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An Empirical Study Of Unemployment And Economic Growth In India

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Abstract
Unemployment is a major concern for every economy. Due to the pandemic, there is enormous unemployment generated in the Indian economy. There is a need for high growth to create employment opportunities in the economy. The article investigates the association between the unemployment rate and the economic growth rate in India. The article also checks the existence of Okun's law in the Indian economy during the period 1991-2021. The time series data used for the study, the Augmented Dickey-Fuller test and Ordinary least Square econometric tools were applied to analyse data. It has been found that there is a negative relationship between unemployment and the economic growth rate. The result confirms the existence of Okun's law in India.

Keywords: Okun's law, Unemployment, Economic Growth, India, Real GDP.
JEL: *E6, J6, O1, Y1*

Introduction

Indian economy is the fifth-largest economy with a nominal GDP of $3 trillion and become $5 trillion by the year 2026. India is a rapidly growing economy after China, with several resources and an advantageous demographic dividend. The biggest obstacle for the Indian economy is to take the benefit of this dividend. The world economies currently deal with crucial financial and economic issues, such as increasing unemployment and adequate economic growth. The increment in unemployment is the most contemplated problem all over the world, and not even developed countries are excluded from it.

Unemployment refers to the state of being jobless due to the lack of employment opportunities. The unemployment rate is calculated by dividing the number of unemployed individuals by the total number of people in the civilian labour force, as defined by the International Labor Organization in 2009. It is a measure of the frequency of joblessness in an economy. Managing the economy becomes a daunting task during periods of high unemployment. Employment levels greatly affect the supply and demand of labour in the market. Demographics and mobility of a nation play a significant role in maintaining the balance of the labour market. According to the "Wage Fund Theory", even though the labour salaries are predetermined, manufacturers hire only a few labourers due to a lack of capital, leading to unemployment.

The unemployment and economic growth rates are the key measures that concurrently are observed by decision-makers. It is generally agreed that economic growth results reduction in the rate of unemployment. On the one hand, authorities work to lower unemployment while attempting to boost economic growth with the right tools. Each rise in output leads to economic expansion, which elevates social well-being to some extent. Each rise in unemployment rates, though, causes certain issues for an economy. Unemployment reduces residents' income and, as a result, overall demand, which has a negative impact on the economy. For these reasons, unemployment is a significant issue for which policymakers should devise and put into effect policies since it has the potential to cause social, moral, and economic difficulties in nations.

Theoretically, the inverse association between unemployment and economic growth firstly, as pointed out by Okun (1962), has become a crucial macroeconomic application since then and is known as Okun's law. The empirical results of Okun (1962) recommended that a 3% increase in economic growth is proportional to a 1% decrease in the rate of unemployment and vice versa. This magnitude of the impact of unemployment on economic growth and vice versa experimentally evaluated through Okun's coefficient is also known as Okun's law coefficient. This association was studied and examined by numerous researchers. Some of them hold Okun's law and some resist it.

The "Review of Literature" section of the article carries related literature on various aspects of Okun's law. The "Data and Methodology" section discusses data and econometric models employed for investigating the association between unemployment and real GDP. The "Results and Discussion" section presents the estimation results of econometric models and analyses the results with a detailed discussion. The "Conclusion" section furnishes conclusions represented from the article.

2. Review of Literature

Numerous studies have examined the relationship between global unemployment and the economic growth rate of the country's product. These will be summarised as follows: Following Okun were numerous economists, such as Smith (1975), Gordon (1984), Knoester (1986), Kaufman (1988), Harris & Silverstone (2001), Sogner & Stiessny (2002), Silvapulle et al (2004), Fouquau (2008), Lal et al (2010) Each of these has approximated the Okan coefficient in a different approach and conducted in-depth empirical research on the validity of the Okan law in various nations and time periods. According to (Abu,2017) the Autoregressive Distributed Lag Model (ARDL), the period between 1970 and 2014 showed that unemployment in Nigeria has a notable negative impact on economic growth in the long term. Additionally, oil prices have a significant positive effect on economic growth. However, it's worth noting that the unemployment rate of 0.18 per cent observed in this study is much lower than the results reported by Okun and other studies in developed countries.

(Acaroglu, 2018) the results of the study based on the Hodrick-Prescott (HP), Chiristiano-Fitzgerald (CF) and Butterworth (BW) methods show that China, Indonesia, Saudi Arabia and Turkey fail to meet at least one of these purification techniques with at least one Okun's coefficient. It is worth noting that the Okun coefficients of G-20 countries vary based on their development structures and productivity heterogeneity.

