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Relationship between Unemployment and Macroeconomics Aggregates: Evidence from Bangladesh

Mohammad Mushfiqul Haque MUKIT^{*1}, Assim Ibrahim ABDEL-RAZZAQ³,
Mohammad Safiqul ISLAM⁴

¹ Department of Economics, Jahangirnagar University, Dhaka, Bangladesh

³ Accounting & Finance Department, Prince Mohammad Bin Fahd University, Saudi Arabia

⁴ Department of Economics, Jahangirnagar University, Savar, Bangladesh

Abstract

This paper examines relationship of unemployment rates with other macroeconomic aggregates in Bangladesh over 1991-2019 using robust econometric analyses. It sheds a light on the fact that GDP growth rate, inflation, and foreign direct investment flows have statistically significant impacts on unemployment rate both in short-run and long-run. More specifically, the paper documents that unemployment rate, GDP growth rate, inflation rate and foreign direct investment flows are co-integrated in long-run at 5% significance level.

Using Vector Error Correction analysis, the paper finds that co-integrated series converge to their long-run equilibrium at a speed of 17.24% per annum at 1% significance level. In case short-run, the study finds that a unit increase in GDP growth rate decreases unemployment by approximately 0.0159 units in short-run at 1% statistically significance level. Likewise, a unit increase in inflation rate will lead approximately 0.004 units drop in unemployment rate at 10% significance level. Plus, it also observes that a unit in Foreign Direct Investment flows causes 0.005 units decrease in unemployment rate in short-run at 5% significance level.

Keywords: Unemployment Rate; Economic Growth; FDI; Inflation Rate; Co-integration.

JEL Classification: B22, B23, E24, E26, E31, J24, R23.

* Corresponding Author

E-mail addresses: mushfig.mukit@gmail.com

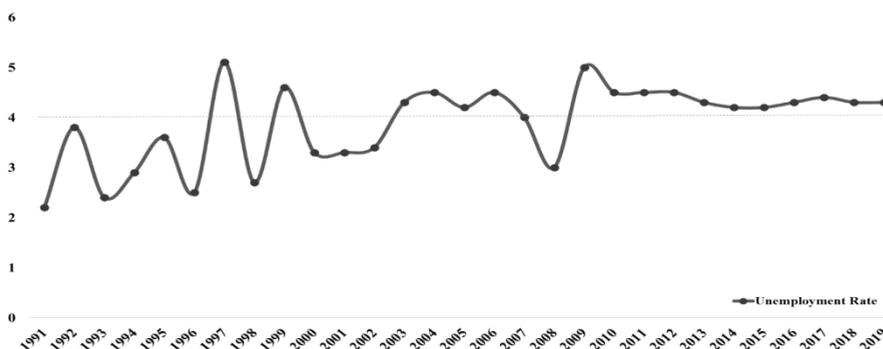
ORCID: <https://orcid.org/0000-0002-7956-484X>

1. Introduction

Unemployment remains one of the world's greatest issues. It is the most persistent challenge affecting all countries that are technologically advanced and weak. 5.7 percent of the global population is unemployed, according to the International Labor Organization (ILO) survey (2017). Nonetheless, Bangladesh faces an austere problem. The unemployment rate measures the number of inactive citizens in Bangladesh, but it is the work force rate that effectively searches into it. 4.18 percent of the country's population is reportedly unemployed, according to the 13th Quarterly Labor Force Survey (QLFS) reported by the Bangladesh Bureau of Statistics in March 2017. The youth unemployment crisis is critical for the economic development of Bangladesh. Over the years, the youth unemployment rate has risen. The World Bank data shows that in 2017, the youth unemployment labor force aged (15-24) was 11.4%. Unemployed graduates in Bangladesh are - in a surprising way.

A big challenge in Bangladesh has been the unemployment situation for university graduates. In some cases, male graduates get more incentives than female graduates. According to the 2015-2016 Quarterly Labor Force Survey of the Bangladesh Bureau of Statistics, the unemployment rate for female graduates is 16.8 percent, almost 2.5 times greater than that for male graduates (QLFS). Growth in the economy helps alleviate unemployment. In 2016, Bangladesh achieved an economic growth rate of 7.11 percent (WDI revised 4-19-2018), according to the Bangladesh Bureau of Statistics (BBS), which beats all previous milestones in the country's economic history. However, despite economic development in Bangladesh, the unemployment crisis has not been resolved. In Bangladesh, the evolution of unemployment is seen by the following figure.

