International Journal of Contemporary Issues in Social Sciences
Volume 3, Issue 2, 2024 ISSN(P):2959-3808 | 2959-2461

TESTING OKUN'S LAW: A CONTEMPORARARY STUDY OF SOUTH-ASIA

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Received: 01 March, 2024 **Revised:** 30 March, 2024 **Accepted:** 12 April, 2024 **Published:** 26 April, 2024

ABSTRACT

The purpose of this paper is to test Okun's law for four South-Asian Countries i.e., Pakistan, India, Bangladesh, and Sri-Lanka, by using panel data analysis for the period of 2010-2020. A famous Levin, Lin & Chu method has been used to check the stationarity of the panel data, the unit root test highlights export is stationarity at level and CPI, GDP and unemployment are stationarity at first difference. Moreover, Fixed effect method, Hausman Test, Wald test, Johansen Cointegration Test, Breusch-Pagan-Godfrey, and RAMSEY RESET TEST, has been used respectively. The estimated result highlights that there is negative relationship between economic growth and unemployment rate in these countries. In other word a 1% increase in GDP growth rate decreases the unemployment rate in these countries by 1.599199% and it is highly significant i.e., p-value = 0.0056, which verifies that these four countries obey Okun's law and there is cointegration among these variables. Furthermore, the result shows that there is a positive relationship between inflation rate and economic growth, which is significant. However, the result highlights that there is a positive relationship between export and economic growth, but it is insignificant. Therefore, it is proved that economic growth is very crucial for these South-Asian countries to dismantle unemployment, so the policy makers can target economic growth by determining the most important determinant of GDP to enhance GDP growth.

Keywords: Economic growth, stationarity, cointegration, export, Unemployment, Okun's law

INTRODUCTION

Economic growth and unemployment are two crucial macroeconomic variables, and it is the primary goals of all developed and developing countries to enhance economic growth and reduce unemployment rate. Economic growth is the increase in the capacity of an economy of a country to produce goods and services for a specific period of time. It is the most mandatory variable for decimating poverty and improving the living standard of people. (Zhu, et al., 2022) studied the negative relationship between economic growth and poverty reduction. On the other hand, it means that with the increase in the economic growth rate, the poverty rate will be reduced. Therefore, economic growth is important for reducing poverty in a country.

Furthermore, the unemployment rate is the total percentage of the people in a country's labour force who are out of labour force participation. There are different types of unemployment, i.e., Structural unemployment, Frictional unemployment and cyclical unemployment. (Ahmad, et al., 2016) determined the causes of unemployment in the district Peshawar, Pakistan. He highlighted that the increase in the unemployment rate is due to lack of education, non-availability of capital, inappropriate or inadequate skill, poverty and the increase in the population growth rate in Pakistan. (Ahmad, 2022) studied the causes of unemployment in the district Mardan Pakistan, and concluded that causes of unemployment are inadequate skills, age level, low level of income, political instability and increase in population level. Likewise, (NAIR, 2020) found that there are various factors such as more population level, illiteracy, lack of full job opportunity, inflation rate and poverty which leads and hinderance economic growth and encourages unemployment rate in India. It is concluded that in these four South-Asian countries, most of the factors which causes unemployment are same as per studied from the previous literature review.

(Ahmad, 2022) examined the consequences of unemployment in the district Peshawar, Pakistan. He concluded that unemployment encourages suicides and crimes in the society. (McClelland &

Macdonald, 1998) explained several social costs of unemployment such as homelessness, tension for arranging housing, social alienation, crime, inadequate finance, lack of self-esteem, and family tension etc. (Rashid & Islam, 2020) highlights the impact of Unemployed Bangladesh graduates , he found that the unemployment leads to the graduates mention depression, decline in the personality embracement from society due to unemployment etc. (Rafi, et al., 2019) investigate the psychological implications of unemployment among Bangladesh civil service job seekers. He determined that there are existence of anxiety, stress and depression among unemployed graduates due to insecurity of job, due to pressure from family and society.

