International Journal of Humanities Arts and Business (IJHAB)
ISSN: 2709-0604
Volume-01, Issue-02, pp-31-39
www.ijhab.com

Research Paper Open Access

The Validity of Okun's Law in Bangladesh Economy: Is Bangladesh Heading towards a Jobless Growth?

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Citation: Haque, R. U. (2022). The Validity of Okun's Law in Bangladesh Economy: Is Bangladesh Heading towards a Jobless Growth? *International Journal of Humanities Arts and Business (IJHAB); Vol-I, Issues-I.*

ABSTRACT : *A veteran American economist named Arthur Melvin Okun, while working with US data in 1962, found out empirical evidence between two extremely important macroeconomic variables- unemployment and real output. Since his discovery, this empirically observed relationship became widely popular as Okun's Law. The Gap Version of the law states that for every percentage increase in economy's unemployment, the output of the economy will be additionally 2 percent lower than economy's potential output. The Difference Version of the same law examines the relationship between the aforementioned variables based on quarterly changes. Subsequent to Okun's first observation, there were many attempts to check the validity of the law among many economists across the globe. These endeavors to check the validity of the law in advanced economies to emerging economies have led to multiple discussions. In many cases, it was observed that, the law seems to work in the advanced economies more than the not-so-advanced economies. This paper aims to check the validity of Okun's Law in Bangladesh economy. In order to examine the relationship, the paper obsereved 26 years of time series data for unemployment and output and examined the relationship between these two variables through OLS Regression. The paper observed the relationship from two approaches- the Gap Version and the Difference Version of the law and found out the Okun's Coefficient in Bangladesh economy. In both approaches, the results showed that the in Bangladesh economy, the negative relationship exists, which aligns with the law; however, the value of the coefficient is insignificant, which is insinuating to the event that Bangladesh economy might be experiencing a jobless recovery.*

Keywords- Validity, Jobless, Okun's Law

I. INTRODUCTION

In macroeconomics, Okun's Law is a widely known empirically observed relationship between unemployment and real GDP. The law, which is named after the person who proposed the relationship (Arthur Melvin Okun) states that there is a negative relationship between unemployment rate and real GDP. In 1962, Okun used economic data of the US to show the empirical relationship between these two indicators. Since his observation from the data, the law turned out to be a rule of thumb across the world to analyze the relationship between economic growth and employment, since these two factors hold utmost importance for economists to understand the economy as a whole. The Gap Version of the law states that, for every 1 percent unemployment increase, economy's real output will be an additional 2 percent lower than its potential output. To be specific, the ratio between unemployment and real output can be shown as 1 to 3. If we delve into the concept a little more, the relationship is basically an inverse relationship between the cyclical fluctuations in output gap and unemployment gap; where the coefficients might vary from economy to economy and can be different in different times.

If we look at the problem from a statistical point of view, the law is a statistical relationship between real gross domestic product and unemployment which depends on the regression. The regression results might vary across different countries i.e. the coefficient might take different values for different economies since the validity of the law depends on the growth dynamics of the economy and the data used. The coefficient, which is known as Okun's Coefficient, represents the responsiveness of unemployment to output.

Over the years, Okun's Law has held significance among academics and policymakers, because of its simplicity and has provided economists with an idea about the effect of unemployment on real output. During the early sixties and seventies, the relationship suggested by Okun's Law was trusted by most economists; however, as more studies were conducted across different economies to check the validity of the law, it was found that the law does not exist in many economies. Furthermore, a few studies found that it only shows a partial relationship for a certain economy.

The purpose of this paper is to find out whether Okun's Law is existent in Bangladesh economy or not and if it does, how the relationship looks like.

II. LITERATURE REVIEW

The existing negative correlation between GDP and Unemployment widely known as Okun's Law, has a significant appeal due to its simplicity and involvement with two extremely important macroeconomic variables. Arthur Melvin Okun, the American economist, after whom the law is named; estimated that a 1% increase in a country's unemployment will result in a 3% decrease in the Gross Domestic product of a country.

