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EMPIRICAL INVESTIGATION TO EXAMINE THE EXISTENCE OF OKUN'S LAW IN SAARC REGION

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ABSTRACT

This study focused on investigating the existence of Okun's law in the SAARC region using panel data from 1990 to 2020. For empirical investigation, the study used the panel least square method. Results indicated negative but differentiated results from other studies in magnitude comparison. These findings supported many other studies in computing negative relation but is contradictory to Okun's law prediction of (1:3) as a decline in GDP by 3% due to unemployment increase by just 1%. Still, in the case of SAARC countries, one percent rise in unemployment decreases GDP by just 0.047 percent. These findings conclude that SAARC countries are labour-abundant countries and most of the labour force engaged in agro based sector with decreasing marginal productivity. These findings also draw attention towards the shifting of labour force from lower marginal productivity to higher marginal productivity i.e. from agriculture to industry and hence total factor productivity.

Key Words: *Okun's law, Unemployment rate, Economic Growth, SAARC countries*

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1. BACKGROUND OF THE STUDY

Okun's law explains the inverse and proportional relation between rising unemployment and declining growth rate. Okun's law was presented by an American economist Arthur Melvin Okun in 1961, and he numerically calculated the proportional relationship between the rise in unemployment and the decline in gross domestic product. He depicts that ratio as 1:3 which says that if unemployment increases by 1% then RGDP decreases by a proportion of 3%. If unemployment decreases by 1%, then RGDP increases by a proportion of 3%. Most developing countries are thought to experience a major issue with unemployment, which exacerbates socioeconomic issues. The high unemployment rate in Jordan, which has maintained an upward trend throughout the years, is acknowledged as one of the country's biggest economic challenges today. Additionally, the percentage of jobless people was reported to be 24% in a study by the National Statistical Department (2020). In the case of Pakistan, the relationship was found but having a very low intensity between the rise in unemployment and the decline in economic growth rates. Causality test results confirmed the one-way causal association between unemployment to GDP for the period 1972 to 2019 (Latif et al., 2021).

According to Samuelson and Nordhaus (1995), there is an inadequacy of Okun's prediction of (3:1) and they indicated that the (2:1) combination is likely to be more precise and accurate in many developing and developed countries. Okun's predictions have been found inaccurate during the last three recessions because unemployment doesn't fall as he predicts. Empirical analysis from international data also confirmed the contradictory findings from Okun's prediction (Cazes et al., 2011). Research institutions also found that this relationship became weak during the Great Recession of 2008-09 when the effects of these shocks were transferred from one country to another in terms of output and unemployment (IMF, 2010).

Developing countries have been facing the problem of rising unemployment rates in the last two decades but due to the global financial crisis, even developed countries were caught up in the same situation. However, the attainment of full employment level is one of the primary macroeconomic goals of the stakeholders, which cannot cause optimum utilization of resources. As a result, there is a significant risk to the nation, as forty percent of people who became a part of terror organizations claimed that their motivation was unemployment in a 2011 survey by the World Bank. Unemployment also serves as a stimulant for 50% of people engaged in criminal activity (Seth, 2018). Despite expansion, the Jordanian economy is still a developing economy having lower per capita income and higher unemployment rates (Kasasbeh, 2021). The inverse relation between output and unemployment is empirically investigated by Okun's law is the backbone for macroeconomic Okun's law and Philips curve jointly derive long-run aggregate supply curve. This proportional association is of prime importance for policymakers. They are interested in finding out how much percentage of output growth is required to decrease a certain level of unemployment.

Furthermore, the efficiency of disinflationary measures is independent of the sensitivity of the unemployment level due to fluctuations in total productivity. Developing countries are already facing rising unemployment rates and this situation has driven attention for policymakers to create employment opportunities either by enhancing economic growth or any other possible measure. Unemployment results in several costs not limited to their

self but also their families and society in the form of crime ratios and other moral hazards (Gordon, 2003). The prevalence of jobless progress in any economy will go contrary to the intention of Okun's law. Numerous studies on the global nexus between unemployment level and declining economic growth have demonstrated the existence of this contradictory relationship; some studies have found a positive relationship while others have found an adverse relationship. Alhdiy et al., (2015) examined the empirical analysis in the same nexus.

