



Determinants of Unemployment in Bangladesh

Submitted by

Marjahan Akter

ID-124171009

Department of Economics

A Thesis

Submitted to the School of Business and Economics

Of United International University

In partial fulfillment of the requirements for the degree

Master of Science in Economics

Supervisor: Mohammad Mokammel Karim Toufique

Asst. Professor & Coordinator

Department of Economics

United International University

Acknowledgement

At the very beginning, I would like to express my deepest gratitude to the almighty Allah for giving me the knowledge, strength and ability to finish the task properly and pursue the graduate degree. Completion of anything requires supports from various sources. I am very much fortunate to get the sincere guidance and supervision from a number of people.

I would like to express my profound gratitude to my Supervisor, Asst. Professor & Coordinator of Department of Economics for his continuous guidance, individual suggestions, constructive criticism, continuous encouragement and unfailing enthusiasm throughout the process of completion of this thesis program which helped me a lot to prepare the report in a well-organized manner. I would like to extend my sincere appreciation to all of my teachers for the individual contribution and cooperation in advancing this thesis and hereby complete my graduate program ultimately.

I would like to give special thanks and greetings to my fellow friends for giving me some required information, valuable advices and suggestions to complete the thesis in a comprehensive manner. I am grateful for the overwhelming love and endless inspiration of my mother and my entire family. I would like to acknowledge the cordial help and participation of all the above people from the bottom of my heart.

Abstract

This study investigates the determinants of unemployment in case of Bangladesh using time series data considering the period of 1991 to 2016. Variables of the study include unemployment as a dependent variable and economic growth, inflation, age dependency ratio, industry and urban population growth as explanatory variables. Simple descriptive statistics, Augmented Dicky-Fuller test and Ordinary Least Square (OLS) method have been applied in this paper. Results of Augmented Dicky-Fuller test shows that all the variables are stationary at level except urban population growth. Then urban population growth became stationary after taking the first difference of this variable. The OLS estimation displays that economic growth has insignificant positive impact on unemployment concluding invalidity of Okun's Law and inflation has insignificant negative impact on unemployment confirming Phillips curve in Bangladesh. It also shows that industry inversely affect unemployment. Also the impact of age dependency ratio on unemployment is found to be statistically inversely significant concluding age dependency ratio as an effective determinant of unemployment. And further, the urban population growth has a negative effect on unemployment. Diagnostic result of the study shows that the model is free from heteroscedasticity, first order positive autocorrelation and multicollinearity. The R-squared value is 43.1% for the model; therefore the model delivers a comparatively good fit of the data.

Key Words: Unemployment, Economic Growth, Inflation, Industry in Bangladesh.

Table of contents

Acknowledgement	i
Abstract	ii
Table of contents	iii
List of Tables and Figures	iv
1. Introduction	1
2. Literature Review	2
3. Data and Methodology	7
3.1 Variables of the study and Data	7
3.2 Description of Variable	8
3.3 Model Specification	9
3.4 Estimation Technique	12
3.5 Diagnostic Checking	12
4. Data Analysis and Discussion of Result	13
4.1 Descriptive Statistics	13
4.2 Unit Root Test	14
4.3 Regression Analysis	14
4.4 Result of Diagnostic Checking	16
5. Conclusion and Recommendations	18
5.1 Recommendations	18
5.2 Conclusion	19
References	20
Appendix	23

List of Tables

List of Tables	
Table1. Descriptive Statistics	13
Table2. Unit Root Test Result	14
Table3. Regression Result	15

1. Introduction

An empirical outcome that plays a diametrical disposition argued in macro-economic analysis is unemployment. It has been considered as a great issue for the policy makers of all industrialized and unprivileged countries of the world. More than 34 million households across the world took out of employment because of economic emergency in 2007. The appraisal of tender age unemployed has shifted 73.5 to 77.7 million over the year 2007-2010 (ILO, 2011) after the world crisis. In this way, it influenced the unemployment rate and poverty alleviation projects desperately, while the ratio of unemployment is decreasing since 2010.

Unemployment is a position by what means the people are ready and capable to pursuit at effective wage rate, but they are disabling to get employment. Unemployment is the origins to extent the economic health; a leading cause to describe how healthy an economy is; when the economies effectiveness maximizes, people will be able to work at a partial wage rate. An unemployed person is both unfertile & a flow-out to the capital of the people (Rothiem, 2007).

Unemployment is a major phenomenon which could be able to reveal depletive benefit of the economic development, inequity, the degradation of labor force, adversity and public instability (Kyei & Gyeke, 2011). The unemployment consequences in various psychological conditions of inefficiency, reverse adversity & continuous steering of several discernible unemployed adulthood within all system of offender conduct (Bakare, 2011).

The situation of having no work or being out of service or a ratio of households who are capable to do job and actively looking for work but having disability to get the job; unemployment. The most accepted reason of unemployment in Bangladesh & the several poor countries are technical variations, female performances in development, demographic formation, financial status, source of lightning (particularly in Bangladesh), increasing rate of city dwellers. The economic growth rate decline due to the financial reversion of October 2008 is a great objective to rise in the rate of unemployment for both industrialized and poor countries. This paper is prepared to show the consequences of inflation, economic growth rate, age dependency ratio, industry and urban population growth on the rate of unemployment. In accordance with this concept, a positive relationship could be found into employment and the economic growth.