Figure 1. Trend of Unemployment

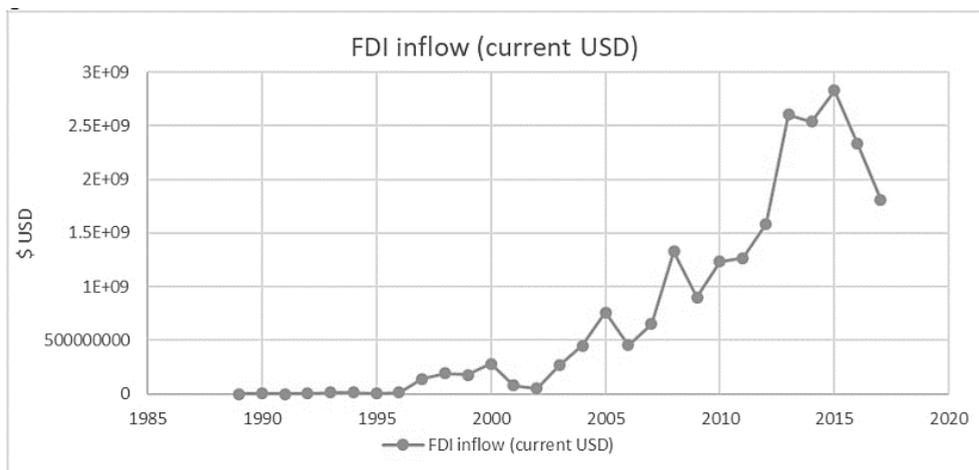


Source: World Development Indicator

Figure 1 shows that the unemployment rate oscillated frequently between 1991 and 2000 and reached an all-time highest value of 5.1% in 1997; due to political chaos and a newly formed government. Then, it has an upward trend until 2004 when fluctuations starts on 2004-2006. Afterwards of 2006, the unemployment rate gets a decreasing trend until 2008. The unemployment rate remained constant at 4.5% between 2010 and 2012. After that period, it gets into stable level of 4.3%

The unemployment rate is closely related with country's economic growth. A country's total production measurement scale GDP is one of the recognized parameter recording the state of an economy. In this research, we proxy the economic growth rate with annual GDP growth rate. From the time of its liberation in 1971, Bangladesh economy has experienced notable progresses. However, the country's growth has been hampered by political uncertainty and dangerous natural disasters. The following figure shows the trend of economic growth in Bangladesh over the period 1991 to 2019.

Figure 2. FDI inflows into Bangladesh (1989-2018)



Source: World Bank(2018)

After the policy reforms to encourage new investment and reward schemes in 1990 and 1995, foreign direct investment inflows have risen dramatically. The lifting of limits on capital and benefit tunnels in the country of origin and the opening up of almost all manufacturing industries to potential foreign buyers was another possible factor. The authorities formed an Investment Board in 1989 (BOI). The primary aim is to construct tunnels and encourage international investment (Mondal, 2003). A linear point of view is that foreign direct investment

(FDI) immensely significant for economic growth. Economic activity and development expedite by the foreign capital. Developing countries have had experience with foreign direct investment and see it as one of the fastest forms of economic change (Makki and Somwaru, 2004). Neoclassical and endogenous growth models establish the most empirical work on the growth parity of FDI. In certain economic state macroeconomic study implies positive relations with FDI and economic state. Though, both are arguable factors in various cases. (Lean and Tan, 2011; Alshehry, 2015; Adhikary, 2015; Gandelman & Hernandez-Murillo, 2009).

Unemployment is a problem of considerable importance to leaders in developed and affluent countries both. About 34 million people have lost their jobs globally due to the global recession of 2007. After the economic recession, the number of unemployed young people has grown from 73.5 million in 2007 to 77.7 million in 2010, from 73.5 million in 2007 (ILO, 2011). Inflation and unemployment, socially and economically annexed, usually sought to establish a relationship between them that is inversely linked when unemployment is toe to tip while inflation is down. If the money supply changes, it indicates to inflation. If the money supply increases, this has a multiplier effect on the prices of goods and services in the economy, which also leads to increase. Goods and services become changes due to inflation of prices. The classic economist indicated that the long-term Phillips curve shaped the natural unemployment rate in the economy. It is said that inflation and unemployment should have no relationship in the long run (Phillips, 1958; Friedman, 1968).