This study intendeds to analyze the prevalence of Okun's law in the SAARC region. The selection of SAARC countries is important for two reasons. First, SAARC countries are developing and lab our abundant countries with a majority of the labour force engaged in the agriculture sector with the lowest marginal productivity. Second, SAARC countries have faced a declining growth rate due to the financial crisis that started in 2009 and almost affected the globe but didn't severely affect the unemployment rate in comparison to GDP growth.

2. LITERATURE REVIEW

There is a lot of existing work on the validity of Okun's law. Lal et al., (2010) studied Okun's co-efficient and he also explored the legitimacy of Okun's law in some Asian economies from 1980 to 2006. They have used Granger's (1987) co-integration technique and determined that the law is not applicable in some emerging economies like Bangladesh, Sri Lanka, India, Pakistan, China, and Nepal because of asymmetric problems. Ghosh et al., (2010) have analyzed the relevance of this law in the context of Bangladesh during the period (1984-2010). Results from the co-integration technique indicated that there exists an inverse relation between unemployment and output level in the long-run case of Bangladesh. Okun's coefficient is 1.12% demonstrating that 1% decline in the unemployment rate is complemented by a 1.12% rise in GDP. Soylu et al., (2018) explored the connection between the unemployment rate and economic growth using annual data from 1992 to 2014. The relationship between the unemployment rate and the level of economic growth in Eastern European countries is then examined using Pooled Panel OLS and Panel Johansen Co-integration tests. Results showed that economic expansion imposes a positive effect on unemployment. According to Okun's coefficient, for nations in Eastern Europe, a 1% rise in GDP growth declines unemployment rate by 0.08 percent. These essential macroeconomic variables co-integrate.

Hussain et al., (2010) investigated Okun's co-efficient and examined the applicability of Okun's law in selected Asian countries for the period 1980 to 2006. They have used the Engle-Granger Co-integration technique and concluded that the interpretation of Okun's law is not applicable in most of the developing labour-abundant countries. Several Asian economies (Korea, China, and Singapore) are good examples over the globe that succeeded gradually in overcoming the problem of unemployment. Many other countries (America, Europe, and Japan) are investing in those regions spontaneously.

Kreishan et al., (2011) have investigated the association between the unemployment rate and the level of real economic growth using Okun's law. They have used time series data for the period of 1970 to 2008. Simple OLS regression results indicated that Okun's law cannot be validated for Jordan. Thus, it can be concluded that the lower level of economic growth in Jordan is not only result because of the higher unemployment rate. Altunöz

(2019) applied panel integration techniques and panel error correction to evaluate the existence of an association between economic growth and the level of unemployment in the European economies in the context of Okun's Law for the years 2000–2012. For all the study's participating nations, employment hysteresis was investigated using numerous non-stationary panel root unit tests. The analysis' findings imply that the Okun law is true. Khalil et al., (2011) have tested the relevance of Okun's law in developing economies using two versions of law. They have used panel data from (1947-2009) on the growth of GDP and unemployment. They have used a simple ordinary least squares (OLS) method to obtain the coefficient of Okun's law. This study contradicts other studies by justifying the non-existence of Okun's law in developing economies either through different versions or through gap versions. Zaman et al., (2013) have studied the nexus between unemployment level and economic growth in SAARC countries from 1990 to 2010. Data is explored by panel co-integration technique, fully modified OLS, and dynamic DOLS for assessing long-run relationships among selected variables. This study shows some estimates for unemployment levels in some SAARC countries. The relationship between GDP and unemployment varies. By investigating the impact of the output gap on unemployment level and the influence of economic growth in creating job opportunities. Louail and Riache (2019) examine Okun's law in Saudi Arabia from 1991 to 2017 using the (ARDL) bounds testing approach. Findings showed that Okun's law holds true in Saudi Arabia. Khan et al., (2013) have explored the nexus between real GDP growth and unemployment rate following Okun's law. The study uses annual data for the period 1976 to 2010. They have used the Hodrick-Prescott filter, unit root test for stationarity and simple least squares method for regression analysis. Empirical analysis shows that a rise in the 1% unemployment rate is linked with a decrease in GDP growth by 0.36 percent.