Economic growth is a major cause which influences the unemployment. The economic theory shows the inverse relationship between unemployment and the economic growth is known as Okun's Law. He constituted the tradeoff between the real gross national product (GNP) and the unemployment. The theory shows the adverse relationship between growth and the unemployment. In macroeconomic theory, A. W. H. Philip developed a negative relationship between unemployment and inflation known as Phillip curve in 1958.

2. Literature Review

An effort has been made to create a summary of the extant literature based on information gathered from the existing research paper.

Calmfors and Holmlund (2000) studied on Unemployment and economic growth: a partial survey and described the equilibrium unemployment factors and the connection concerning long-term growth and unemployment. They revealed an unclear association between long-term growth and unemployment. The authors also demonstrated that the effect of unemployment in long-term growth can be positive and negative too.

Cashell (2004) conducted a paper and observed the concurrence into inflation & unemployment. Study period was 1997-2001. The author found that the sensitivity of inflation to changes in the unemployment was very low. He concluded that prevailing calculation of natural rate suggested that rates of unemployment below 5% will raise the rate of inflation in the end.

Kitov (2006) studied a paper on Inflation, unemployment, labor force change in the USA, observed the link between them considering the period 1960-2004. The author took unemployment as dependent variable and inflation, change in labor as explanatory variables. He described that estimate of population created by Census Bureau of United States delivered a necessary instrument to assess long-term conduct of changes in employment. Moreover, inflation as well as economic growth were distinct & led by several legion linked to people.

Khaliq, Soufan and Shihab (2006) conducted a paper and tested the connection concerning unemployment and GDP growth over the period 1994-2010 considering 9 Arab countries. They employed unit root test methodology and Pooled Estimated Generalized Least Squares, EGLS (Cross-Section Least Seemingly Unrelated Squares, SUR) to calculate the long-term model.

They discovered that economic growth significantly and inversely influenced the rate of unemployment. The numerical value demonstrated that 1% increase in economic growth would lower the unemployment rate by 0.16%.

Pallis (2006) analyzed the connection concerning inflation and unemployment in new European Union member states was studied over 1994-2005. Annual data was that collected from the European commission 2004 noted to the new 10 EU member states. Variables used in this study were “the price deflator of GDP at market prices, nominal compensation per employee and total employment rate (%). The author used Non-linear least square method and E-views techniques for the analysis. The study concluded that the use of common policies across economy may be questionable as these policies have several impacts on inflation and unemployment.

Messkoub (2008) explored data from 1980 to 2003 applying descriptive analysis method and showed that although economic growth in MENA countries was stable they achieved moderate increase in reducing unemployment. He discovered that economic growth does not alone lower unemployment. He suggested that flexible rules and regulation for the SME as well as productive job creation should be the target.

Wajid and Kalim (2010) conducted a study and examined the influence of inflation and economic growth along with trade openness and urban population on unemployment in Pakistan taking into account 1973-2010 as study period. They employed Augmented Dicky Fuller Test for checking the stationarity and Johansen-Juselius Maximun Likelihood Approach to find out the impact of explanatory variables on unemployment. They found that inflation considerably raises unemployment in the long-term and economic growth has an extensive negative influence in the long run and short run too.

By observing the data in 2009, Daly and Hobjin (2010) displayed that the real GDP was closed upon flat in 2009 and trend level raised by 3% which should make a 1.5% rise in unemployment under Okun’s law. But in real fact, the unemployment increased by 3% which was in excess of twice the predicted increase. This was because fast progress in productivity enabled business to sustain output levels with fewer labors. This result was calculated by taking into account potential factors, measurement errors, changes in employer and worker behavior, unusual surges in productivity and the efficiency of producing output.

Tunah (2010) conducted a study and examined the macroeconomic variables that affect the unemployment rate in Turkey. Data was collected from 2000 to 2008 on Quarterly basis for this study. The author used Augmented Dicky Fuller test, Phillip-Perron test, Johanses's Cointegration and Granger causality approach for the analysis. The outcomes confirmed a significant influence of real GDP, consumer price index and preceding rate of unemployment on unemployment rate. The outcomes also revealed that real effective exchange rate has no effect on unemployment.

Al-Habees and Rumman (2012) studied the nexus between unemployment and economic growth in Jordan and some Arab countries considering the period 2006 to 2011. The authors used Okun's Law which directs the link between economic growth and change in unemployment rate. As per this approach, it was supposed that a reduction in unemployment involves the national economy growth rate outstrips the minimum or natural limit. The outcomes of their study presented the adverse link between growth and unemployment. They also revealed that in some Arab countries for example Algeria it was improbable to lower the rates of unemployment although the growth rate was positive at that time. The authors recommended distinct policies for growth and fall of unemployment rates.

Aurangzeb and Asif (2013) conducted a paper and examined the macroeconomic factors of unemployment. The authors selected India, China and Pakistan as the study area. Data was collected from 1980 to 2009. Study variables include unemployment, inflation, gross domestic product, exchange rate and the increasing rate of population. On the basis of theoretical work and empirical literature they constructed model and used co integration approach, granger causality analysis and regression analysis. The outcomes of regression analysis revealed that the influence of all the variables on unemployment were statistically significant in all three countries. Granger causality test presented that there was no bidirectional association within any of the variable but one-way causality exists among the GDP (from GDP to unemployment) and exchange rate (from unemployment to exchange rate). Cointegration outcome discovered the existence of long-run linkage among the variables.