Therefore, it is important to dismantle unemployment rate because it has many social and economic consequences. Okun's law explain, the negative relationship between economic growth and unemployment. According to him, when economy of a nation grows, their unemployment rate decreases. (Atigala, et al., 2023) indicated a long-run negative relationship between economic growth and unemployment in Sri-Lanka. (Prabagar, 2015) verified that the relationship between unemployment and economic growth in the short-run and long-run equilibrium in case of Sri-Lanka verifies Okun's law. So, it is important for these four South-Asian countries i.e. Pakistan, India, Bangladesh and Sri-Lanka to investigate the factors which encourages economic growth. As (BOLDEANU & CONSTANTINESCU, 2015) examined some important factors which positively enhances economic growth and these factors are, Foreign direct investment, Trade openness and public expenditures. (Sendi, et al., 2021) empirically estimated the determinants of economic growth for Uganda and found that population growth, investment, government expenditure, and openness of trade have positive influence upon economic growth in the context of Uganda. (Upreti, 2015) and (Fouthe & Ndedi, 2017) have mentioned different determinants for 76 developing countries and for CEMAC countries, which positively affect economic growth such as an increase in export, increase in the investment rate, increases in life expectancy.

The main aims of this paper are to examine the relationship between economic growth and unemployment for four South-Asian Countries. Various sections have been made for this study i.e., literature review, Theoretical framework, Methodology, Estimations and Result, & Discussion and Conclusion.

LITERATURE REVIEW

(Hjazeen, et al., 2021) highlighted the relationship between unemployment and economic growth in Jordon for the period of 1991 to 2019 by OLS approach. He found negative association between economic growth and unemployment in Jordon. However, (Kreishan, 2011) determined the relationship between economic growth and unemployment by using time series technique thought out the period of 1970 to 2008 for Jordon. His empirical findings revealed that economic growth & unemployment are un-related and don't not follow Okun's law. (Soylu, et al., 2018) investigated the relationship between economic growth and unemployment in Eastern European countries throughout the period of 1992 to 2014 by using panel data technique. The empirical result depicted that economic growth and unemployment have negative relationship i.e., 1 percent increase in GDP will reduce the unemployment rate by 0.08%. (Khem, et al., 2017) explored the association between unemployment rate & economic growth in India and found a strong negative correlation between economic growth and unemployment rate, their findings aligned with Okun's law. (Abbas, 2014) determined the connection between unemployment rate and economic growth in the context of Pakistan by using time series analysis for the period of 1990 to 2006. He showed a long run significantly negative relationship between economic growth and unemployment rate, meaning that 1 % increase in GDP growth rate will topple the unemployment rate by 1.665% in case of Pakistan.

(Moosa, 2008) determined the relation for four Arab countries i.e., Algeria, Egypt, Morocco & Tunisia. His result suggested that economic growth and unemployment are unrelated and for these four Arab countries, Okun's law don't follow due to unemployment in these countries are not cyclical rather it is structural and friction, rigidity of labour market and domination of government in sectors like oil in Algeria. (Wajid & Kalim, 2013) concluded that economic growth has a significantly negative relationship with unemployment rate both in the short and long run in the context of Pakistan for the period of 1973 to 2010. (Conteh, 2021) investigated the relationship between unemployment rate and economic growth in Liberia. His finding suggests that there is no significant relationship between

unemployment and economic growth for Liberia in the long-run and short-run for the period of 2001 to 2019. (Uddin & Rahman, 2023) examined the association between economic growth and unemployment for developing countries using panel data analysis. He found that there is negative relationship between unemployment and GDP per capita for the 79 developing countries for the period of 2002 to 2018. (Resurreccion, 2014) concluded that unemployment is negatively related with economic growth in case of Philippine covering the period of 1980 to 2009 by using OLS technique.