Raza et al., (2014) work on empirical validity of Okun's law in Pakistan. Using time series data for real GDP and the unemployment rate for the period 1972 to 2012. To calculate Okun's coefficient they have used three Descriptions of this law i.e. gap version, difference version and dynamic version. OLS results confirmed negative but contradictory results as per Okun's predictions. Similarly, Amor and Hassine, (2017) conducted the empirical investigation for Saudi Arabia using the ARDL model. They have found that the GDP and unemployment comparison is clearer in response to the gap model than the difference model. Findings confirmed that one percent increase in gross domestic product significantly decreases unemployment by 0.54 percent. Al-Sawaie (2020) investigated the connection between the unemployment rate and economic growth in Jordan from 1976 to 2018. The (ARDL) method and Causality test were applied. Unemployment was found to have a negative connection with GDP, which is consistent with the findings from Okun's law. Additionally, he pinpointed the direction as well as the magnitude of the relationship between economic growth and the level of unemployment in the long run and the causality test confirmed the bidirectional relationship.

Developing countries face the challenges of higher unemployment and lower GDP growth rates simultaneously. Nurudeen (2017) conducted an empirical analysis of Nigeria from 1970 to 2014. Using the ARDL model for the empirical analysis, findings showed that a 1% rise in the unemployment level rate reduces GDP growth by 0.18 % in the long run. Similarly, Bande and Martín-Román, (2017) computed an empirical investigation on regional data in Spain from 1980 to 2015. Findings showed an asymmetric relationship

with high magnitude for the growing periods. Neifar. M (2020) conducted an empirical analysis of the GDP and unemployment nexus in Arabic countries for the period 2000 to 2014 using a non-linear (NARDL) model. First, linear model results confirmed the opposite relation between unemployment and total output except in Oman. The Non-linear (NARDL) model found that positive shocks of economic growth impose higher effects on unemployment than negative shocks.

In the existing work, some researchers have found the results closer to Okun's predictions while others found contradictory results. This study aimed to conduct an empirical investigation of SAARC countries using the recent data and better estimation techniques. It is important to be addressed because the crisis of 2008-09 hampered the growth and employment level of the countries and more recently coronavirus destroyed the economies with higher unemployment and reduced growth pattern of the economies. Both these tenures have been captured in this analysis to draw a clearer picture that might be helpful for policymakers to initiate towards betterment.

3. DATA AND METHODOLOGY

Following the gap version of Okun's law, there is an inverse relation between unemployment and output expressed as (Yp-Y)/Yp, where Yp represents the probable output at the level of full employment and Y is the total real output level and un represents the variation of real unemployment level and U represents the natural rate of unemployment. It is convenient to address because Okun's law considers a constant level of output and a natural unemployment rate.

Econometrically, it is more convenient to use macroeconomic variables having similar origins and dimensions. Therefore, we used real GDP growth in annual G and wrote Okun's law as follows:

$\Delta U = a + b\ \Delta \ln G$ ---------- (1)

Where Δ represents the change in unemployment rate per unit of time (Per Year) and Δ ln G indicates per unit change in economic growth rate, a and b are the coefficients. This law states that b < 0 which is easy to interpret because unemployment goes on to increase when GDP tends to be very low or negative.

When integrated between current and previous time, equation (1) can be rewritten as:

$ut = u0 + b\ln [Gt / G0] + a(t-t0) + e$ ---------- (2)

Where ut represents unemployment over time t. Intercept e=0, as clarified for t=t0. This is the modified form of Okun's law that links the initial rate of unemployment Uo and the current rate of unemployment Ut. When there is no growth, i.e., Gt/G0 =1, unemployment increases to a > 0 and decreases to a <0. It is also somehow crucial for a < 0 because the real GDP growth rate tends to be ln [Gt/G0] > -a (t-t0)/b, where b is less than zero. This scenario indicates that economic growth might result in decreasing unemployment and for poor economic growth unemployment may increase. The following econometric model is constructed based on literature and theoretical support:

$Y_{it} = \beta o + \beta_1 UNE_{it} + \mu_{it}$ ---------- (3)

Where:

Yt=Gross Domestic product over the time "t"

Unempt=Unemployment over the time "t"

Gross Domestic Product is measured as GDP as growth rate annual percentage and unemployment is measured as percentage of jobless people out of total population. Data for these selected variables have been taken from WDI for the period 1990-2020.

4. FINDINGS OF THE STUDY

This chapter represents the discussions of our empirical findings based on panel data for 7 countries and 31 years for the time span 1990 to 2020. The panel data model is estimated by using PLS (panel least square). The study then proceeds with the interpretations of results obtained through PLS for selected SAARC regions. Recently (Chenini et al., 2023; Alkasasabeh 2022 and Tumanoska 2019) conducted similar analyses for different countries and regions using similar variables. This dimension is more important particularly for labour-abundant countries because if the marginal productivity of labour is too small, therefore can be shifted from agriculture to industrial sector to increase total factor productivity and particularly for the attainment of economy of scale.