Jaradat (2013) studied and investigated the effect of inflation and unemployment on GDP in Jordan. The data was collected from 2000 to 2010. The author used SPSS software to test the correlation amid the dependent (GDP) and independent variables (inflation and unemployment).

The model of the study was linear regression model. The findings displayed that unemployment and GDP was inversely associated and the connection between inflation and GDP was positive.

Chowdhury and Hossain (2014) conducted a study and stated that underutilization of human capital namely unemployment plays a vital part in the growth of economies. They investigated macroeconomic factors of unemployment rate in Bangladesh covering the period of 2000 to 2011. They used Simple Single Equation Linear Regression Model (SSELRM) for exploring the determinants of unemployment. The variables they took for this study were Unemployment rate as dependent variable, GDP growth rate, Exchange rate, and Inflation rate (CPI based) as explanatory variables. They found significant results through the regression analysis. The results of the study displayed that the influence of inflation on unemployment was positive and GDP growth rate and Exchange rate influenced unemployment inversely. They advised that making the influence of growth better for employment rate policy makers should improve distribution of income.

Bayar (2014) studied on Effects of economic growth, exports and foreign direct investment inflows on unemployment in Turkey. The author considered 2000 to 2013 as the study period. He employed Augmented Dicky-Fuller test for checking the stationarity of time series and Autoregressive Distributed Lag (ARDL) and Error Correction Model (ECM) for investigating the long term as well as short term connection among unemployment and economic growth, exports, foreign direct investment inflows. He discovered the presence of long run relationship among the variables. Further he revealed that the association of unemployment with economic growth, export was adverse and with foreign direct investment inflows unemployment was positively connected. But the influence of FDI inflows on unemployment typically altered depending on the types of FDI inflows: Green field investment or brown field investment. Turkey had been in form of brown field investment and hence FDI inflows did not generate employment in turkey. The author proposed that Turkey should execute policies in order to attract green field investment for creating employment.

Abbas (2014) observed the effect of economic growth on unemployment in Pakistan. The study period was 1990-2006. They employed Autoregressive Distributed Lag (ARDL) bounds testing approach. The outcomes of the study demonstrated the presence of long run significant and inverse influence of growth on unemployment but in the short run no connection was identified.

The coefficient of parameters in the short run was insignificant. The calculated model strength was verified by several diagnostic tests such as Autoregressive Conditional Heteroscedastic (ARCH) test to heteroscedasticity, Lagrange multiplier test for detecting whether the model had serial correlation or not and Jarque-Bera test for checking the normality of residuals. The outcomes exhibited that residuals were normally distributed and the model was free from heteroscedasticity and serial correlation. The paper recommended that efforts should be taken to make economic growth as an unemployment reducing factor in the long-run.

Imran et. al. (2015) conducted a study on Unemployment and Economic Growth of developing Asian Countries: A Panel Data Analysis and presented the new regression estimates of the association amid unemployment and economic growth. The authors selected 12 Asian countries and the study period was 1982 to 2011. The model of this paper displayed output level (i.e. Per capita GDP) is function of labor amount (measured by Labor force of the country) and capital (measured by Gross Capital Formation). They used fixed effect; Pooled Ordinary Least Square (OLS) technique, time effects to discover the influence of unemployment on the economic growth of these countries. They discovered that high rate of unemployment was inversely connected to GDP per capita growth. The findings of the study further investigated the seemingly significant influence of other factors e.g. inflation, population growth, trade openness etc. on economic growth.

Makun and Azu (2015) examined the relationship among economic growth, unemployment and investment in Fiji. They collected data from the year 1982 to 2012 for this study. The authors sought to investigate the long run connection between growth and unemployment. They applied Johanson Cointegration test and dynamic error correction model, unit root test. The paper stated that in the long run growth rate of output and unemployment was inversely linked and the effect of investment on economic growth was positive. Investment stayed one of the crucial elements in lessening unemployment and therefore economic growth. The authors suggested that policy makers should strengthen economic policies for increasing investment.

Cheema and Atta (2014) investigated The Economic Determinants of Unemployment by applying the ARDL bound approach in Pakistan using the time series data from 1973 to 2010. They found that unemployment is positively related to output gap on the other hand Economic

Uncertainty and Productivity are negatively related to Openness of Trade and Gross Fixed Investment respectively.

Strat et. al. (2015) studied the interdependencies within FDI inflow and unemployment. Data was collected from 1991 to 2012 on yearly basis for this study covering latest thirteen EU member states. They employed Toda Yamamoto (T-Y) procedure for examining short run causality connection between FDI and Unemployment. They used this method as it can be applied in level Vector Autoregressions (VARs) for stationarity and co integrated variables too. They investigated the short term causal link between FDI and unemployment. The outcomes of the study show that there was no causal link between FDI and unemployment for six countries but a one-way causal link was recognized for the rest of the states.

There have been many research works completed on the connection concerning unemployment and other macroeconomic variables but less has done to find out the determinants of unemployment that is, what are the important factors that determine unemployment? This study is an attempt to examine the determinants of unemployment on the basis of the confirmation from the economy of Bangladesh.

3. Data and Methodology

This part of the study narrated the type and source of data and econometric methods that are employed to calculate the determinants of unemployment.

3.1 Variables of the study & Data

There are six variables considered for this study to find out the determinants of unemployment. Unemployment is hold as dependent variable and the others are independent variables such as economic growth, inflation GDP deflator, age dependency ratio, industry and urban population growth. The type of data used in this study is time series Data are collected from secondary sources considering the period 1991-2016. As data for unemployment is not available before 1991 the research time is enclosed in 26 years.