(Bhat. et.al., 2019**)** investigate the existence of Okun's law in the Indian economy. They used time-series data from 1983 to 2013 and applied Augmented Dicky fuller, Phillips Perron, co-integration, and vector Error Correction models to estimate the Okun law. They found that there is a negative and significant impact of economic growth on unemployment. The result advocates that a 1 per cent increment in GDP will reduce the unemployment rate by 0.4 per cent.

(Chand, et.al., 2017) discovered that the unemployment rate and economic growth have a strong inverse relationship. Additionally, it was discovered that GDP is responsible for 48% of the change in the unemployment rate. The results are consistent with both Okun's law and previous research's findings.

(Das A. , 2020) explore the relationship between the rate of unemployment and GDP growth rate in the Indian scenario. He used data for the period 1998 to 2013. He also examines the Okun's law holds true or not for the Indian economy. He detected that there is no relation between the rate of unemployment and the GDP growth rate.

(Das & Mukherjee 2020) survey the viability of Okun's law in the Indian context. Analysing the relationship between unemployment and real GDP growth using annual data from 2008-2017. They conclude the existence of a negative correlation between the unemployment rate and real GDP growth rate indicates Okun's law's viability.

(Godara, et. Al., 2020) evaluate the association between unemployment and GDP growth rate in India with consideration of Okun's law. They used data for the period 1991-2018 and applied the ordinary least square technique using EViews software. They found that there is a positive relationship between unemployment and GDP growth rate in India which means that Okun's law was violated in India.

(Irfan et al.,2010) findings and conclusions drawn from the investigation of the Okun law may not be universally applicable to developing countries in Asia. Notably, several Asian developing countries have successfully addressed unemployment through sustained economic growth. Examples include Korea, Malaysia, China, and Singapore.

(Kumar and K. Murali,2016) concluded that India has been identified as the country with the fastest economic growth in comparison to other nations. However, despite the positive economic growth, there exist certain inadequacies in the employment regulations that have been attributed to several reasons. The Indian government has recognized the need to address these issues and will focus on rapidly reforming the existing policies to enhance job opportunities in the country.

(Lal, et.al., 2012) evaluate the validity of Okun's law in some Asian economies and used time series annual data over the period 1980-2006. They applied the Engle-Granger co-integration technique for the long run and the error correction mechanism for the short run. The result shows that Okun's law is not applicable in some Asian developing economies.

(Moosa,2008) used the ARDL approach to calculate Okun's equation for Algeria, Egypt, Morocco, and Tunisia. The study utilized annual data on growth and unemployment rates, with estimates ranging from 1990 to 2005. Notably, the study found that Okun's coefficients were not significant, resulting in the rejection of Okun's law for the economies of the four countries.

(Papola,2013) found that India's employment growth has been around 2% per year in the long term. However, over the past decade, it has decreased to about 1.5% despite GDP growth reaching 7.5%. This suggests that the relationship between unemployment and economic growth in India has been relatively weak.

(Srinivas, 2018) examine Okun's type relationship between unemployment and output in the Indian economy. He used annual data for the period from 1990 to 2017. He employed a co-integration model to estimate Okun's law in the long run and a Vector Error Correction Mechanism for the short run. He found that Okun's law is absent in the short run whereas, present in the long run in the Indian economy.

(Victoria Kenny, 2019) employed the VAR Granger Causes approach to explore the causal relationship between unemployment (UNEMP) and economic growth rate (RGDP) in Nigeria, with a focus on the period between 2016 and 2018. The results revealed a unidirectional VAR relationship between unemployment and the economic growth rate in Nigeria, indicating that changes in unemployment had a significant impact on the economic growth rate in the country.

An examination of the literature revealed that certain research on India's unemployment and economic growth had already been conducted. However, very few people apply robust econometric techniques. Thus, bridging this gap is the goal of the current work. India has been grappling with a significant unemployment problem for an extended period. Global

bodies such as the International Labour Organization (ILO) have forecasted that India's jobless rate will soar in the coming years, turning the problem of unemployment into a global phenomenon. The primary goal of the research study is to investigate the impact of India's economic growth on the country's rate of unemployment. The policy ramifications of this study are crucial for Indian economic authorities. The focus of the current analysis is only on India's economic growth and unemployment. The study examines whether Okun's law holds true for the Indian economy. The time series data are the foundation of the study.

