A., Lin C.F. & Chu C.S.J. (2002). Unitroot Tests in Panel Data: Asymptotic and Finite-Sample Properties. *Journal of Econometrics*, 108 (1), 1–24.

Mankiw, N. G. (1994). *Macroeconomics*. New York: Worth Publishers.

Marconi, G., Beblavý, M. & Maselli, I. (2016). Age effects in Okun's law with different indicators of unemployment. *Appl. Econ. Lett*., 23, 580–583.

McKinsey Global Institute (2011). *An Economy That Works: Job Creation and America's Future*, June 2011 report.

Meyer, B. & Tasci, M. (2012). An unstable Okun's Law, not the best rule of thumb. *Economic Commentary*, June 7.

Owyang, M T., & T. Sekhposyan. (2012). Okun's law over the business cycle: was the great recession all that different? *Federal Reserve Bank of St. Louis Review*, 94 (5), 399-418.

Palley, T.I. (1993). Okun's Law and the Asymmetric and Changing Cyclical Behaviour of the USA Economy. *International Review of Applied Economics,* 7, 144-62.

Phiri, A. (2014). Nonlinear co-integration between unemployment and economic growth in South Africa. *Managing Global Transitions,* 12 (2), 81–102.

Prachowny, M. F. J. (1993). Okun's Law: Theoretical Foundations and Revised Estimates. *Review of Economics and Statistics*, 75, 331–336.

Sheehan, Richard G., and Frank Zahn. (1980). The Variability of the Okun Coefficient. *Southern Economic Journal*, 47, 488-97.

Stanley, M. (2013). FX Pulse. Accessed August 01 2013. https://www.morganstanley.com/institutional/research/pdf/FXPulse_20130801.pdf

Vinayagathasan, T. (2013). Inflation and economic growth: A dynamic panel threshold analysis for Asian economies. *Journal of Asian Economics*, 26, 31-41.

Virèn, M. (2001). The okun curve is non-linear. *Economics letters*, 70, 253–257.

Wang, X. & Huang, H. C. (2017). Okun's law revisited: a threshold in regression quantiles approach. *Applied Economics Letters*, 24 (21), 1533-1541.

Weber, C. (1995). Cyclical output, cyclical unemployment, and Okun's coefficient: a new approach. *Journal of Applied Econometrics*, 10, 433–446.

Worldbank Database, (2019). PWT 9.0 Datas, https://data.worldbank.org/

How cite this article / Atıf biçinmi

Şit, M. (2024). The relationship between unemployment and economic growth in selected large emerging countries: a revisit using threshold regression analysis. *İktisat Politikası Araştırmaları Dergisi - Journal of Economic Policy Researches, 11*(1), 76–85. https://doi.org/10.26650/JEPR1232910