The annual data for unemployment (hereinafter UNEMP) as percentage of total labor force estimated by International Labor Organization (ILO), economic Growth (hereinafter GROWTH)

as GDP growth (annual %), inflation (hereinafter INF) as GDP deflator (annual %), industry (hereinafter IND) value added (annual % growth), age dependency ratio (hereinafter AGEDEP) (% of working age population) and urban population growth (annual %) are taken from world Development Indicators, WDI (2018).

3.2 Description of Variables

Unemployment

International Labor Organization (ILO) defined unemployment as the number of people without work but available for and actively looking for it as percentage of total labor force (age between 15-64). Unemployment is one of the common problems in Bangladesh. Unemployment is taken as dependent variable in this study.

Economic Growth

Economic growth is an expansion in the production of goods and services compared from one period of time to another. Gross domestic product (GDP) is the best way for measuring economic growth as it considers the overall output of the economy. As economic growth helps to lessen unemployment, this study tries to find out the impact of it on unemployment in Bangladesh. Economic growth as GDP growth (annual %) is taken one of the explanatory variables in this study.

Inflation

The definition of inflation can be stated as follows: a sustained rise in the general price level of goods and services in a country over a period of time. The impact of inflation on an economy can be simultaneously positive or negative. When inflation is high it increases the prices of goods and services that lead to fall in aggregate demand as well as fall in demand for labor and therefore low unemployment. Opposite can also happen when inflation is low. This study used inflation as a GDP deflator as a proxy to calculate the impact of it on unemployment.

Industry

Industry is a business action that is linked to processing, producing or manufacturing of products. Industry relates to ISIC division (10-45) and comprises manufacturing. As industry grows it generates employment opportunities and hence unemployment reduction. Industrial sector is one of the key employment opportunity creators. Industry value added (annual % growth) is used as another explanatory variable in this study to find out its impact on unemployment.

Age Dependency Ratio

The age dependency ratio is defined as the ratio of dependent people (ages below 15 and over 64) to the working age population (age between 15-64) and expressed as the share of dependents per 100 working age population. When the age dependency ratio is high the no of dependent people increases in relation to working labor force. This may cause a shortage of labor force and thus low unemployment. Also the high no of dependents compare to working age population may create a pressure on the working age population to actively looking for work and hence lessen the unemployment. Based on this notion age dependency ration is included as an explanatory variable in this study.

Urban population growth

National statistical offices defined urban population as the number of people living in urban areas. Urban population growth is estimated utilizing World Bank population estimates as well as urban ratios from the United Nations World Urbanization Prospects. As the number of people live in urban places increases the density of urban population. This leads to an increase unemployment rate. Urban population growth (annual %) is taken another explanatory variable for this paper.

3.3 Model Specification

The negative connection between an economy's growth rate and unemployment is a broadly acknowledged theory in economics. The connection has been proposed and explained by Author Melvin Okun in 1962, known as Okun's Law, especially the other version of Okun's Law. It is an empirically observed association amid unemployment and country's production. The other

version of Okun's Law described that the rate of unemployment changes from one quarter to the next with quarterly real output growth and can be written as:

Unemployment rate change = $a + b * (\text{Real output growth})$. This captures how growth rate of output changes simultaneously with unemployment rate change. The parameter b is often called 'Okun's coefficient' (Knotek, 2007). 'One would expect the Okun's coefficient to be negative, so that rapid output growth is associated with a falling unemployment rate and slow or negative output growth is associated with a rising unemployment rate. The ratio ' $-a/b$ ' gives the rate of output growth consistent with a stable unemployment rate, or how quickly the economy would typically need to grow to maintain a given level of unemployment, described by Knotek (2007). Many researches have been directed to examine the applicability of Okun's Law. The validity of Okun's Law and significance connection concerning the rate varies taking into account the country and time period.

The Phillips Curve named after William Phillips describes the connection between the inflation rate and the unemployment rate. A study by Phillips (1958) on The Relation between Unemployment and the Rate of Change of Money Wage Rate in the United Kingdom during the period of 1861-1957 delivered evidence of a consistence negative association: high unemployment increased wages slowly and wages increased rapidly when the unemployment was low. Phillips supposed that lower unemployment make labor market tighter and consequently the quicker firms need to increase wages to attract limited labor. Higher unemployment rate decreased the pressure. Phillips Curve shows short run tradeoff concerning unemployment and inflation but in the long run it has been noticed. Friedman (1968) stated that Phillips Curve was found relevant only in the short run but in the long run unemployment won't reduce by inflationary policies. After that Friedman accurately predicted that during the 1973-75 recessions, inflation as well as unemployment would rise. In modern times the long run Phillips Curve is seen vertical at the natural unemployment rate indicating no inflationary influence on unemployment.