3. Objectives of the study

The present study is based on the following objectives:

1. To determine whether Okun's law applies to India.
2. To investigate the impact of the unemployment rate and economic growth on the Indian economy.

4. Hypotheses of the Study

1. H_o: Okun's law does not apply in India.
2. H_o: There is no significant difference between the unemployment rate and real GDP in India.

5. Data and Methodology

The study examines the relationship between India's unemployment rate and economic growth using data from the World Bank database and the Reserve Bank of India (RBI) from 1991 to 2021. This study is built upon an exploratory research design and secondary sources used for data collection. Econometric methods were used to analyse the relationship between unemployment and Gross Domestic Product. For the analysis of data, the study employed Augmented Dickey-Fuller (ADF) test is used, as given by Dickey and Fuller (1981) and Autoregressive Distributed Lag Model (ARDL).

5.1 Econometric Model Specifications

The present study uses a first-difference model of Okun's law to inspect its validity for the Indian economy. Okun (1962) evaluates the empirical model in gap form and different forms. In the long run, output gap and unemployment are imperceptible and must be evaluated, which creates uncertainty in evaluating Okun's law in gap form (Andonova & Petrovska, 2018). Due to this limitation, we only evaluate different forms of Okun's law. The first difference form of Okun's law can be represented in Equation 1:

$$\mathbf{Y_t - Y_{t-1} = \alpha + \beta\,(U_t - U_{t-1}) + \varepsilon_t} \quad \textbf{(1)}$$

Where Y_t represents real GDP in a current time and Y_{t-1} is its first lag. Similarly, U_t represents the current unemployment rate and U_{t-1} is the lagged unemployment rate. Subscript t shows the time dimension of the data series.

5.2 Unit Root Test

In the first step, we tested the stationarity of the data employed in the study the Augmented Dickey-Fuller (ADF) test is used, as given by Dickey and Fuller (1981). This test is applied to check the long-term properties of variables in the study. A time series is stationary if its mean, variance, and covariance remain constant over time and it can be used for forecasting. The ADF model is applied using the following equations.

$$\Delta \mathbf{U_t} = \boldsymbol{\alpha_0} + \boldsymbol{\alpha 1 U_{t-1}} + \sum_{i=1}^{k} \boldsymbol{\beta_i \Delta U_{t-i}} + \boldsymbol{\varepsilon_t} \quad \textbf{----------2}$$

$$\Delta \mathbf{Y_t} = \boldsymbol{\alpha_0} + \boldsymbol{\alpha_1 Y_{t-1}} + \sum_{i=1}^{k} \boldsymbol{\beta_i \Delta Y_{t-i}} + \boldsymbol{\varepsilon_t} \quad \textbf{----------3}$$

Where U_t and Y_t are unemployment and real GDP at t time trend, Δ is the first difference operator, $\alpha_0$is constant, k is several lags in the model, and ε_t is the error term. At the same time, if the ADF result fails to reject the test of the first difference, it indicates that the series has the unit root and is of integrated order one.

5.3 Autoregressive Distributive Lag Model (ARDL)

As a crucial component of our research, we will be conducting co-integration tests utilising an autoregressive distributive lag (ARDL) system that has been recommended by esteemed scholars such as Pesaran (1997), Pesaran and Shin (1999), and Pesaran (2001). We will be employing the distinctive estimation technique of limits testing. Notably, the ARDL system can be utilized irrespective of whether the repressors are I (0) or I(1), as the order of integration no longer holds significance.

$$\mathbf{RGDP_t = ß_o + ß_1 UNEMP_t + U_t} \quad \textbf{----------4}$$

Where the model parameters are:
ß$_o$ = Intercept of the regression model
ß$_1$ = Slope of Unemployment
t = time trend running from 1991-2021

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Other variables remain as defined in equation (4) above one can transform the econometric model in equation 1 into ARDL ECM specification, as well as taking partial logarithms to achieve a common unit of measurement gives the estimable ARDL ECM model in equation 5.

$$\Delta lnGDP_{t-1} = \alpha + \alpha_1 lnEmploy_{t-i} + \sum_{i=0}^{n} \beta 1 \, \Delta lnEmploy_{t-i} + ECM_{t-1} + \varepsilon t \text{----------} 5$$

Where,
Δ is the difference operator, n is the lag length, ECM is the speed of adjustment ε is the serially uncorrelated error term and ln* is the natural log. Other variables remain as previously defined.