4.1. Stationarity Test

This test is applied to examine the stationarity characteristics of data. If it is not stationary either at the level or at the difference, if we run estimates, it may give spurious results. There are numerous tests to check the stationarity of data including the augmented Dickey Fuller test (ADF), Philips and Peron test (PP), Levin Lin Chu (LLC), LM Pesaran and Shin test. We used Levin Lin Chu (LLC) and Pesaran and Shin (LPS) test to check the stationarity of our data. The results are written in the table.1

Table.1 Stationarity test

Variables	level Form	
	LLC(Statistic)	IPS(W.stat)
Y(HP)	-3.85*	-2.15784*
	(0.0001)	(0.0155)
Unemp	-6.46643*	-9.05*
	0.0000	0.0000

Note. *, ** denotes significance at 1% and 5% level. P-values are given in parentheses.
The probability values show data is stationary at the level. Unemp and Y (HP) represent unemployment and growth rate. HP refers to Hodrick-Prescott, the quadratic trend filter. LLC and IPS represent Livin, Lin & Chu and Im, Pesaran & Shin unit root tests respectively (Mohammad, 2016 and Al-Sawaiea's 2020).

4.2. The Hodrick-Prescott filter

The Hodrick-Prescott filter is a statistical inference method that is typically used to separate the time-varying cyclical component from the raw data to identify business pattern strategy. Usually, this filter is used to attain a smoothed-curve reflection of a period sequence of raw data that is more sensitive to long-term variations than in the short-term. Equation for HP filter (Hodrick, 1997) is written as:

$$\min_r(\sum_{t=1}^{T}(Yt-\tau t)^2+\lambda\sum_{t=2}^{T=1}[(\tau_{t+1}-\tau_t)-(\tau_t-\tau_{t-1})]^2 \quad \text{---------- (4)}$$

This filter is used to examine graphically the fluctuations in variable of interest i.e. (GDP) in our study. This table shows the results using HP used for smoothing the panel data based

on 7 countries and 31 years over the period of 1990 to 2020. This graph shows variation in GDP in the Selected SAARC region. In the graph, the GDP of Nepal was the lowest, and the Maldives was the highest over time.

Figure 1: Hodrick Prescot Filter

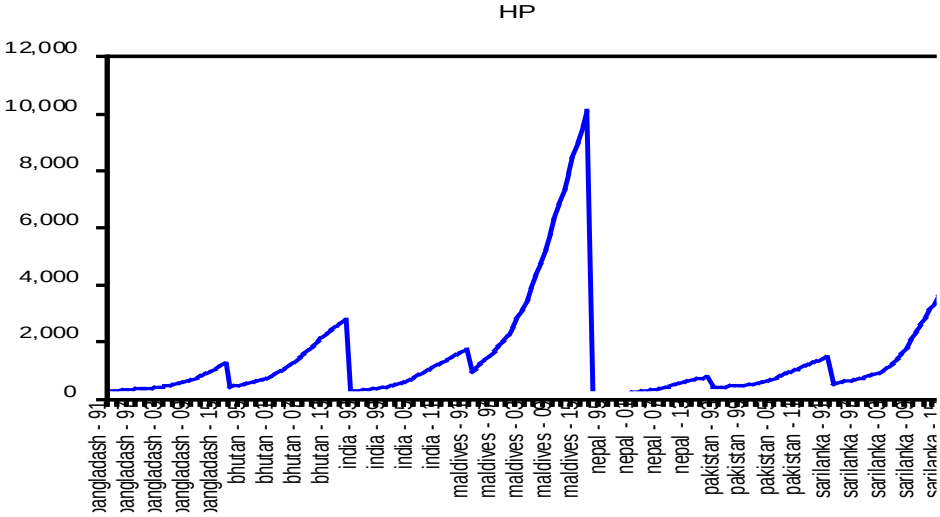


Table.2 Panel Least Squares Estimates (SAARC region)
GDP Growth annual percentage as the dependent variable

Variables	Coefficients
Unemployment rate	-0.047*
	(0.000)
Constant	6.987*
	(0.000)
R-square	0.98
Adjusted R square	0.98
Statistics	47.55 (0.000)
DW statistics	0.222
Total Observations	217

Note: * denotes significance at 1% level.