On the basis of existing literature and objectives of the study, the regression model is constructed as follows:

$$\text{UNEMP} = f(\text{GROWTH}, \text{INF}, \text{AGEDEP}, \text{IND}, \text{UPG})$$

$$\text{UNEMP} = \beta_0 + \beta_1 \text{GROWTH}_t + \beta_2 \text{INF}_t + \beta_3 \text{AGEDEP}_t + \beta_4 \text{IND}_t + \beta_5 \text{UPG}_t + \epsilon_t$$

Where,

UNEMP = Unemployment rate

GROWTH = GDP growth (annual %) as a proxy economic growth

INF = Inflation Rate

AGEDEP = Age dependency ratio (% of working age population)

IND = Industry value added (annual % growth)

UPG = Urban population growth (annual %)

β_0 = Intercept term

$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$ = Partial regression coefficient

t = Time period (1991-2016)

ϵ = Error term

The hypotheses regarding the signs of the independent variables are stated below:

1. The association between unemployment rate and economic growth as stated by Okun's law is adverse. Faster growth in output leads to a reduction in unemployment whereas slow or negative growth raises unemployment.
2. Inflation is inversely connected to unemployment according to Phillips Curve. When labor demand rises because of monetary expansion, the rate of unemployment would fall leading wages/prices to increase and therefore generating a trade-off between inflation and unemployment.

3. High number of dependent people as share of the working age population encourage the latter to more actively look for job to support the dependents and therefore probably lead to a fall in the rate of unemployment.

4. The industrial sector helps to reduce unemployment as an organized industrial sector must absorb an adequate number of workers by creating job opportunities. The sign of industry is accepted to be negative.

5. When the numbers of people live in urban places increases the density of urban population also increases. This leads to an increase unemployment rate. So there tend to be a positive association amid unemployment rate and urban population growth.

3.4 Estimation Technique

The study used descriptive statistics for the model. Since the data used in this study are time series, before going into regression analysis there is a need to test the data for stationery. There are various techniques for testing unit root problem to determine whether it is stationary or not. This study employed Augmented Dicky-Fuller (ADF) test. After checking for stationary and if it is required, testing co-integration and the determinants of unemployment is tested by applying Ordinary Least Square (OLS) method.

3.5 Diagnostic Checking

After regression analysis the study use Jarque-Bera test for testing the normality of data, Breusch-Pagan test for heteroscedasticity, Variance inflation factor (VIF) for testing the presence of multicollinearity, Durbin Watson d statistic for testing first order autocorrelation, and Ramsey's Regression specification Error test (RESET) for checking of omitted variable that are important and not included in the model.

4. Data Analysis and Discussion of Result

4.1 Descriptive Statistics

The data analysis starts with the descriptive statistics that helps to discover time series properties of the variables. Table 1 below is the descriptive statistics also called the summary statistics of the study.

Table1. Descriptive Statistics

Variable	Obs	Mean	Std.Dev.	Min	Max
UNEMP	26	3.831	.822	2.2	5.1
GROWTH	26	5.435	1.007	3.485	7.113
INF	26	5.738	3.362	.156	19.143
AGDER	26	65.867	9.3	51.465	82.271
IND	26	7.765	1.661	4.711	11.094
UPG	26	3.84	.339	3.267	4.589

The table1 describes descriptive statistics of the dependent (Unemployment) and independent variables (Economic growth, inflation, age dependency ratio, industry and urban population growth). The study has 26 observations. It shows there is a slight gap between minimum and maximum values of unemployment during the study period which directs a consistent and less unstable unemployment in Bangladesh. It is found that the variation and gap amid minimum and maximum values of economic growth is relatively low in Bangladesh. Inflation in Bangladesh has a large gap during the study period within its minimum and maximum values. It directs an unstable inflation. It can be shown from the table that the gap between minimum and maximum values of age dependency ratio is large. This large gap exhibits a highly inconsistent age dependency ratio of Bangladesh. Industry shows a little variation and gap. The variation and gap between the minimum and maximum values of urban population growth is small. It concludes a less unstable urban population growth in Bangladesh.

4.2 Unit Root Test

Unit root problem is checked individual variables by applying Augmented-Dicky Fuller test. Table 2 shows the result of the unit root test.

Table2. Unit root test

Augmented Dicky- Fuller Test											
At level						At first difference					
Variable s	t- statistics	Critical values			p- value*	Variable s	t- statistics	Critical values			p- value*
		1%	5%	10%				1%	5%	10%	
UNEMP	-5.208	-3.750	-3.000	-2.630	0.0000	UNEMP	-12.609	-3.750	-3.000	-2.630	0.0000
GROWTH	-3.776	-4.380	-3.600	-3.240	0.0178	GROWTH	-6.095	-3.750	-3.000	-2.630	0.0000
INF	-3.866	-3.750	-3.000	-2.630	0.0023	INF	-6.923	-3.750	-3.000	-2.630	0.0000
AGDER	-5.798	-3.750	-3.000	-2.630	0.0000	AGDER	-1.483	-3.750	-3.000	-2.630	0.5420
IND	-3.141	-3.750	-3.000	-2.630	0.0237	IND	-6.349	-3.750	-3.000	-2.630	0.0000
UPG	-1.963	-3.750	-3.000	-2.630	0.3031	UPG	-4.224	-3.750	-3.000	-2.630	0.0006
Notes *MacKinnon approximate p-value (5%) Test contains constant term, and both constant and trend terms, testing hypotheses variable has unit root. If p-value<0.05, the null hypothesis of non-stationary is rejected that is series is stationary.											

The table above shows that all the variables are stationary at level except urban population growth. Unemployment, inflation, age dependency ratio, industry are successful to reject the null hypothesis of non-stationary while testing the hypothesis with constant term. Urban population growth is successful to reject the null hypothesis of non-stationary while testing the hypothesis with constant term at first difference. Economic growth successfully rejects the null hypothesis while testing it with constant and trend terms.

4.3 Regression Analysis

The following table shows the estimation of the regression model of the study. The estimation is done so by employing Ordinary Least Square Method (OLS).