(Tenzin, 2019) examined the relationship between economic growth and unemployment in Bhutan for the period of 1998 to 2016.He highlighted that there is no relationship between economic growth and unemployment rate i.e., the increase in economic growth has not affect the unemployment rate in the context of Bhutan. (Akter, 2018) explored the association for Bangladesh and other four South-Asian countries like, Pakistan India, Nepal and Bhutan with the help of Random-Fixed effect Model. They demonstrated that economic growth has a significantly negative association with unemployment for the period of 1990 to 2010. (Khaliq, et al., 2014) investigate the relationship between economic growth and unemployment rate for 9- Arab countries for the year 1994 to 2010. The empirical result showed that there is a significantly negative association between economic growth and unemployment, meaning that if the 1 percent upsurge in the economic growth, the unemployment rate will decline by 0.16 percent. (DIAKHOUMPA, 2020) showed negative long-run and short-run association between unemployment and economic growth in Senegal for the period of 1991 to 2018. (khrais & Al-Wadi, 2016) explored the relation for the MENA countries and found that there is no significant association between economic growth and unemployment for these countries for the period of 1990 to 2016.

(Kostov, 2017) presented the clear picture of the relationship between growth and unemployment for Bulgaria for the period of 2006 to 2016, his study validated Okun's law, showing the negative relationship between Unemployment and Economic Growth. (Niranjala, 2019) presented the association in the context of Sri-Lanka, and their result verify the presence of Okun's law for the period of 1991 to 2017 by using ARDL Bound test approach. Sameas, (Shiyalin & Bhavan, 2021) found a strong significant and negative relationship between growth and unemployment in Sri-Lanka for the period of 1990-2016. (Chowdhury & Hossain, n.d.) he examined that GDP growth rate has a significantly negative impact on the unemployment rate in case of Bangladesh. (Bhujbal & Shafighi, 2021) Illustrated that GDP has a substantial impact on the unemployment rate in India, meaning that whenever, the level of economic growth in India slows down, the unemployment rate goes upward and wise versa. (Atigala, et al., 2023) indicated a long-run negative relationship between economic growth and unemployment in Sri-Lanka. (Apau, et al., 2019) estimated this relationship for China by using time-series analysis. This study reveals that there is short-run and long-run negative relationship between employment and economic growth in the context of China.

THEORETICAL FRAMEWORK

Okun's law

Okun's law was firstly given by Arthur Okun in 1960s, according to him there is negative relationship between economic growth and Unemployment. He pointed out that a one percent upsurge in the unemployment rate means, three percent decline in the GDP growth rate of a country. In other word, when unemployment decrease, the output of any nation will uprise. Many researchers have endorsed that some countries verify Okun's law such as (Hjazeen, et al., 2021) he found the negative relationship between unemployment and economic growth for Jordon. Moreover, (Soylu, et al., 2018) determined this relationship for Eastern European countries.

METHODOLOGY

The data is collected from World Bank, where economic growth is dependent variable and is taken in GDP growth (annual %). Moreover, Unemployment rate and inflation rate are independent variable and are taken in Unemployment rate, total (% of total labore force), inflation (CPI, 2010 = 100) and export (annual % growth). the data is taken from World Bank for the period of 2010 to 2020 for four South-Asian countries i.e., Pakistan, India, Bangladesh, and Sri-Lanka. This data is then analysed with the help of EViews.

There are various researchers such as (Hjazeen, et al., 2021), (Wajid & Kalim, 2013), (Akter, 2018), (

Bhujbal & Shafighi, 2021), (Khem, et al., 2017), (Wajid & Kalim, 2013), (Khaliq, et al., 2014) and our model becomes,

Y = C (1) + C (2) *EXP01 + C (3) *UN + C (4) *CPI

Here,
GDP = Y
EXP01 = export rate
Unemployment rate = UN
Inflation rate = CPI
Constant = C

Estimations & Result

Descriptive Statistics

The description of variables such as GDP, unemployment (UN), Inflation rate (CPI) and export rate (EXP01) for four countries i.e., Pakistan, India, Bangladesh and Sri Lanka have been mentioned in table 1.1. It highlights the average values for GDP, UN, CPI and EXP01. The average value for GDP growth is 5.591320, and the average rate of unemployment rate is 4.15691. Moreover, the mean growth of inflation rate is 141.1818 and for export it is 4.497539. Standard deviation shows the fluctuation of data from the mean points. Furthermore, only GDP is showing negative skewness and other variables are rightly skewed. Kurtosis shows all variables have normal kurtosis except export which have positive kurtosis.