The inflow of foreign direct investment into Bangladesh started in 1994 to interrupt the steady influx of previous years, rising from \$11 million to \$231 million almost twenty times in 1995 and 1996. So this rise in Swift is the product of a set of rewards for hedging. Buyers of foreign direct investment have been granted financial sovereignty for innumerable years, consisting of tax exemptions for innumerable years, a non-binding facility for the import of machinery, 100% goods to abroad and a 100% income return facility, reinvestment of income or dividends as foreign direct investment, some visas, work allows executives abroad, permanent residence or even citizenship to invest a single post, export processing area (EPZ) facility and hassle-free, easy exit facility (Abedin, 2015).

1.1. Objective of the Study

The study will explore the short and long-term relationships between macroeconomic factors and unemployment in Bangladesh. The macroeconomic

variables taken into account are GDP, inflation and foreign direct investment. The following hypothesis is made

H₁: The long-term relationship between unemployment and macroeconomic factors is at a significant level in Bangladesh.

H₂: In Bangladesh, there is a major long-term association between unemployment and GDP.

H₃: The short-term relationship between unemployment and inflation in Bangladesh persists at a substantial level.

H₄: In Bangladesh, there is a major short-term association between unemployment and GDP.

H₅: In Bangladesh, there is a substantial degree of short-term linkage between unemployment and FDI supply.

1.2. Significance of the Research

There is no wide consensus on relationship between unemployment and macroeconomics aggregates in Bangladesh. Many previous studies bring mixed results. This study aim to bring significant findings for these relationships both in short-run and long-run.

2. Literature Review

This section review relevant literature with their methodologies and findings. For instance, Haque and Amin (2018) examine relationship and causalities between foreign direct investment, trade and growth in Bangladesh, taking into account macroeconomic stability. They found unidirectional causalities running from trade openness to GDP and from trade openness to inflation in Bangladesh. They also observe a mutual causal relationship between foreign direct investment and GDP. However, they fail to document causality interactions between inflation and foreign direct investment, trade and foreign direct investment, inflation and GDP. Thus, they conclude that foreign direct investment and trade are two key reasons for economic growth in Bangladesh.

Dey and Awal (2017) study the impacts of foreign direct investment on economic growth in Bangladesh during the period of 1990-2015 by using Ordinary Least Square (OLS) method. They document an inverse relationship between

foreign direct investment and economic growth. They conclude that the negative sign of FDI indicate that Bangladesh should attract FDI by increasing human capital, creating a good political environment and enhancing adequate infrastructure facilities, which will improve our economic growth.

Noor et al (2016) also study significance of foreign direct investments on economic growth of Bangladesh for the period 1981-2010. Using OLS technique, they document positive relationship between GDP growth and FDI, while they observe a negative and significant relationship between GDP growth and inflation.

Jaradat (2013) examines impact of inflation and unemployment on Jordanian economic growth during 2000-2010. He finds a negative relationship between unemployment and economic growth, while a strong positive impact of inflation over the GDP.

Hussain and Haque (2016) analyse relationship between foreign direct investments, trade, and growth rate of per capita GDP for Bangladesh with the help of annual time series data for 1973 to 2014. Using Vector Error Correction Model (VECM) analysis, they find a long-term relationship between these variables. They conclude that the trade and foreign investment variables have a significant impact on the growth rate of GDP per capita. Thus, it is important to frame policies that promote growth and reduce the barriers for capital flows in Bangladesh.

Khan, Khattak and Hussain (2012) examine correlation between growth in gross domestic product and unemployment in Pakistan. As a result, they observe that 1% increase of economic growth reduces unemployment by 0.63%. On the other hand, a 1% drop in unemployment rates will increase GDP growth by 7.25%.

The statistical relationship of unemployment and inflation is widely known as Phillips Curve. Haider and Dutta (2012) examine inflation-unemployment trade-off under Phillips Curve in Bangladesh during 1987-2009. As a result they document the relevancy of the Phillips curve in the Bangladesh economy by confirming strong negative relationship between unemployment and inflation. Moreover, they also find that exchange rates are negatively correlated inflation while international price of crude oil has positive effects on inflation.

On contrarily, Chowdhury and Hossain (2014) document positive relationship between inflation and unemployment rates in their investigation of macroeconomic determinants of unemployment in Bangladesh during 2000-2011 periods using Simple Single Equation Linear Regression Model. They also find negative impact of exchange rates on unemployment rates.