Table3. Linear regression

UNEMP	Coef.	St.Err	t-value	p-value	Sig.
GROWTH	0.218	0.271	0.80	0.431	
INF	-0.036	0.043	-0.82	0.420	
AGDER	-0.051	0.024	-2.15	0.044	**
IND	-0.169	0.126	-1.34	0.195	
UPG	-0.134	0.540	-0.25	0.807	
_CONS	8.026	3.376	2.38	0.028	**
R-squared	0.431	Number of obs			26.000
F-test	3.029	Prob > F			0.034

*** p<0.01, ** p<0.05, * p<0.1

The model can be expressed in equation form like this:

$$\begin{aligned}
 \text{UNEMP}_t = & 8.026 + 0.218\text{GROWTH}_t - 0.036\text{INF}_t - 0.051\text{AGEDEP}_t - 0.169\text{IND}_t - 0.134\text{UPG}_t \\
 & (2.38)^{**} \quad (0.80) \quad (-0.82) \quad (-2.15)^{**} \quad (-1.34) \quad (-0.25) \\
 & R^2 = 0.431 \quad F = 3.029 \quad p\text{-value} = 0.034
 \end{aligned}$$

Table 3 demonstrates the regression result of the study. The constant or intercept value of unemployment is 8.026 considering all the independent variables of the model are constant. To check whether the explanatory variables are separately statistically significant or not, t-statistics is used. The coefficient value of economic growth is 0.80 that indicates a positive connection between unemployment and economic growth but it is not significant. The findings exhibit that one unit increase in economic growth holding all other variables constant leads to an increase of 0.80 units in unemployment. So it can be concluded that Okun's law of inverse link between unemployment and economic growth does not hold for Bangladesh. The reason is inequality in income distribution. It is found that inflation has an insignificant adverse impact on unemployment. Though the impact is not statistically significant, the negative connection between unemployment and inflation shows the relevancy of Phillips Curve in Bangladesh. It is found that age dependency ratio has a negative and statistically significant influence on

unemployment for the case of Bangladesh. The value of -0.051 indicates that one unit increase in age dependency ratio holding all the other variables constant, lower the unemployment by 0.051 units. The coefficient value of industry shows an inverse and insignificant impact on unemployment in Bangladesh. If industry growth rises by one unit holding all other variables constant, then unemployment goes down by 0.169 units. The coefficient value of urban population growth finds an inverse and insignificant relationship with unemployment in Bangladesh. If the urban population growth rate rises by one unit holding all other variables constant, unemployment decreases by 0.134 units. The R^2 value of 0.431 or 43.1% shows that 43.1% variation in unemployment can be explained by the variation in explanatory variables (Economic growth, Inflation, Age dependency ratio, Industry and Urban population growth). F-statistics shows the overall significance of the model. It is found that $\text{Prob}>F = 0.034$, this is <0.05 (i.e. significant). So it can be concluded that the overall model is statistically significant.

4.4 Result of Diagnostic Checking

Jarque–Bera test: Through Jarque-Bera test, normality of data can be checked. Jarque-Bera statistics follow chi-square distribution. Hypothesis for this test is stated below:

H₀: Error term is normally distributed

H₁: Error term is not normally distributed

The result is $\text{Prob Chi} = .9035 > \alpha = 5\% \text{ or } 0.05$. So the null hypothesis cannot be rejected rather it is accepted. Therefore it is concluded that error term of the model is normally distributed.

Breusch-Pagan Test: By this, heteroscedasticity in a multiple linear regression model can be checked. Hypothesis for this test is stated below:

H₀: Constant variance or Homoscedasticity

H₁: Heteroscedasticity

The result is $\text{Prob} > \chi^2 = 0.5728$, this is $>\alpha = 5\% \text{ or } 0.05$. So the null hypothesis cannot be rejected. The conclusion will be the model is free from heteroscedasticity.

Multicollinearity test: By variance inflation factor multicollinearity among explanatory variables of the model can be checked. The result of this test is given below. The Rule of thumb is that VIF above 5 recommends further inquiry.

Variance Inflation Factor

	VIF	1/VIF
GROWTH	3.862	.259
AGDER	2.517	.397
IND	2.285	.438
UPG	1.745	.573
INF	1.111	.9
Mean VIF	2.304	

From the result of variance inflation factor it is shown that for all the variables VIF is less than 4 that indicates explanatory variables are not correlated. So it can be concluded that the problem of multicollinearity is not present in the model.

Durbin Watson d-Statistics: For detecting first order serial correlation, Durbin Watson d-statistic is used. The critical values, d_U and d_L for several explanatory variables can be found from Durbin Watson d-statistics table. The decision will be reject the null hypothesis of no positive first order serial correlation if $d < d_L$, do not reject the null hypothesis if $d > d_U$ and if the result is inconclusive if $d_L < d < d_U$. From the result the value of Durbin-Watson d-statistic is $d = 2.589123$. From the table for $n = 26$ and $k = 5$, at 5% level of significance Durbin Watson statistics, $d_L = 0.979$ and $d_U = 1.873$. As $d > d_U$, it can be concluded that the model is free from first order positive autocorrelation.

Ramsey RESET test: Regression Specification Error Test suggested by Ramsey is used for checking of important variables that are not included in the model. In other words, it is used for checking whether the model is correctly specified or not. The hypothesis for this test is stated below:

H₀: The model is correctly specified

H₁: The model is not correctly specified

The result is Prob > F = 0.0935, this is $>\alpha=5\%$ or 0.05. So the null hypothesis of the model is correctly specified cannot be rejected rather it is accepted. Therefore the conclusion of the test is the model is free from misspecification.