Table 1.1

	GDP	UN	CPI	EXP01
Mean	5.591320	4.156591	141.1818	4.497539
Median	6.061059	4.045000	141.6985	4.564708
Maximum	8.669483	6.610000	200.0790	29.33912
Minimum	-0.220484	2.460000	100.0000	-17.50239
Std. Dev.	2.070595	1.176920	26.41122	8.464489
Skewness	-0.620292	0.568954	0.207483	0.063523
Kurtosis	2.968987	2.592482	2.269328	4.316292
Jarque-Bera	2.759183	2.678330	1.265056	3.133206
Probability	0.251681	0.262064	0.531247	0.208753
Sum	240.4268	182.8900	6070.816	193.3942
Sum Sq. Dev.	180.0693	59.56101	29297.20	3009.198
Observations	43	44	43	43

Unit-Root Test

Table 1.2 is representing Panel-Unit Root Test for stationarity by using famous Levin, Lin & Chu method. Null hypothesis tells that there is unit root or data is not-stationarity and the alternation hypothesis adduce that data is stationary. The table shows that only for export the p-value is 0.000 which is significant at level and we reject the null hypothesis of unit root. But for other variables at level, we failed to reject the null hypothesis, therefore, we take first difference and at 1st difference we are able to reject null hypothesis and accept the alternative hypothesis.

H. = series have unit root
H1 = series don't have unit root

Table 1.2
Panel Unit-Root Test

Variables			Method: Levin, Lin & Chu t*
Statistics	Prob.	Cross-section	Hypothesis
GDP	-1.21602	0.1120 4	null: not rejected
Diff_GPD	-3.04986	0.0011 4	null: rejected
CPI	5.35204	1.0000 4	null: not rejected
Diff_CPI	-2.26525	0.0117 4	null: rejected
UN	5.95359	1.0000 4	null: not rejected
Diff_UN	-5.62575	0.0000 4	null: rejected
EXP	-4.19358	0.0000 4	null: rejected
Diff_EXP	-1.21612	0.1120 4	null: not rejected

Fixed-Random and Pooled Regression Model

This section gives a snap shot of the pooled, random and fixed regression model. The table 1.3 highlights that there is negative and significant relationship between economic growth and unemployment. In the pooled regression and random regression, it shows that 1% increase in GDP growth rate will reduce the unemployment rate by 1.377110% and it is significant. Moreover, in the fixed regression model, it upsurged to -1.599199.

Table 1.3

Variable	Coefficient	Std. Error	t-Statistics	Pro.	Obs.
Pooled regression					
C	4.871947	1.902469	2.560855	0.0144	43
CPI	0.043957	0.025973	1.692387	0.0985	43
UN	-1.377110	0.613706	-2.243923	0.0306	43
EXP01	0.035347	0.037517	0.942168	0.3519	43
Fixed Effect					
C	4.518470	1694405	2.666699	0.0114	43
CPI	0.053324	0.023639	2.255776	0.0303	43
UN	-1.599199	0.543090	-2.944629	0.0056	43
EXP01	0.022319	0.031533	0.707794	0.4836	43
Random Effect					
C	4.871947	1.589921	3.064269	0.0039	43
CPI	0.043957	0.021706	2.025077	0.0497	43
UN	-1.377110	0.512884	-2.685035	0.0106	43
ECP01	0.035347	0.031354	1.127380	0.2665	43

Wald Test

Wald test is used to select method between pooled and Fixed-Random Method. If the p-value is less than 0.05 then we conclude that Pooled method is appropriate for this study, otherwise we reject pooled method and choose random or fixed effect. In table 1.4. the estimated result is presented, which shows that the p-value i.e., 0.3731 and it is above the value of 0.05, therefore, it shows the pooled method is inadequate for this study.