Since the proposition of Okun's Law, there were many endeavors to check the validity of the law. In an earlier study during 1997 conducted by Imad A. Moosa estimates Okun's Law in four Arab countries (Egypt, Morocco, Algeria and Tunisia) and concludes that the law is not existent in four of these countries. There were many studies conducted in the beginning of 21st century as well. Soegner and Stiassny (2002) tested the validity of Okun's Law and found negative relationship between unemployment and GDP. A study by Arshad (2007) checks the validity of Okun's Law and scrutinizes the relationship between GDP and Unemployment to conclude the law's existence in Swedish economy. Another study by Ball, Leigh and Loungani (2016) has shown that Okun's Law worked in a set of 20 advanced economies. In a follow up paper, Ball, Leigh and Loungani (2016) discovered that the law fits in advanced economies twice more than in the developing economies.

In an effort to investigate both Beveridge Curve and Okun's Law, Hugh George Courtney (1991), suggested an asymmetric relationship between output and unemployment. According to Hugh Courtney, Okun's Law can be considered to be a non-linear relationship that does not hold significant continuity. As a possible reason behind the non-linearity, he indicated the instability in productivity growth in the business cycle.

Martin Prachowny (1993) conducted a study on Okun's Law with the first principal approach. The study concluded that for a 1.5% decrease in unemployment, the output increases by 1%. However, Okun's Gap approach showed different results (0.37% decrease in unemployment, 1% increase in output). According to Prachowni, Okun's Law only exhibits a partial relationship between unemployment and GDP.

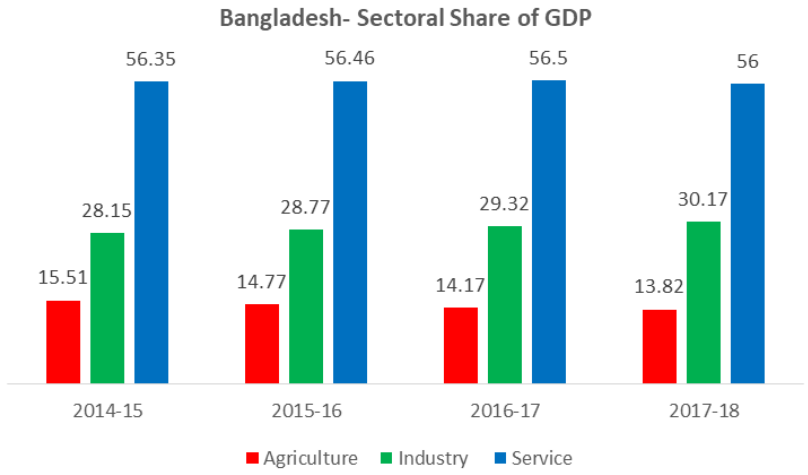
In case of African continent, a significant study was conducted by Imad Moosa during 1997. In his study, Okun's Law was non-existent in four of the selected countries (Egypt, Morocco, Algeria and Tunisia). The study used gap approach and growth rate approach for estimation.

In case of South Asian economy, a study to check empirical evidence in Pakistan's economy by Akram, Shahzad, Raja and Masood (2014) also did not find significant coefficient of Okun's Law in Pakistan's economy. The study undertook the gap version, the difference version and dynamic version to check the existence of Okun's Law in respective economy but failed to find one. According to the authors of the study, this happened due to the lower standard of the labor force therefore, increase in real output has a very low impact on unemployment. One of the most significant studies regarding Okun's Law was conducted by Lal, Muhammad, Jalil and Hussain where the authors checked the validity of Okun's Law in 5 economies out of which 4 were SA economies- India, Bangladesh, Pakistan and Sri Lanka (the other economy in this study was China). The study could not find the presence of Okun's Law in the SA countries due to asymmetry. The most interesting finding the study

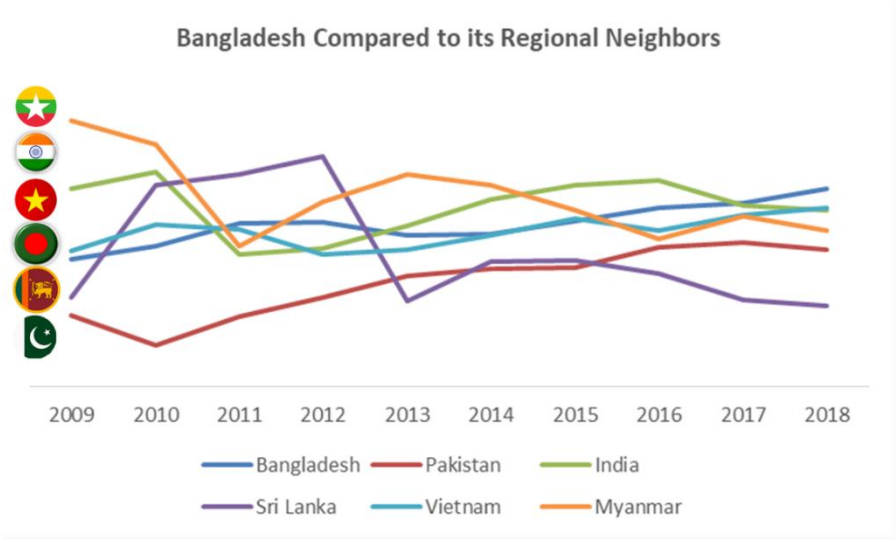
offers is finding the NRU (Natural Rate of Unemployment) due to recurring fluctuations in inflation rates. The authors came to the conclusion that Okun's Law is less likely to appear in developing countries especially the countries lying in the South Asian region.