Like these two study there are many conflicting results over inflation and unemployment relationship. However, Sovbetov and Kaplan (2019) bring an explanation for these conflictions. They study this relationship considering tranquil and recessionary economic environment. They employ wide range study by sampling 41 countries and accounting the periods of 1980-2016. As a result they find this statistical relationship is fragile and varies across countries and time periods depending on tranquillity of economic environment. More specifically, they document that the relationship holds in the majority of developed countries, while it fails to hold in emerging and frontier economies even during tranquil periods. They also show that the relationship totally collapses during recessionary periods, even in developed markets. Thus, they conclude that tranquillity of economic environment is significantly important for the Phillip trade-off to work smoothly.

Table 1. Summary of Literature of Relevant Studies

Authors	Findings
Adamu et al. (2015)	An effective and excellent relationship between foreign direct investment and real GDP, an indicator of Nigeria's economic development. The existence of this positive link therefore requires a commitment to implement strategies that attract foreign direct investment, particularly in Nigeria's non-oil sectors.
Adhikary (2015), Ghatak and Halicioglu (2007), Lean and Tan (2011), Alshehry (2015)	An empirical enquiry suggests that economic growth influence by FDI.
Bibhuti (2020), Abdullahi et al. (2012), Nwaogu & Ryan (2015), Makun & Azu (2015)	The experiment has suggested that foreign direct investment as well as other variables for instance- human capital, economic infrastructure and capital formation have positive and important effects on economic growth. Also, commended more open economies, more investments in economic infrastructure and more political engagement in the fight against corruption.
Sovbetov & Moussa (2017)	They document strong positive impact of economic freedom on foreign direct investments inflows in both global and regional analyses involving 156 countries through the period of 1995-2016.

Borensztein et al. (1998)	Measured of foreign direct investment in 69 developing countries during the period 1970-1989 in developed nations. This demonstrates that foreign direct investment is an important route for technology transfer and that it contributes extraordinarily much more to growth than domestic investment. However, FDI only promotes economic growth if the host country can properly absorb the technology.
Wu and Hsu (2008)	The record of 1975-2000 for 62 countries shows the effects of foreign direct investment on economic growth according to different absorption capacities. It implies that FDI is influenced by the initial GDP and human capital factors.
Kornecki and Borodulin (2011)	The study shows that, based on FDI and its importance in the IP, the significant factors are: real income per capita, real spending per capita on education, employment, research and development in foreign direct investment and investment having a significant positive impact on foreign direct investment.
Hussain and Haque (2016), Tang (2018)	Applied VECM, in this enquiry shows that the variables of trade and foreign investment have a major impact on the growth of GDP per capita. Because foreign direct investment and trade are the two essential tools for economic growth in 2006 Bangladesh.

3. Research Methodology

This study examines the relationship of unemployment and macroeconomic parameters in Bangladesh during 1991 to 2018. The study formulates following model with annual data of unemployment rate and other independent variables such as inflation, economic growth and foreign direct investment. The source of the data is the annual reports of the Bank of Bangladesh and the World Bank (1991-2019).

$$U = f(GDP, INF, FDI) \quad (1)$$

$$U_t = \beta_0 + \beta_1 GDP_t + \beta_2 INF_t + \beta_3 FDI_t + \varepsilon_t \quad (2)$$

Where U_t is unemployment rate at time t ; GDP, INF, and FDI are GDP growth, Inflation rate, and Foreign Direct Investments respectively. The betas are coefficients of each related variables and the ϵ is error term of the model.

Due to stationarity requirement of OLS technique, we have examined stationarity all series that are intended to be used in the model using Augmented Dickey Fuller (ADF) unit root test. An important assumption for this test is that the error term is not serially correlated and it is White Noise. The test checks the correlation of errors by adding lags of the series. The ADF test hypothesizes below the H_0 against H_1 where rejection of the null hypothesis confirms stationarity of the series.

H_0 : The data is non-stationary.

H_1 : The data is not non-stationary

A significance level of 1%, 5% or 10% is included in the analysis when making a decision. If the absolute value of the test state is greater than the critical value, we can reject the null hypothesis. However, if the absolute value of the test statistics is less than the critical value, we cannot reject the null hypothesis.