Table: 1.4

Wald Test

Test Statistic	Value	Df	Probability
t-statistic	-0.905674	27	0.3731
F-statistic	0.820246	(1, 27)	0.3731
Chi-square	0.820246	1	0.3651

Hausman Test

Hausman test is used to check which method i.e., fixed and random effect is appropriate for the study, therefore, we run Hausman test. To test Hausman test, we need to check the null hypothesis. If the p-value is less than 0.05 then we reject the null hypothesis and the fixed effect model would be most appropriate method. On the other hand, if the p-value is greater than 0.05, we will fail to reject the null hypothesis and we will go with random effect model.

In our case, the estimated result shown is the table 1.4 shows that the p-value is less than 0.05, which is 0.0002, hence, we reject the null hypothesis and conclude that Fixed-Effect model would be more appropriate method for our study.

Table 1.5

Correlated Random Effects - Hausman Test				
Test cross-section random effects				
Test Summary		Chi-Sq Statistic	Chi-Sq. d.f.	Prob.
Cross-section random		19.840382	3	0.0002
Cross-section random effects test comparisons:				
Variable	Fixed	Random	Var(Diff.)	Prob.
UN	-1.599199	-1.377110	0.031897	0.2137
CPI	0.053324	0.043957	0.000088	0.3170
EXP01	0.022319	0.035347	0.000011	0.0001

Fixed Effect Model

Hausman test indicated that Fixed effect model is most suitable model for our study, table 1.5 gives the snapshot of fixed effect model. This highlighted that Unemployment rate is inversely related with economic growth in case of four South-Asian countries i.e., Pakistan, India, Bangladesh and Sri-Lanka. The estimated result adduces that a 1% increase in GDP growth rate decreases the unemployment rate in the aforementioned countries by 1.599199% and it is highly significant i.e., p-value = 0.0056.

This estimated result verifies Okun's law in case of Pakistan, India, Bangladesh and Sri-Lanka

Moreover, this study also supports the previous research of (Uddin & Rahman, 2023). Furthermore, it further tells that inflation rate and economic growth have direct relationship for these countries. This estimated result indicated that 1% increase in inflation rate incites the GDP growth rate by 0.053324 percent and it is statistically significant. Besides, the estimated result also shows that there is direct positive relationship between economic growth and export rate but it is insignificant, therefore, it is not important to explain this relationship.

The R-Squared shows the goodness of fit of regression model. In this study its value is 0.461131, which means that 46 % fluctuation in GDP is happened due to variation in the independent variables and the rest of the 54% is happened due to other factors that is not explained or included in our model. The F-statistics i.e., 5.134428 and p-value i.e. 0.0006 gives evidence of model is statistically significant. The constant (C) in this study , which have co efficient value (4.518470) and p-value which is (0.0114) indicating that there are some external factors which is not included in this study (other than inflation, export, and unemployment) which shares to the baseline of growth.

Table.1.5

Dependent Variable: GDP				
Method: Panel Least Squares (Fixed Effect Model)				
Date: 08/03/23 Time: 11:28				
Sample: 2010 2020				
Periods included: 11				
Cross-sections included: 4				
Total panel (unbalanced) observations: 43				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.518470	1.694405	2.666699	0.0114 ***
dCPI	0.053324	0.023639	2.255776	0.0303 ***
dUN	-1.599199	0.543090	-2.944629	0.0056 ***
dEXP	0.022319	0.031533	0.707794	0.4836

Cross-section fixed (dummy variables)

R-squared	0.461131	Mean dependent var	5.591320
Adjusted R-squared	0.371319	S.D. dependent var	2.070595
S.E. of regression	1.641762	Akaike info criterion	3.977318
Sum squared resid	97.03379	Schwarz criterion	4.264025
Log likelihood	-78.51233	Hannan-Quinn criter.	4.083046
F-statistic	5.134428	Durbin-Watson stat	1.097042
Prob(F-statistic)	0.000670		

Heteroskedasticity test

The Breusch-Pagan -Godfrey is used to check the Heteroskedasticity test, and the null hypothesis is that there is no heteroskedasticity in this model. The p-value is used to check the null hypothesis, if the p-value is above 0.005, then we will have not enough evidence to reject the null hypothesis and we accept the null hypothesis of no heteroskedasticity. On the other hand, if we have p-value less than 0.05 then we have enough evidence of rejecting null hypothesis and we accept the alternative hypothesis i.e., there is heteroskedasticity in this model. In this study table 1.6 gives the overview of Heteroskedasticity test, which show that the p-value i.e., 0.3891 and is above than 0.05 explaining that we don't have enough evidence to reject the null hypothesis, therefore, we accept the null hypothesis of no heteroskedasticity.