III. BANGLADESH: A STORY OF CONSISTENCY

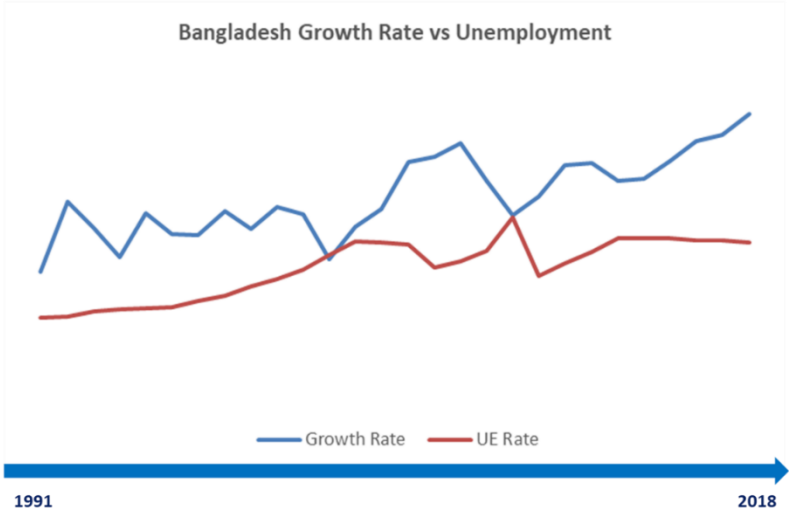
Bangladesh, a river delta from South Asia, is currently considered as one of the fastest growing economies in the world. Since its independence in 1971, Bangladesh has undergone major economic transformations over the last 48 years. Currently Bangladesh is ranked 41st among the world's largest economies. From an agriculture-based economy, the country has turned into an economy with strong industries and a thriving service sector with highest contribution to the country's total output. Just like any other economy undergoing a major structural transformation, Bangladesh is also experiencing a gradual increase in the industrial sector's contribution to the total output while the agriculture's share in the total output is declining.



The reason behind the consistent and gradual increase in the industrial sector is considered be the rise of the apparel sector, which contributes 12% to the total GDP of the economy and has helped the economy achieve an export led growth. The service sector has also remained relatively consistent over the years. Bangladesh continues to keep up the stable performance in terms of growth as well. Compared to its regional neighbors, Bangladesh has relatively remained consistent in its story of growth.



The consistent growth trajectory has led Bangladesh to register a 7+ percent growth rate. The country's economic performance in terms of industrialization, service sector enhancement, GDP growth and poverty eradication has been extraordinary; however, the country's employment is not satisfactory compared to the other performance indicators. In the last two decades, country's unemployment rate initially increased and later on had some fluctuations. If we take the recent years into consideration, for the last 7 years, country's unemployment rate stayed relatively constant around 4 to 4.4 percent.



Economic growth and unemployment, both of these indicators hold significant importance to understand the nature of the economy. The primary objective of this paper is to understand the relationship between output and unemployment in Bangladesh in the light of Okun's Law.

IV. THEORETICAL FRAMEWORK

From a theoretical point of view, Okun's Law has multiple versions of it where each of the versions have different properties in terms of approaching the relationship between unemployment and output.

The most used approaches to address this problem are the Gap Model, the First Difference Model and the Dynamic Model. In his paper published in 1962, Arthur Okun used the Gap version and the First Difference version. The Difference version takes period lags into consideration and exhibits the change in unemployment from one period to the next.