Table: 1 Descriptive Statistic

	RGDP	UNEMPLOY
Mean	5.9258	5.6354
Median	6.7000	5.6000
0Maximum	8.9000	8.0000
Minimum	-6.6000	5.3000
Std. Dev.	3.0324	0.4658
Skewness	-2.4200	4.3856
Kurtosis	10.4509	22.9088
Jarque-Bera	101.9681	611.3452
Probability	0.0000	0.0000
Sum	183.7000	174.7000
Sum Sq. Dev.	275.8794	6.5109
Observations	31	31

Source: Author's Calculation.

Table 1 indicates the descriptive statistics of the data series. It shows that the mean value of both series is nearly the same whereas, standard deviation estimates show that GDP has large variability. The values of skewness and kurtosis coefficients indicate that unemployment and real GDP rates are not normally distributed. The p-value of the Jarque-Berra test for both variables is greater than 0.05 per cent. Hence, we accept the null hypothesis which shows that both GDP and unemployment are normally distributed.

Table: 2 Augmented Dickey-Fuller Test Unit Root Test

Variables	Values	@Level	1st Difference	Order of Integration
InRGDP	t-Statistic	-7.032430	-8.070331	I (0)
	P-Value	0.0000	0.0000	
InUnemployment	t-Statistic	-4.499763	-8.836982	I (0)
	P-Value	0.0012	0.0000	

Source: Author's Calculation

Augmented Dickey-Fuller (ADF) Test results are presented in Table 2. At level and 1st difference, ADF clearly shows that both real GDP and Unemployment rate are stationary. The probability value (p-value) is significantly less than the 5% critical value therefore it rejects the null hypothesis (H_0) which states that both real GDP and unemployment have unit root. Hence, both real GDP and unemployment are stationary at level with a zero mean. The results indicate that both variables are stationary at levels thus both are an I (0) series.

5.4 ARDL Bound Test for Cointegration

Table 3: ARDL Bound Test for Cointegration

F-Bound Test Null Hypothesis: No levels relationship

Test Statistic	Value	Sign.	I(0)	I(1)
		Asymptotic: n=100		
F-Statistic	16.081	10%	4.05	4.49
K	1	5%	4.68	5.15
		2.5%	5.3	5.83
		1%	6.1	6.73

		Finite Sample: n=35		
Actual Sample Size	26			
		10%	4.38	4.86
		5%	5.23	5.77
		1%	7.47	8.21
		Finite Sample: n=30		
		10%	4.42	4.95
		5%	5.37	5.96
		1%	7.59	8.35

Source: Author's Calculation

ARDL test can be carried out if the series is purely at I (0), purely at I (1), or a mix of I (0) and I (1). Short-run relationships can only be estimated with the ARDL model. ARDL combines endogenous and exogenous variables.
Based on the unit root test all the variables are purely stationary at I (0) or integrated at levels. Before analysing the long- and short-run association between variables, it is essential to confirm the cointegration using the ARDL bound test (Pesaran et al. 2001). This test helps determine the presence of a stable and long-term relationship between the variables. The estimated outcomes shown in Table 3 represent that the value of F-statistics is larger than the lower and upper bound at 1% level of significance. Hence, the alternative hypothesis of cointegration is accepted and the ARDL bound test allows the existence of the long-run relationship between real GDP and Unemployment.

Table: 4 Short-run ARDL Estimate Dependent Variable: ln_RGP Method: ARDL

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.***
C	-31.8593	14.0030	-2.2751	0.0347
@ trend	0.0706	0.0250	2.8241	0.010
In_RGP (-1)	-0.5639	0.2349	-2.4000	0.0268
In_Unemployment	26.2827	3.5006	7.5079	0.0000
In_Unemployment (-1)	11.3023	6.7076	1.6849	0.1083
In_Unemployment (-2)	-10.8874	3.4596	-3.1469	0.0053
In_Unemployment (-3)	-6.9709	3.2560	-2.1408	0.0347
R^2	0.8170			
Adjusted R^2	0.7593			
F- statistic	14.1451			
Prob (F- statistic)	0.0000			

Source: Author's Calculation.

After conducting an ARDL bound test to verify the existence of a long- and short-term association between variables, the study identifies the variables' short- and long-term parameters. Table 4 conveys that RGDP lag influences the current period. Based on the Wald test RGDP lag 1 influences itself. Unemployment is positively related to RGDP. In the second lagged period unemployment has a negative influence on RGDP at the current period but first and third lagged period is not significant. Based on Wald test unemployment at level, lag1, lag2, and lag3 can jointly influence RGDP. The Adjusted R^2 is 75 per cent, F-statistic is 14.14 and p-value is 0.00 which is significant. According to the results, there is a positive relationship between real GDP and unemployment at 1% level. Hence, Okun's law does not hold in the short run for the Indian economy during study.