Table. 1.6

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	1.031857	Prob. F(3,39)	0.3891
Obs*R-squared	3.162080	Prob. Chi-Square (3)	0.3673
Scaled explained SS	2.778193	Prob. Chi-Square (3)	0.4271

Breusch- Godfrey Serial Correlation LM Test

Breusch-Godfrey Serial Correlation LM Test is used to check the availability of serial correlation or auto-correlation in the model. The null hypothesis is that there is no serial correlation and the alternative hypothesis is that there is presence of auto-correlation in this model. Also, if the p-value is less than 0.05 then we reject the null hypothesis and accept the alternative hypothesis. Table 1.7 gives simple view of this estimation for serial Correlation LM test, showing that F-statistics = 1.947382 and p-value is 0.1771, indicating that the p-value is higher than 0.05 and we don't have sufficient evidence of rejecting the null hypothesis, therefore, we accept null hypothesis of no serial correlation in this model.

Table. 1.7

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	1.947382	Prob. F (2,15)	0.1771
Obs*R-squared	4.328715	Prob. Chi-Square (2)	0.1148

RAMSEY RESET TEST

The RAMSEY RESET TEST indicates that the inclusion of non-linearities can enhance the result accuracy of our model. The null hypothesis indicates that there is no need to include the non-linearities because the model is already fit or the alternative hypothesis is that there is need to include some non-linearities in the model which might improve the accuracy of the regression result. Table 1.8 gives the out look of the test which highlights that p-value is greater than 0.05 and we don't have sufficient evidence to reject the null-hypothesis, therefore, we accept the null hypothesis that addition of non-linear terms in the independent variable improves the significance of the model fitness.

Table 1.8

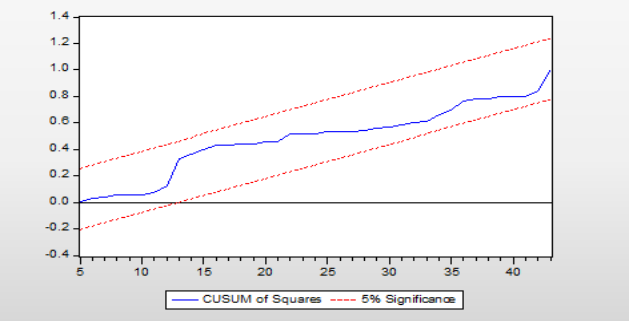
Ramsey Reset Test

	Value	Df	Prob.
t-statistic	1.396151	38	0.1708
F-statistic	1.949238	(1, 38)	0.1708
Likelihood ratio	2.151008	1	0.1425

Granger Causality Tests

This test is used to detect whether the lag value of one variable may predict the future value of other variables such as GDP, export, inflation and unemployment in our case. The null hypothesis is

that the first variable does not Granger Causes the 2nd variable, so if the p-value is less than 0.05 then we ca not reject the null hypothesis, but if it is less than 0.05 then we reject the null hypothesis and accept the alternative hypothesis. The table 1.9. gives the results of Granger Causality Tests, for the first cause, the null hypothesis states that "CPI does not Granger cause GDP", the f-statistic is 3.78338 and p-value is 0.0274 which is less than 0.05, so we reject the null hypothesis and conclude that past value of CPI can cater forecasting information for GDP. On the other