4.1 Gap Version

The Gap version of the law shows the relationship by taking potential output and the natural rate of unemployment into consideration. The Gap version expresses a connection between the change in unemployment and the economy's actual output with the potential output.

This is how the Gap version equation looks like in details:

$$Y - Y' = \beta (U - U') + \acute{\varepsilon}$$

In the left-hand side of the above equation, Y represents the actual output and Y' represents the potential output. On the right-hand side of the equation, U represents Unemployment and U' represents the Natural Rate of Unemployment (the unemployment which only includes Frictional and Structural Unemployment and excludes Cyclical Unemployment). β is known as the Okun's

Coefficient, the coefficient which represents average change in unemployment with change in the output.

4.2 The Difference Version

The Difference Version of Okun's law involves time period lag, the change in unemployment rate from one time period to the next time period. The Difference Version of the law can be shown as follows:

$$Y_t - Y_{t-1} = \alpha + \beta (U_t - U_{t-1}) + \acute{\varepsilon}$$

In the above equation, Y_t represents output in time period t and Y_{t-1} represents the output in period t-1. Similarly, U_t and U_{t-1} represents the Unemployment rate in period t and period t-1 respectively. α is the intercept term and β is the Okun's Coefficient. $\acute{\varepsilon}$ is the Error Term.

V. METHODOLOGY

5.1 Source of Data

All the data used for this study are obtained through secondary sources. The time series data for Bangladesh's GDP at Constant Prices (USD 2010) is collected from the World Bank Open Data portal. The time series data for unemployment is obtained from World Bank Open Data portal (from 1991 to 2018) and BBS Publications (1983 to 1990). The unemployment data retrieved from the WB Open Data are ILO estimates and express the unemployment rate as percentage of labor force unemployed in the economy. Although the unemployment data of Bangladesh were collected for 36 years, 26 years were taken into consideration for the study. The time period used for this study is particularly from year 1992 to the year 2018. The rationale behind using this time period is to have a solid understanding on the relationship over the last two decades. Besides, the data for unemployment before 1991 is not readily available in the secondary sources. For the convenience of measuring NRU, some data before 1991 was required and was taken from BBS Library publications.

5.2 Calculating the Potential Output

In order to conduct the test based on the Gap version, the data for potential output was necessary. Since there are no sources that for the data of potential output, the potential output was calculated from the real output. The idea is to simply extract the cyclical component from the available time series and get it out from the series. There are multiple ways to eliminate the cyclical component from a time series, however, for calculating the potential output, one of the most widely used method is calculating through HP Filter (Hedrick-Prescott Filter). In this study, the time series data for the potential output was calculated through HP Filter and the smoothing parameter (λ) used was 100. The reason behind using the $\lambda = 100$ is the suggestion from prior literature review. In a paper published in 1992, David K Backus and Patrick J Kehoe suggested that the ideal smoothing parameter for yearly time series data should be, $\lambda = 100$ and for quarterly time series data should be, $\lambda = 1600$.

5.3 Calculating the Natural Rate of Unemployment

Since the study focuses on checking the validity of Okun's Law based on the Gap version, the NRU (Natural Rate of Unemployment) needed to be calculated. In order to calculate the Natural Rate of Unemployment, the statistical method of moving average was used. For this study, 10 years moving average was used to calculate the NRU.

5.4 Using OLS Regression

In order to calculate the coefficient, Ordinary Least Squared (OLS) Method was used for the study. OLS is a tool used to estimate association between variables in a Linear Regression Model. Prior to conducting the OLS Regression, normality and stationarity check was conducted.

5.5 Coefficient Estimation- Gap Version

In order to estimate the Gap Version coefficient, the gap between Real Output and Potential Output was calculated. Similarly, the gap between Unemployment Rate and the Natural Rate of Unemployment was also calculated. Subsequent to that, the regression was run to estimate the change in percentage within the Gap framework. This can be shown as follows:

$$Y_t - Y' = \alpha + \beta\,(U_t - U') + \acute{\varepsilon}_t$$

5.6 Coefficient Estimation- Difference Version

In order to estimate the Difference Version, first lags between one period and previous period real output were calculated. Similarly, recent unemployment rate and the previous period's unemployment rate was also calculated. Application of OLS subsequent to that gives us the coefficient we were looking for.

$$Y_t - Y_{t-1} = \alpha + \beta\,(U_t - U_{t-1}) + \acute{\varepsilon}$$

VI. RESULT

The empirical results from the study involves result found from estimation through Gap Version and estimation through Difference Version.