Table: 5 Long-run ARDL Estimates Level Equation Case 4: Unrestricted Constant and Restricted Trend

Variable	**Coefficient**	**Std. Error**	**t-statistic**	**Prob.**
In Unemployment	12.6137	4.4206	2.8533	0.0102
@ TREND	0.0451	0.0128	3.5084	0.0023
EC=ln_RGDP - (12.6137*ln_Unemployment + 0.0452*@ TREND)				

Source: Author's Calculation.

Table 5 shows the empirical results for long-run association which indicate unemployment has a positive and significant impact on RGDP at 5% level. The conclusion is that Okun's law does not hold in the long run for India during the study.

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Table: 6 Error Correction Model (ECM) ARDL Error Correction Regression Dependent Variable: D(ln_RGDP) Method: ARDL (2,3)

ECM Regression Case 4: Unrestricted Constant and Restricted Trend				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.***
CointEq (-1) *	-1.5639	0.2141	-7.3022	0.0000
C	-31.7886	4.3608	-7.2896	0.0000
D(In_Unemployment)	26.2827	2.5395	10.3494	0.0000
D(In_Unemployment(-1))	17.8583	3.5698	5.0026	0.0001
D(In_Unemployment(-2))	6.9709	2.9009	2.4029	0.0266
R^2	0.9044			
Adjusted R^2	0.8862			
Durbin-Watson stat	1.6619			

*p-value incompatible with t-Bound distribution
Source: Author's Calculation.

The Cointegration Equation (-1) is negative with a coefficient estimate of -1.5639. This implies that the speed of adjustment towards long-run equilibrium is 156% or system corrects its previous period disequilibrium at a speed of 156% within one period. The t-statistic is -7.3022, and the coefficient is significant at less than 1% significance. The study also concluded that unemployment has a positive influence in both the long and short term on real GDP in India.

Table: 7 Residual Diagnostic tests

Test	**Null Hypothesis**	**Statistic Value**	**Probability**
Breush-Godfrey Serial Correlation (LM) test	No serial correlation at up to 2 lags	0.0713	0.9314
Jarque-Bera	Residuals are normally distributed	0.3757	0.8287
Breush-Pagan-Godfrey test	No conditional heteroskedasticity	2.4999	0.0592
Ramsey RESET test	No misspecification	1.4041	0.2514

Source: Author's calculation

Table 7 indicates several diagnostics of the ARDL model for credibility and soundness. It uses the LM serial correlation test to determine whether there is serial correlation between the errors. Its result of 0.9314 suggests that there is no correlation between the errors. The model does not exhibit heteroscedasticity, according to the Breush-Pagan-Godfrey test, which demonstrates heteroscedasticity. This is because the probability value is greater than 0.05. Residuals are normally distributed because the p-value is greater than 5% significance. The analysis uses Ramsey's RESET test to investigate the model's misspecification. With a result of 0.2514, the model has adequate specifications. The model's stability is additionally investigated by the CUSUM and CUSUM square tests. The figures 1.1 and 1.2 report their graphical representations. We can reasonably conclude that the exhibits satisfactory stability since, as both tests show, the blue line lies inside the crucial boundaries (red lines).

