Testing Okun's Law in India: An Empirical Analysis (2000–2024)
Using R and World Bank Data

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1. Introduction

Economic growth is often expected to create more jobs and reduce unemployment. One of the most popular economic ideas that explains this relationship is known as **Okun's Law**, which suggests that when an economy grows faster, the unemployment rate should fall.

However, in a country like India, economic growth has not always resulted in enough job creation. In recent years, the term **"jobless growth"** has often been used to describe the Indian economy.

The purpose of this project is to **test whether Okun's Law holds true for India** using real data and simple econometric models.

The main questions of this study are:

- Is GDP growth related to unemployment in India?

- Does higher growth reduce unemployment?

- Or is the relationship weak or insignificant?

2. Data Description

This study uses **annual data from 2000 to 2024**.

The data sources are:

- **GDP Growth (annual %)** – World Bank

- **Unemployment Rate (% of labour force)** – World Bank

The dataset contains the following variables:

- Year

- GDP Growth Rate (%)

- Unemployment Rate (%)

The data was cleaned and merged into a single dataset and then analyzed using **R**.

3. Methodology

To test the relationship between economic growth and unemployment, two simple regression models were used.

Model 1: Basic Okun's Law Model

$$Unemployment_t = \alpha + \beta \times GDP\_Growth_t + \epsilon_t$$

This model checks whether GDP growth in the same year affects the unemployment rate.

Model 2: Dynamic (Lagged) Model

$$\Delta Unemployment_t = \alpha + \beta \times GDP\_Growth_{t-1} + \epsilon_t$$

This model checks whether **last year's GDP growth** affects the **change in unemployment** in the current year.

This is done because employment effects often happen with a delay.

4. Results

4.1 Descriptive Analysis

Time-series plots of GDP growth and unemployment show that:

- GDP growth in India is **very volatile**
- Unemployment does not always move in the opposite direction of growth
- In many years, even when growth is high, unemployment does not fall much

This already suggests that the relationship may be weak.

4.2 Regression Results – Model 1

The estimated equation is:

$$Unemployment = 7.96 - 0.06 \times GDP\_Growth$$

Interpretation:

- The coefficient of GDP growth is **negative**, which means higher growth is associated with lower unemployment.
- However, the **p-value is very high (0.50)**, which means this relationship is **not statistically significant**.
- The **R² is about 2%**, which means GDP growth explains almost nothing about unemployment changes.

Conclusion:

GDP growth alone does not significantly explain unemployment in India.

4.3 Regression Results – Model 2 (Lagged Model)

The estimated equation is:

$$\Delta Unemployment = -0.336 + 0.029 \times GDP\_Growth_{t-1}$$

Interpretation:

- The coefficient is **positive**, which is opposite to what Okun's Law suggests.

- The **p-value is 0.46**, which means the relationship is **not significant**.

- The R^2 is again **very low (about 2.5%)**.

Conclusion:

Even when using lagged growth, GDP growth does not explain changes in unemployment in India.

5. Discussion: Jobless Growth in India

Both models show that:

- The relationship between growth and unemployment in India is **weak and insignificant**.

- This suggests that **economic growth in India has not been employment-intensive**.

Possible reasons:

- High population growth

- Large informal sector

- Automation and capital-intensive growth

- Skill mismatch in the labour market

- Structural problems in the economy

This supports the idea that India has experienced **jobless growth** during the period studied.

6. Conclusion

This project tested Okun's Law for India using data from 2000 to 2024.

The main findings are:

- GDP growth has **no strong or significant impact** on unemployment in India.

- Both the basic and dynamic models show **very weak relationships**.

- This indicates that **growth alone is not enough to solve India's unemployment problem**.
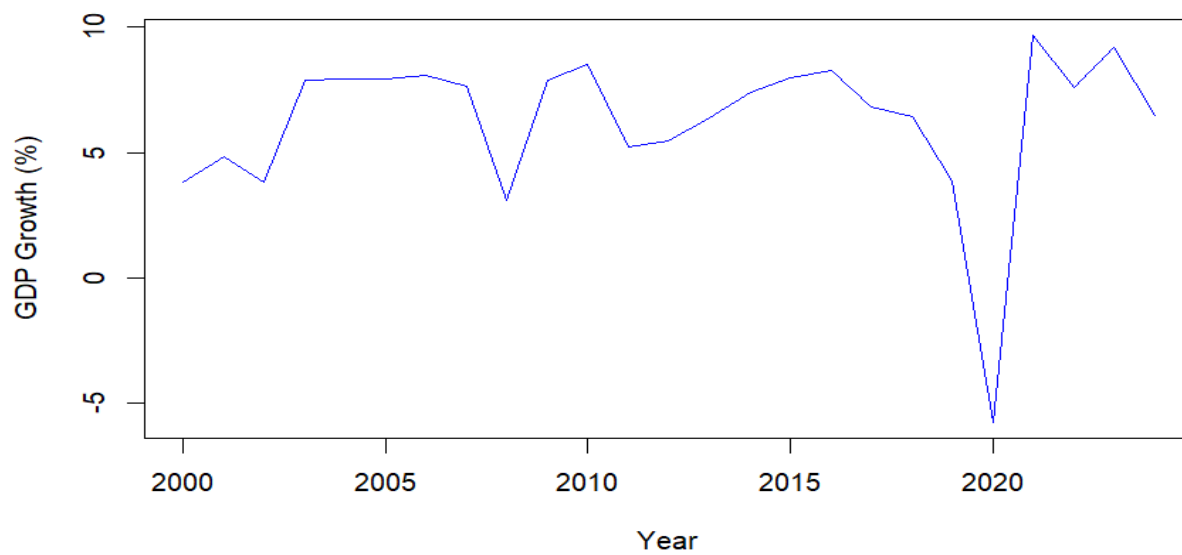
Policy implication:

India needs not only growth, but also **employment-focused and inclusive growth strategies**.
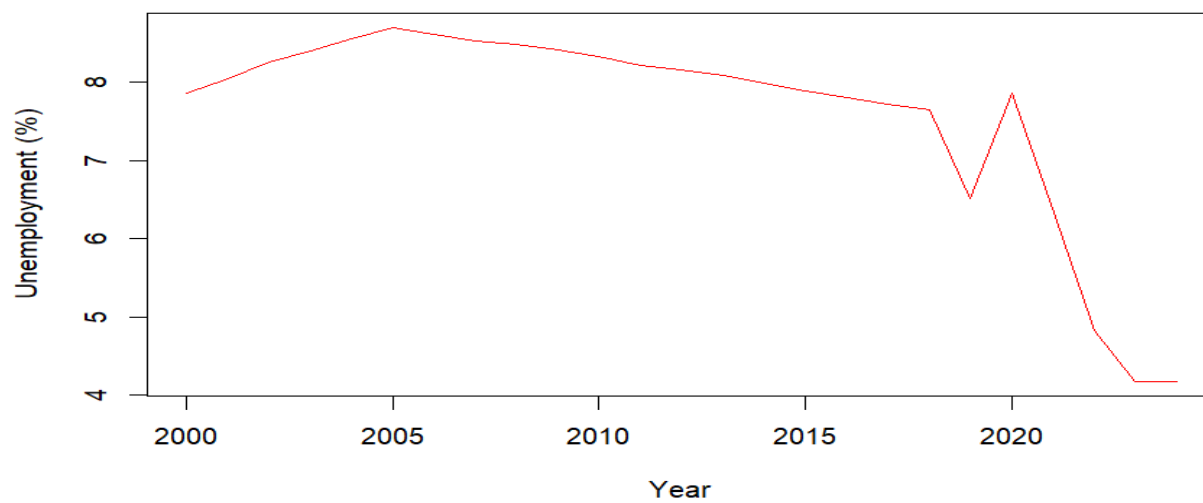
7. Tools Used

- R and RStudio

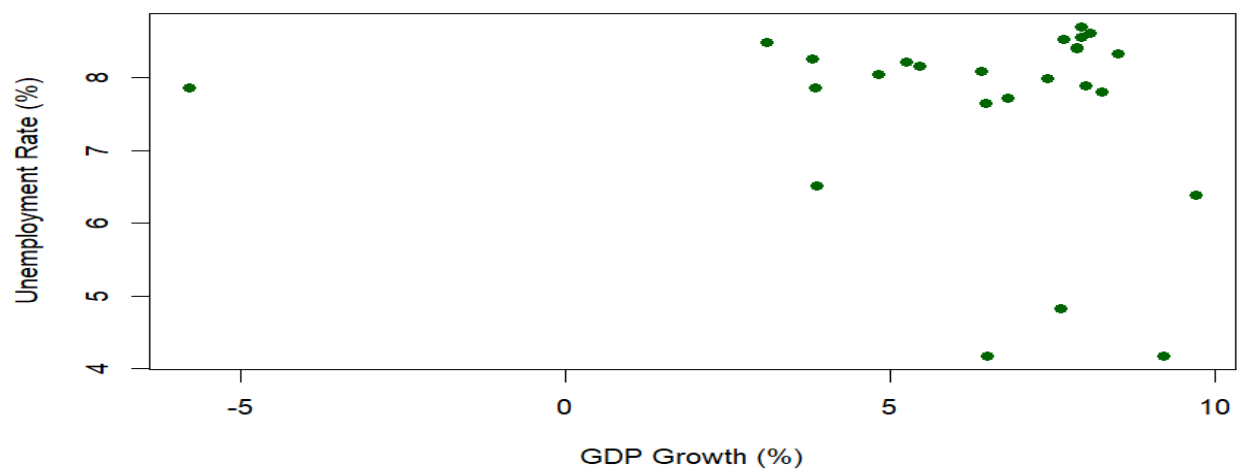- World Bank data

- Basic econometric regression models

GDP Growth in India

Unemployment Rate in India

Unemployment vs GDP Growth

Model 1

lm(formula = Unemployment ~ GDP, data = data)

Residuals:

Min	1Q	Median	3Q	Max
-3.3962	0.0783	0.4765	0.8726	1.2177

Coefficients:

	Estimate	Std. Error	t value	Pr(>|t|)	
(Intercept)	7.96438	0.61907	12.865	5.44e-12	***
GDP	-0.06084	0.08911	-0.683	0.502	

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Residual standard error: 1.346 on 23 degrees of freedom

Multiple R-squared: 0.01987,   Adjusted R-squared: -0.02275

F-statistic: 0.4662 on 1 and 23 DF, p-value: 0.5016

Model 2

lm(formula = dUnemp ~ GDP_lag1, data = data2)

Residuals:

Min	1Q	Median	3Q	Max
-1.50693	0.01412	0.05858	0.18811	1.57300

Coefficients:

	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	-0.33608	0.27185	-1.236	0.229
GDP_lag1	0.02921	0.03903	0.748	0.462

Residual standard error: 0.5893 on 22 degrees of freedom

Multiple R-squared: 0.02483,   Adjusted R-squared: -0.0195

F-statistic: 0.5601 on 1 and 22 DF, p-value: 0.4622