1.1 Results from Estimation through Gap Version

Following is the Coefficient and Intercept term after estimation:

Parameter & Intercept	Value	p > | t |	95% Confidence Interval	
β	-0.4421784	0.016	- 0.7958905	- 0.0884663
α	2.354977	0.005	0.7699271	3.940026

The results from the Gap Version shows that the coefficient β is -0.4421784. The result indicates that the relationship between output and unemployment is negative. Here, the relationship is negative significant and indicates consistency with Okun's Law. However, the value of the coefficient is low indicating a weak relationship.

1.2 Results from Estimation through Difference Version

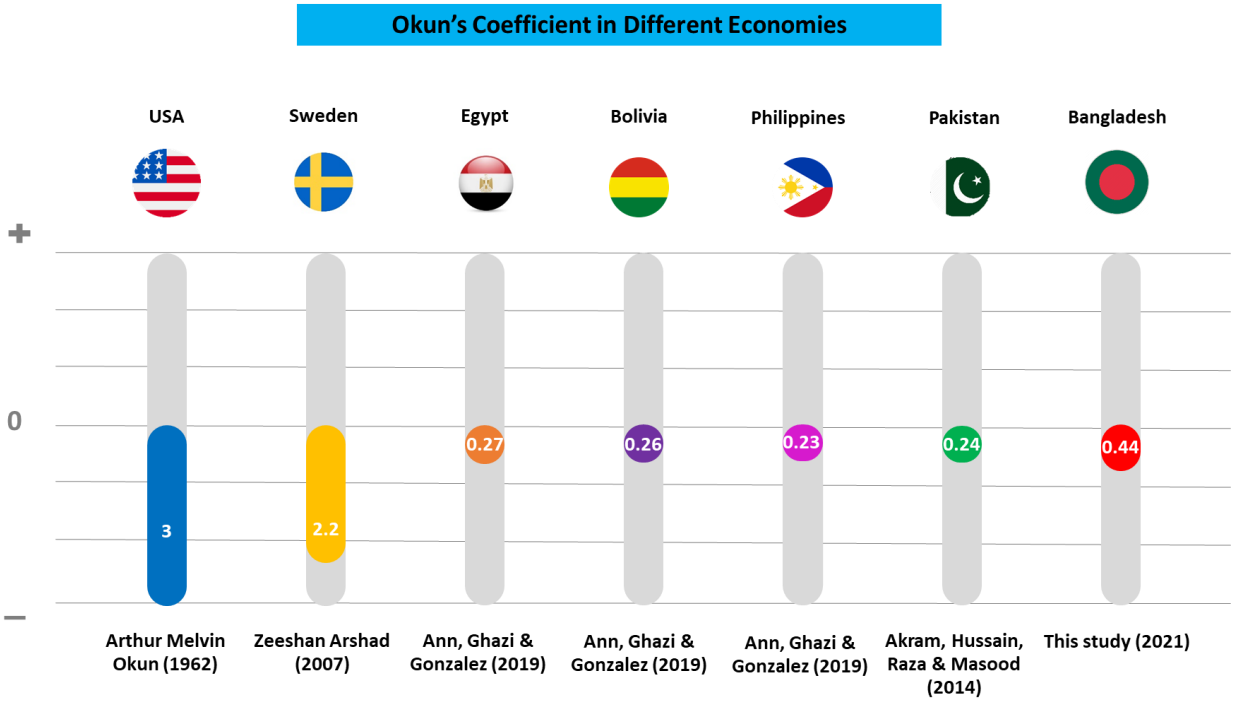
Following is the Coefficient and Intercept term after estimation through Difference Version.

Parameter & Intercept	Value	p > | t |	95% Confidence Interval	
β	-0.4693564	0.019	- 0.8559277	-0.082785
α	2.470089	0.007	0.749708	4.190471

The results from the Difference Version as well exhibits negative relationship between output and unemployment in Bangladesh economy. The value of the estimated coefficient, β is numerically close (-0.47) to the results found from Gap Version. This indicates the negative significant relationship as well and the magnitude of the coefficient is significantly low.