Table 2. ADF Unit Root Test

Variables	Level	1 st Difference
<i>U</i>	-2.29 (0.4374)	-6.02 (0.0000)
<i>GDP</i>	-2.88 (0.1672)	-3.61 (0.0293)
<i>INF</i>	-3.83 (0.0150)	NA
<i>FDI</i>	-2.07 (0.5597)	-4.00 (0.0088)

The results of ADF test reveal that unemployment rates, GDP growth, and FDI are no stationary at their levels, while inflation rates appear stationary. But all these series can be converted into stationary series by using first differentiation methodology. Thus, as they are integrated at same order, we can examine whether these series are co-integrated in the long-run. For this, we employ often used Johansen co-integration test which is based on the maximum likelihood method that provides two main statistics: Trace statistics and Max-

Eigen statistics. If the rank is zero, it means that there is no co-integration relation, and if the rank is one (1), it implies existence of a co-integration equation. Below, we formulate our VAR model for this study where we check for co-integration and its error correction.

$$VAR(p) = \Delta U_t = \alpha_0 + \sum_{i=1}^p \alpha_i \Delta GDP_{t-i} + \sum_{i=1}^p \beta_i \Delta INF_{t-i} + \sum_{i=1}^p \theta_i \Delta FDI_{t-i} + \varepsilon_t \tag{3}$$

$$VECM(p) = \Delta U_t = \alpha_0 + \sum_{i=1}^p \alpha_i \Delta GDP_{t-i} + \sum_{i=1}^p \beta_i \Delta INF_{t-i} + \sum_{i=1}^p \theta_i \Delta FDI_{t-i} + \lambda_1 ECT_{t-1} + \varepsilon_t \tag{4}$$

Where VAR equation is used to examine co-integration and VECM model is used to detect speed of the model in converging its long-run equilibrium. The ECT indicates the cointegration equation and its multiplies λ should be negative and statistically significance in robust VECM models.

4. Results

Below table 3 presents diagnostic results for Vector Auto Regression (VAR) analysis. The diagnostic statistics appear robust for the model where unemployment rate is considered as dependent variable. Thus, we can further continue with co-integration test.

Table 3. Vector Auto Regression (VAR) Test

Equation	Parms	RMSE	R-Sq.	chi2	P>chi2
Unemployment	9	0.424981	0.7820	36.14632	0.0000
GDP growth	9	0.587846	0.8000	29.08123	0.0003
Inflation	9	3.79148	0.0672	1.871623	0.9847
FDI	9	3.50E+08	0.9139	276.1061	0.0000

Table 4 below shows results of Johansen co-integration test for variables of unemployment rate, inflation rate, economic growth, and FDI in Bangladesh during 1991-2018. The test is performed by allowing linear deterministic trend in

data and setting the lag interval as 2 by default. As a result, both Trace and Max-eigenvalue tests indicate existence of 1 co-integrating equation at 5% statistically significance level.

Table 4. Johansen Co-integration Test with Linear Trend and Intercept

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.333198	70.84864	47.85613	0.0001
At most 1	0.126302	26.67503	29.79707	0.1098
At most 2	0.087646	11.95778	15.49471	0.1590
At most 3	0.017816	1.959487	3.841466	0.1616

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.333198	44.17361	27.58434	0.0002
At most 1	0.126302	14.71726	21.13162	0.3092
At most 2	0.087646	9.998291	14.26460	0.2120
At most 3	0.017816	1.959487	3.841466	0.1616

Note: *denotes the rejection of null hypothesis at 5% significance level. ** MacKinnin-Haug-Michelis (1999) p-values

We also have checked other specification of the co-integration test such as no intercept and trend or quadratic trends and etc. Below table 5 summarises all these examinations where all confirms at least one co-integrated equation.

Table 5. Summary of Johansen Co-integration Tests with All Specifications

Data Trend:	None	None	Linear	Linear	Quadratic
Test Type	<i>No Intercept</i>	<i>Intercept</i>	<i>Intercept</i>	<i>Intercept</i>	<i>Intercept</i>
	<i>No Trend</i>	<i>No Trend</i>	<i>No Trend</i>	<i>Trend</i>	<i>Trend</i>
Trace	1	1	1	1	1
Max-Eigen	1	1	1	1	1

Further we employ VECM analysis. The table 6 below illustrates the regression equations using "unemployment" as dependent and lagged values of GDP, inflation and foreign direct investment as independent variables. The ECT indicates co-integration equations and it should be White-noise stationary residual of long-run equation VAR equation. The coefficient of ECT is expected to be statistically significant in the range of -1 and 0 for robustness of VECM model which will show that co-integration series will eventually converge to a long-run equilibrium. In case, the coefficient is estimated positive, then it indicates that the model is suffering of serially correlated residual terms (autocorrelation problem). Or if the coefficient is estimated negative but greater than 1 (in absolute terms), then the model is instable comprising of structural breaks that are needed to be controlled (Sovbetov, 2018).