5. Conclusion and Recommendations

5.1 Recommendations

Findings of this study have confirmed that economic growth along with inflation industry and urban population growth has insignificant influence on unemployment but only age dependency ratio is significantly connected with unemployment. The study offers some recommendations that are given below:

- The study has found a positive insignificant connection between unemployment and economic growth which is undesirable in case of Bangladesh. Economic growth does not affect unemployment rate despite a gradual increase of it. So the government of Bangladesh should take a policy so that economic growth can influence the unemployment rate.
- Inflation is found adversely connected to unemployment from the result of this study. But it is not statistically significant. Fiscal and monetary policy makers need to form policies for achieving required level of inflation that could affect unemployment rate.
- The findings of the study have stated that as age dependency ratio increases; it reduces unemployment significantly. Increase in the dependent people relative to working age population causes a reduction in the labor force and hence lower unemployment. But it in turn could slow down economic growth. To make the impact of age dependency ratio on unemployment useful , productivity could be increased for avoiding economic slowdown due to decrease in labor force or expanded the elderly labor force participation rate by rising age for retirement or decreasing elderly workers' income tax.

- The study also found that industry growth inversely affect unemployment rate albeit it is not statistically significant. As industry is a sector that creates job opportunities, government of Bangladesh should finance more on it and also encourage private investors to invest more for generating new job for the unemployed.
- The urban population growth has negative effect on unemployment in this study that it is insignificant in the relation. As urban population increases unemployment decreases providing them different job opportunities.

5.2 Conclusion

This paper examines the determinants of unemployment in Bangladesh utilizing the annual data over the period from 1991 to 2016. The study considers economic growth, inflation, industry, age dependency ratio and urban population growth as determinant of unemployment. The addition of the variable age dependency ratio brings newness of the studied model. From regression results economic growth is found to be insignificantly and positively affecting unemployment that shows an unwanted situation for Bangladesh. The result leads to the conclusion that Okun's Law does not valid in case of Bangladesh. Inflation though inversely linked with unemployment is not a significant variable. But the negative connection confirmed Phillips Curve in Bangladesh. The study also found that industrial impact on unemployment is insignificantly negative. The urban population growth has an insignificant negative relationship with unemployment. Only age dependency ratio is found a significant variable to explain unemployment in the case of Bangladesh. The R-squared value is moderate which assures this model as a good model by providing comparatively good fit of the data. The overall model is significant as indicated by the F-statistics.

References

- Ahmed, S. & Mortaza, M. G. (2005). Inflation and Economic Growth in Bangladesh: 1981-2005. Working Paper Series: WP 0604.
- Asif, K. (2013) & Aurangzeb, Dr. Factors effecting unemployment: A cross country analysis. International Journal of Academic Research in Business and Social Sciences, 3(1), 219.
- Abdul-Khaliq, S., Soufan, T., & Shihab, R. A. (2014). The Relationship between Unemployment and Economic Growth Rate in Arab Country. Journal of Economics and Sustainable Development, ISSN, 2222-1700
- Abbas, S. (2014). Long Term Effect of Economic Growth on Unemployment Level: In Case of Pakistan. Journal of Economics and Sustainable Development. ISSN 2222-1700 (Paper) ISSN 2222-2855 (Online) Vol.5, No.11.
- Al-Habees, M. A. & Rumman, M. A. (2012). The Relationship Between Unemployment and Economic Growth in Jordan and Some Arab Countries. World Applied Sciences Journal, 18 (5): 673-680.
- Bayer, Y. (2014). Effects of economic growth, export and foreign direct investment inflows on unemployment in Turkey. Investment Management and Financial Innovations, Volume 11, Issue 2, 2014
- Chowdhury, M. S. R. & Hossain, M. T. (2014). Determinants of Unemployment in Bangladesh: A Case Study. Developing Country Studies, Vol.4, No.3.
- Calmfors, L. & Holmlund, B. (2000). Unemployment and economic growth: a partial survey.
- Cashell, W. B. (2004). Inflation and unemployment: What is the connection? Federal Publications. Swedish Economic Policy Review 7 (2000) 107-153
- Daly, M. & Hobbijn, B. (2010). Okun's Law and the Unemployment Surprise of 2009. FRBSF Economic Letter.
- El-Agrody, Othman, A. Z. & Hassan, M. B. E. (2010). Economic Study of Unemployment in Egypt and Impacts on GDP. Nature and Science, 8(10): 102-111

Impact of Economic Growth and Inflation on Unemployment in Bangladesh: A time series analysis

Friedman, M. 'The Role of Monetary Policy' (1968) 58(1) American Economic Review 1. E McGaughey, 'Will Robots Automate Your Job Away? Full Employment, Basic Income, and Economic Democracy' (2018) SSRN, part 2(1)

Hossain, M. E., Ghosh, B. C. & Islam, M. K. (2012). Inflation and Economic Growth in Bangladesh. Researchers World, Journal of Arts, Science & Commerce, Vol. – III, Issue–4(2).

Jaradat, M.A. (2013). Impact of inflation and unemployment on Jordanian GDP. Retrieved from <http://journal-archievers28.webs.com/317-334.pdf>

Krugman, P. (1994). Past and prospective causes of high unemployment. Economic Review Federal Reserve Bank of Kansas City, 79(4), 23.