VII. OKUN'S COEFFICIENT: COMPARISON AMONG ECONOMIES

In 1962, Arthur Okun first discovered this negative relationship while working with US data. In the examination, Okun stated an additional 2 percent decrease in economy's actual output with a percentage decrease in unemployment (which means a 3 percent decrease in output with a percentage increase in unemployment). Since his examination, there were some attempts to check the validity of the law for multiple economies. Let us take a look at the Okun's Coefficient found in different time



for different economies.

From the look of the exhibit above, the Okun's Coefficient is fairly significant in advanced economies. In a study conducted by Arshad (2017) on Swedish economy, the coefficient had the value of negative 2.2. Another study conducted by Ball, Leigh and Loungani (2016) on 20 advanced economies, found out that Okun's Law is significantly existent in advanced economies. In a follow up paper by the same authors, the authors concluded that this law works more on the advanced economies. For all the economies that are not as advanced, the value of the coefficient is fairly low.

The possible reason behind this is how unemployment is defined in the advanced economies. Usually, in the advanced economies, the definition of unemployment is fairly strict while on the other hand, in countries like Bangladesh, the definition of unemployment is much more relaxed which indicates the stability of unemployment rate in the long-run. This low variation might be causing such a result.

For example, in an advanced economy like USA, the definition of an unemployed individual is when an individual has actively looked for jobs in the past four weeks (e.g. contacting employers, job agencies, placing job applications et cetera). Passive job searches like attending job training and reading job postings are not included. Besides, temporary laid off employees are also counted as unemployed. Also, in order to be counted as employed, advanced economies generally consider an individual to be working at least 15 hours a week. In Bangladesh, on the other hand, the definition of

unemployment is fairly relaxed. An individual contributing less than 7-8 hours a week in a household business (or sometimes even unpaid labor) is considered employed. This relaxed definition caused the unemployment rate to be consistent over the past few years despite the rapid economic growth.

VIII. DISCUSSION: IS BANGLADESH HEADING TOWARDS A JOBLESS GROWTH

In case of both Gap Version and the Difference Version, the relationship is negative significant, which is consistent with Okun's Law but the magnitude of the coefficient is significantly low, which possibly imply a jobless growth in Bangladesh economy.

Although the country's unemployment rate stayed relatively consistent within 4 to 4.4 percent over the past couple of years, the capacity of the economy to employ more people has not increased. Bangladesh economy's Employment Elasticity has decreased based on the recent reports. *Employment Elasticity*, which is a measure of the percentage change in employment with one percentage change in economic growth rate, indicates an economy's capacity to employ its population with the change in growth rate. The economy's employment elasticity, which was o.55 during the time period of 2005 to 2010; has come down to 0.25 between the years 2011 to 2018 (Source: The Daily Star). Economy's lack of ability to create jobs has raised a question about whether Bangladesh economy is experiencing a jobless growth or not. The result found from this study indicates that there is a possibility that the economy is experiencing a jobless growth, an economic situation where the economy keeps growing but the employment remains constant or decreasing.

However, this study provides only implication and cannot provide any evidence of jobless recovery. More studies with staunch models need to be conducted to figure out whether a jobless growth is actually taking place.

IX. CONCLUSION

The primary purpose of this paper was to figure out the existence of Okun's Law in Bangladesh by examining the relationship between output and unemployment in Bangladesh economy. To recapitulate, based on the examination from two different approaches (Gap Version and Difference Version), it can be concluded that, the negative relationship between these two macroeconomic variables is existent and this negative relationship aligns with Okun's Law. However, the value of the coefficient is really low due to the stable unemployment rate over a long time, the stability of this variable was possibly caused by the eased-up definition of unemployment in Bangladesh. Despite the growth over the last decade, the measure of unemployment stayed the same.

Also, the low coefficient has some implication of jobless growth taking place within the economy. According to statistics, from 2013 to 2018, economy's output grew on an average of 6+ percent adding 2.8 million new jobs on top of the baseline year (2013). This means the growth of jobs was only 0.9 percent per annum which insinuates jobless growth. The result and implications added with the decreasing Employment Elasticity could imply that the rapid growth Bangladesh has experienced over the years could not create enough employment opportunities. However, this is just an observation based implication and not a conclusion; in order to reach a conclusion whether Bangladesh is moving towards a jobless recovery, more studies should be conducted.

Author Contributions: All the sections are done by Haque. R. U.; Author has read and agreed to the published version of the manuscript.
Funding: This research received no external funding.
Acknowledgments: The author is grateful to all the contributors of the study.
Conflicts of Interest: Author declare no conflict of interest

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