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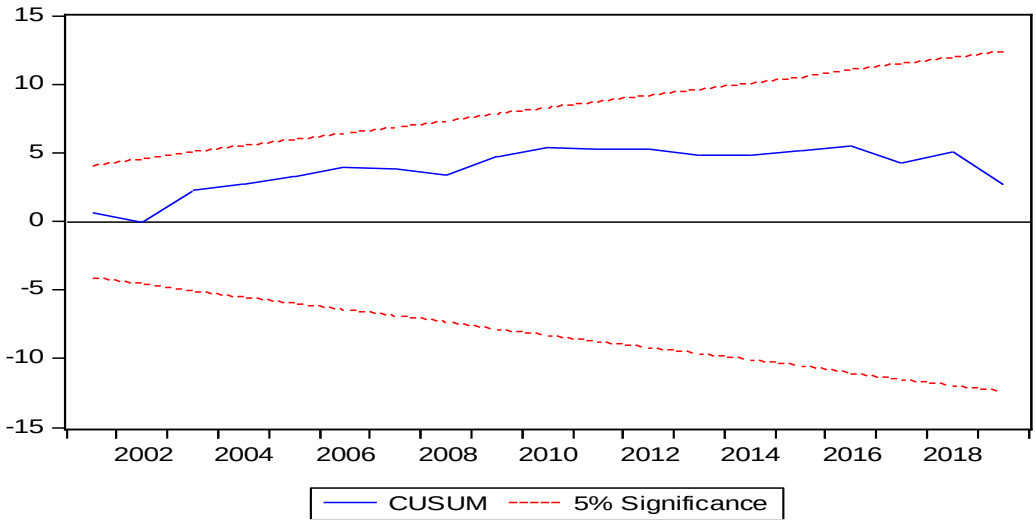
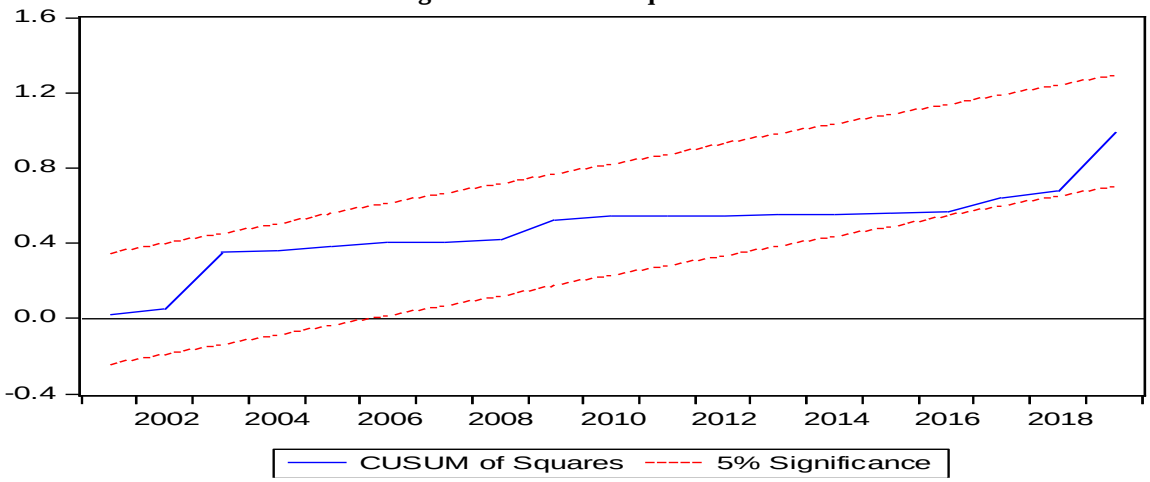


Figure:1.1 CUSUM Test

Figure:1.2 CUSUM-Square Test



6. Conclusion and Suggestions

Unemployment is the biggest problem in developing countries. In this study, we analysed the causal relationship between the unemployment rate and economic growth considering Okun's law for the Indian economy for the period 1991 to 2021. The presence of a positive relationship between real GDP and unemployment exhibits there is no existence of Okun's law in the Indian economy during the study period. The results of the study indicate that the data series was stationary at level. The co-integration test shows that there is co-integration relationship between unemployment and real GDP in India in the short and long run. Despite this, the positive relation between unemployment and economic growth in both the short and long term indicates Although the Indian economy has experienced good growth rates at various times, it has been unsuccessful in substantially lowering the unemployment rate. This is primarily because the Indian economy is structured around capital intensity, which prioritizes the use of capital over labor. As a result, the economy has not been able to create enough employment opportunities for its growing workforce, leading to persistently high levels of unemployment. It gives insight to the policymakers when they frame any policies to reduce unemployment. Both structural initiatives, such as labour market changes, and stabilisation policies, such as appropriate monetary policy responses, may benefit from knowledge of the degree of asymmetries in the real GDP and unemployment connection. The relationship aids in preventing predicting mistakes. It now demands immediate action to end the sluggishness of the idea of unemployment in our nation since it has grown to be such a difficult, economic, social, and political issue. Therefore, initiatives to promote entrepreneurship and create jobs to lower the unemployment rate may have a considerable and growing influence on output levels. Still, the policy must be implemented and carried out correctly.

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CONFLICT OF INTEREST
The author/s declares no conflict of interest.

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DATA AVAILABILITY:
On request one can get the data. Email:monicamust2017@gmail.com

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