Table 6. Vector Error Correction Model (VECM)

Unemployment	Coef.	Std. Err.	Prob.
ECT	-0.1724***	0.0653	0.0092
Δ GDP	-0.0159***	0.0061	0.0098
Δ INF	-0.0038*	0.0022	0.0861
Δ FDI	-0.0049**	0.0023	0.0375
Intercept	0.2789	0.6503	0.6680

Table 5 shows that the error correction term ECT appears statistically significant at 1% level with negative sign complying with the ECM theory. It implies that the model seems to be correcting 17.24% of its previous period disequilibrium in the way converging its long-run level. And it would take approximately 5-6 years to reach their final equilibrium stance.

Other coefficients of variables in table 5 indicate short-run impacts on unemployment. Briefly, a unit increase in GDP growth rate decreases unemployment by approximately 0.0159 units in short-run at 1% statistically significance level. Likewise, a unit increase in inflation rate will lead approximately 0.004 units drop in unemployment rate at 10% significance level. It complies with Phillips Curve theorem, but it has a weaker significance in Bangladesh. Lastly, we also document negative and significant impact running from FDI to unemployment in short-run. Its multiplier indicates that a unit increase in FDI flows will cause 0.005 units decrease in unemployment rate in short-run at 5% significance level.

5. Conclusion

Unemployment is one of the key problems in many economies nowadays, especially in less developed countries. Therefore, we study determinants of unemployment in Bangladesh over 1991-2019 using robust econometric analyses. As a result, we document that GDP growth rate, inflation, and foreign direct investment flows have statistically significant impacts on unemployment rate both in short-run and long-run. More specifically, we observe that unemployment rate, GDP growth rate, inflation rate and foreign direct investment flows are co-integrated in long-run at 5% significance level.

In order to examine short-run dynamics and speed of long-run convergence, we have employed VECM analysis. This analysis reveals that model Error Correction Term gets negative value at 1% significance level. Complying with the ECM theory, it indicates that the model corrects 17.24% of its previous period disequilibrium in each period. It shows that the model has 17.24% annual speed of convergence to its long-run equilibrium. Thus, we conclude that it would take approximately 5-6 years to reach their final equilibrium stance.

The analysis also gives plausible results for short-run dynamics of unemployment rate. It shows that a unit increase in GDP growth rate decreases unemployment by approximately 0.0159 units in short-run at 1% statistically significance level. Likewise, a unit increase in inflation rate will lead approximately 0.004 units drop in unemployment rate at 10% significance level. It complies with Phillips Curve theorem, but it has a weaker significance in Bangladesh. In addition, we also document negative and significant impact running from FDI to unemployment in short-run. Its multiplier indicates that a unit increase in FDI flows will cause 0.005 units decrease in unemployment rate in short-run at 5% significance level.

7. Recommendations

The implications of this study show that economic growth rate, inflation rates, and foreign direct investment flows have a significant impact on unemployment rate. The study offers some recommendations, which are given below:

- ✓ Bangladesh can effectively decrease its unemployment rate by stimulating its GDP growth rates.
- ✓ Bangladesh should focus on development of labour-intensive projects and consolidate with new entrepreneurial entrants of current

entrepreneurship operations to build more opportunities and absorb a wide pool of unemployed people.

- ✓ The Phillips curve trade-off between inflation and unemployment appears valid in Bangladesh but its significance is a bit weaker. The government can effectively use this trade-off in order to control the unemployment rates. Fiscal and monetary policy makers need to formulate policies to achieve the required inflation, which can affect the unemployment rate.
- ✓ The Foreign Direct Investment flows also another tool to decrease unemployment rates. Through implementing the joint venture scheme, Bangladesh should attract foreign investments and bring them into the country. It means also import of new technology and creation of new employments. Thus, this will decrease unemployment rate gradually.
- ✓ Foreign direct investment generates employment, more socio-economic growth sectors such as agriculture, education, IT, pharmaceuticals, fisheries, cattle farming, ready-made clothes, electricity, gig economy, entrepreneurship, etc should be funded by the government of Bangladesh, and private investors should also be allowed to spend more in the economy.
- ✓ It is important to prioritize foreign direct investment and domestic investment to reinvigorate our economy. To some point, where we are less concentrated on it, our neighbouring country relies more on FDI. We should apply policies to develop our economy in order to keep pace with the global trade pace. We have seen a vast influx of economic growth in Bangladesh in recent years. Expecting potential researchers to improve FDI and the form of policies or interventions that can raise FDI flows.

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