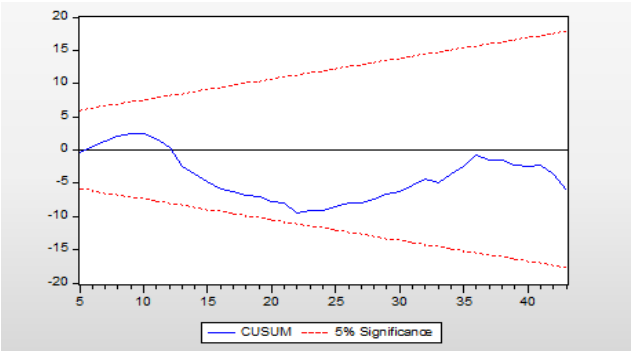
hand, for the null hypothesis i.e., GDP does not Granger cause CPI" the f-statistic is 0.785 and p-value is 0.5795, which is greater than 0.05, hence we can not reject the null hypothesis and accept that the past value of GDP can not provide predictive information for CPI.

Table. 1.9

Null Hypothesis:	Obs	F-Statistic	Prob.
DIFF_GDP1 does not Granger Cause DIFF_CPI	23	0.78548	0.5795
DIFF_CPI does not Granger Cause DIFF_GDP1		3.78338	0.0274
DIFF_UN does not Granger Cause DIFF_CPI	23	0.91938	0.5010
DIFF_CPI does not Granger Cause DIFF_UN		-2.37666	1.0000
EXP01 does not Granger Cause DIFF_CPI	23	0.38594	0.8491
DIFF_CPI does not Granger Cause EXP01		0.76370	0.5930
DIFF_UN does not Granger Cause DIFF_GDP1	23	4.90215	0.0113
DIFF_GDP1 does not Granger Cause DIFF_UN		-2.38464	1.0000
EXP01 does not Granger Cause DIFF_GDP1	23	3.31289	0.0414
DIFF_GDP1 does not Granger Cause EXP01		0.71426	0.6246
EXP01 does not Granger Cause DIFF_UN	23	-1.77237	1.0000
DIFF_UN does not Granger Cause EXP01		2.79953	0.0668

CUSUM & CUSUMSQ

The result of both CUSUM and CUSUMSQ are showing that our selected model is stable.



Johansen Cointegration Test

This test is used to check the long-run relationship between dependent and independent variables. The null hypothesis states that there is no cointegration exists between variables and the alternative hypothesis shows that there exists cointegration between variables. The Panel v-statistic and Panel PP-statistic which have p-value of 0.0046 and 0.0048 rejects the null hypothesis of no cointegration and accepts the alternative hypothesis i.e., there exits cointegration between variables.

TABLE 2.2

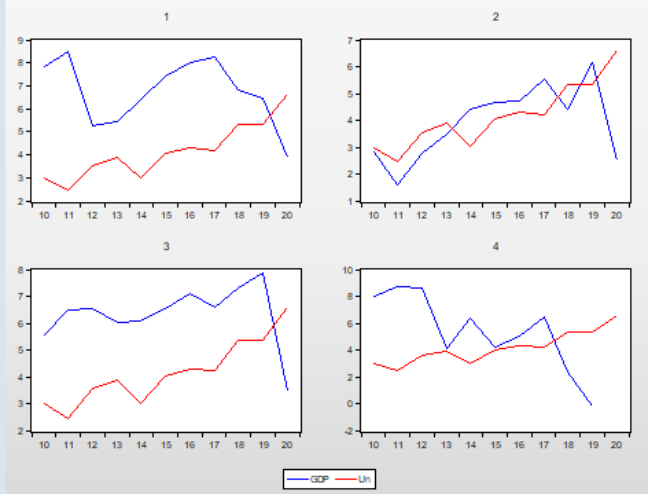
Pedroni Residual Cointegration Test

	Statistic	Prob.
Panel v-Statistic	**1.658260**	**0.0486**
Panel PP-Statistic	**-2.591477**	**0.0048**

Graphical Representation of Individual Countries GDP & Unemployment rate:

In this given table 2. It gives clear snap shot of India (1), Pakistan (2) , Bangladesh (3), Sri-Lanka (4) . It also shows that whenever, there is increase in GDP growth, it unemployment rate in these countries go downward and vice versa. We can clearly see that during covid-19 in 2020, the economic growth rate decrease, resulting the sharp increase in the unemployment rate in these countries. On the y-axis there is GDP growth rate in percentage and on the x-axis, there is time period which ranges from 2010 to 2020.