$Y_t = 6.987 - 0.047_t + \mu_t$

Table 4.4 shows the estimated results of our sample. The results reveal that a 1% increase in the unemployment rate will decrease GDP by 0.047% at 1% level of significance. Our results computed the negative relationship between GDP and the unemployment rate in the SAARC region but the ratio (3:1) does not exist as Okun has predicted by previous

studies (lal *et al.* 2010; Mohammad, 2016). The reasons for the negative impact in developing economies like Pakistan, Nepal, India, Bhutan, Sri Lanka, Bangladesh, and Maldives is that these countries are labour-abundant countries and the majority of the labour force is engaged for a job in the agriculture sector with lower marginal productivity. These findings are consistent with (Neifar. M 2020; Chenini et al., 2023; Alkasasabeh 2022). These findings have found a reverse relation between the unemployment rate and GDP growth but with different magnitudes. Most of the developing countries face the problem of rising unemployment and lower GDP growth simultaneously but still GDP growth is not much more sensitive to change in the level of unemployment. As Nurudeen (2019) conducted an analysis of Nigeria and found that one percent increase in unemployment by 0.18 percent. These findings are also contradictory to Okun's law of 1:3 proportion between unemployment and GDP growth. Our findings are also consistent with Nurudeen (2019) and Bande and Martín-Román, (2017). The magnitude of this relationship also depends on the growing period and the period of depression. Neifar. M (2020) examined that GDP shocks drive higher effects on employment levels in the long run as compared to the short run and our results are also in line with these findings.

a) Goodness of fit

R-square indicates how a model is well-fitted. It shows variations in dependent variables because of the selected independent variables. The value of multiple R is also high. The regression results indicate that the model is well-fitted because the value of R^2 is 98 percent.

(b) F-Test:

The total significance of the association between the dependent and explanatory variables is shown by the F-test value. It illustrates the association between dependent variable explained variation and unexplained variance. A maximum "F" number indicates a minimal amount of unexplained variance. A higher "f" value with a significant P-value indicates that our estimated regression is well-fitted.

Additionally, the model indicates simultaneous importance, which we evaluated using the significance of the F-statistics. (F-test = 47.55 and F sig = 0.000). The results indicate that the independent variable significantly influence the dependent variable.

5. CONCLUSION AND POLICY OPTIONS

This study focused on examining the influence of the unemployment rate on GDP in the case of SAARC countries. This study uses the panel least square (PLS) method over the time from 1990-2020. The findings of this study show that the relationship of Okun's law exists but the ratio (1:3) does not exist as predicted by Okun's (1962). Okun's law is significant because of how it affects economic policy. Nevertheless, due to asymmetry issues, our findings contradict the applicability of Okun's Law in some emerging nations. One may argue that underdeveloped nations may not be able to use Okun's legal interpretation. Many developing economies particularly in Asia are the bright example in the World that successfully overcome higher unemployment rates by investing and expanding their sectors other than agriculture. Korea, Malaysia, China, and Singapore are examples of these countries. Although having huge population and higher population growth rates, these have ensured domestic food security as well as expanding their investment from agriculture to industries. This transition initiated their labour force

participation with higher marginal productivity in different sectors and ultimately the attainment of a higher economic growth rate. If SAARC countries didn't shift their economies from agriculture to industries, their skilled and unskilled labour force would be unable to participate more in their economic growth. Many American, European, and Japanese economies are expanding their sectors and utilizing the potential of their skilled labour force. Moreover, investing in the labour force to make them skilful in the form of education and technical education, labour force didn't seem a burden on economies rather they contributed in nation's total output.

The following are some policy implications derived from the findings of the study:

- The governments of the SAARC region should put emphasis on various policies to utilize the potential of the labour force in sectors other than agriculture having lower marginal productivity and lower contribution to total productivity or economic growth of their economies.
- These findings also pay attention to improving the skills of the labour force. Most of the SAARC countries are labour abundant and even unskilled labour force making less contribution to the country's progress. The contribution of a skilled labour force can be significant in increasing economic growth in developing countries.
- Stakeholders in SAARC countries must think about the provision of job opportunities particularly to its skilled labour force to stop the brain drain as well as to contribute to their own economic progression.
- The provision of job opportunities to the skilled labour force can be a greater motivation for the unskilled labour force to move towards education and technical education to secure their future as well as to participate in their nation.

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