Kitov, I. O. (2006). Inflation, unemployment labor force change in USA. 1-35.

Makun, K. & Azu, N. P. (2015). Economic Growth and Unemployment in Fiji: A Cointegration Analysis. International Journal of Development and Economic Sustainability, Vol.3, No.4, pp.49-60.

Mallik, G. & Chowdhury, A. (2001). Inflation and Economic Growth: Evidence from Four South Asian Countries. Asia-Pacific Development Journal, Vol. 8, No. 1.

Messkoub, M. (2008). Economic Growth, Employment and Poverty in the Middle East and North Africa International Labour Office, Employment and Poverty Programme - Geneva: ILO, 2008 1 v.; 46 p.

Saaed, Afaf A. J. (2007). Inflation and Economic Growth in Kuwait: 1985-2005 Evidence from Co-Integration and Error Correction Model. Applied Econometrics and International Development, Vol. 7-1.

Saidu, B. M. & Mohammad, A. A. (2015). Do Unemployment and Inflation Substantially Affect Economic Growth? Journal of Economics and Development Studies, Vol. 3, No. 2, pp. 132-139.

Start, V. A., Alexandaru, A.D. & Vass, A. M. P. (2015). FDI and The Unemployment - A Causality Analysis for The Latest EU Members. 2nd GLOBAL CONFERENCE on BUSINESS, Impact of Economic Growth and Inflation on Unemployment in Bangladesh: A time series analysis ECONOMICS, MANAGEMENT and TOURISM, 30-31 October 2014, Prague, Czech Republic. *Procedia Economics and Finance* 23 (2015) 635 – 643.

Thayaparan, A. (2014). Impact of Inflation and Economic Growth on Unemployment in Sri Lanka: A Study of Time Series Analysis. *Global Journals Inc. (USA)*, Volume 13 Issue 5 Version 1.0.

Wajid, A. & Kalim, R. (2010). The Impact of Inflation and Economic Growth on Unemployment: Time Series Evidence from Pakistan. 3rd International Conference on Business Management (ISBN: 978-969-9368-07-3).

Umair, M., & Ullah, R. (2013). Impact of GDP and Inflation on Unemployment Rate: A Study of Pakistan Economy in 2000-2010. *International Review of Management and Business Research*, 2(2).

Data Collected from:

<https://data.worldbank.org/indicator/SL.UEM.TOTL.ZS>

<https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG>

<https://data.worldbank.org/indicator/NY.GDP.DEFL.KD.ZG>

<https://data.worldbank.org/indicator/NV.IND.TOTL.KD.ZG>

<https://data.worldbank.org/indicator/SP.POP.DPND>

<https://data.worldbank.org/indicator/SP.URB.TOTL.IN.ZS>

Appendix

Data of the study

Year	UNEMP	GROWTH	INF	AGDER	IND	UPG
1991	2.200000048	3.48522782	2.729532	82.27106	4.710898	4.589004
1992	3.799999952	5.44268555	2.582162	80.96719	6.989203	3.995948
1993	2.400000095	4.71156172	0.155518	79.49189	8.094187	3.911871
1994	2.900000095	3.89012644	3.966216	77.93528	8.129669	3.875826
1995	3.599999905	5.1212779	7.144939	76.35107	10.13437	3.846584
1996	2.5	4.52291922	19.14321	74.97568	6.736727	3.831701
1997	5.099999905	4.4898965	3.800232	73.55851	5.225482	3.790072
1998	2.700000048	5.17702687	4.736213	72.11547	8.726901	3.751602
1999	4.599999905	4.67015637	3.781038	70.6518	5.241305	3.690044
2000	3.299999952	5.29329472	3.446659	69.17965	6.255771	3.616634
2001	3.299999952	5.07728778	3.26116	68.03509	7.46168	4.023766
2002	3.400000095	3.83312394	3.892867	66.83512	5.80301	4.544469
2003	4.300000191	4.7395674	5.815817	65.60707	6.5817	4.437117
2004	4.5	5.23953291	4.562136	64.37285	7.049272	4.290898
2005	4.199999809	6.53594494	4.586361	63.1347	7.932371	4.118258
2006	4.5	6.67186827	5.875972	62.23812	9.7979	3.948005
2007	4	7.05863621	6.471223	61.28605	9.027828	3.793969
2008	3	6.01378976	7.860966	60.29092	7.033534	3.682178
2009	5	5.04512479	6.764355	59.27227	6.913173	3.627816
2010	4.5	5.57180227	7.144649	58.23679	7.032202	3.622885
2011	4.5	6.46438388	7.859446	57.07321	9.01913	3.625856
2012	4.5	6.52143508	8.164598	55.97101	9.435599	3.592864
2013	4.300000191	6.01359607	7.174963	54.88729	9.639359	3.53444
2014	4.199999809	6.06109305	5.668755	53.76235	8.160014	3.460026
2015	4.199999809	6.55263332	5.872777	52.57851	9.666905	3.365309
2016	4.099999905	7.11348947	6.727836	51.46542	11.09378	3.267463

Data Source: World Development Indicators

Here, UNEMP = Unemployment, total (% of total labor force) (modelled ILO estimate)

GROWTH = GDP growth (annual %)

INF = Inflation GDP deflator (annual %)

AGEDEP = Age Dependency Ratio (% of working age population)

IND= Industry Value Added (annual % growth)

UPG = Urban population growth (annual %)