Table 2



Discussion and Conclusion

The study aims to examine to verify Okun's law i.e. negative relationship between Unemployment and Economic Growth for four South-Asian countries like India, Pakistan, Bangladesh and Sri-Lanka. The data was collected from World Bank for the period of 2010-2020 and is analyzed with the help of EViews Statistical package. The result shows that the unemployment rate has negative and significant effect on economic growth, which are in align with many previous researchers. Moreover, it also highlights, inflation rate has positive relation with economic growth, many of the previous researcher such as (Mallik & Chowdhury, 2001) found a positive relationship between economic growth and inflation for South-Asian countries, but some researchers such as (Aydın, et al., 2016), (Ekinci, et al., 2020) have set threshold point of 4.182% and 7.97% respectively, above this threshold point there will be a negative relationship between inflation and economic growth i.e. inflation will be negatively affecting the economic growth above this point. The Johanson cointegration test indicates that there is long-run relationship between the dependent and independent variables.

Our estimated result indicated that the result is in line with (Soylu, et al., 2018) and (Uddin & Rahman, 2023) which used panel data analysis for East-European countries and 79 developing countries and determined the relationship between unemployment and economic growth for the year 1992-2014 and 2002-2018. Their estimated outcomes show that there is a significant and inverse relationship between unemployment and economic growth. Our estimated result Pooled, fixed and random effect model , showing that there is a negative relationship between them. For the selection of model we tested different kind of tests like Wald Test and Hausman Test: which shows that the fixed effect model would be the most appropriate method for this study. Therefore, in the light of fixed effect model, we determined that there is negative and significant association between Economic growth and Unemployment in case of Pakistan, India, Bangladesh and Sri-Lanka. This study is important because in these developing countries both India and Bangladesh economy is burgeoning rapidly, and the economy of Pakistan and Sri-Lanka is facing many hurdles, therefore, the policy makers should formulate policies to enhance economic activities so that unemployment rate could go downward. (Upreti, 2015) and (Fouthe & Ndedi, 2017) have mentioned different determinants for 76 developing countries and for CEMAC countries, which positively affect economic growth such as an increase in export, increase in the investment rate, increases in life expectancy etc. (Nawaz, et al., 2014) examined the interest rate, FDI , literacy rate and exchange rate have positive and significant impact on economic growth. (Rahman & Alam, 2021) Highlights other factors like energy use, trade and capital have positive effects on economic growth.

Indian economy is one of the fastest growing economy in Asia, currently they are growing at the rate of 6 % , but during covid-19 their economy slipped from 7 % to -4 percent. According to the report, during 2019 and 2020 when India economy was facing covid-pandemic their economic growth topple and unemployment rate increased from 5.2 percent in 2019 to 8 % in 2020. Likewise, it is the same as in the case of Bangladesh, with the increase in the GDP growth rate, the unemployment rate in Bangladesh has decreased. Also, from the Granger Causality Tests which pointed out that there exists cointegration among some variables in our study. This means that we can predict or forecast the present value of a variable from the past value of another variables. Furthermore, the graphical representation of the variables also verifies the existence of negative relationship between unemployment rate and economic growth. Therefore, the policy makers should focus on the determinants of economic growth such as FDI, both physical and human capital, trade, export etc. which may enhance the economic growth in these South-Asian Countries and

help them to dismantle unemployment. As India and Bangladesh economy is growing very robustly in the region, but Pakistan and Sri-Lanka need to foster economic growth by determining the factors which hampers economic growth. In case of Pakistan, (AZAM & RAHMAN KHATTAK, 2009) examined the positive factors which affects economic growth positively are domestic investment, trade openness, and FDI. Besides, (AJMAIR, et al., 2018) determined that Gross fixed capital formation and remittances have positively associated with GDP growth and CPI, Gross national expenditures, domestic credit extended to private sector negatively effects growth. By keeping these things under control Pakistan can increase the GDP growth rate and reduce unemployment rate.

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