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Diploma Thesis

**Thesis Topic: Statistical analysis of unemployment in
Bangladesh**

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DIPLOMA THESIS ASSIGNMENT

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Economics and Management

Thesis title

Statistical analysis of unemployment in Bangladesh

Objectives of thesis

The main objective of the thesis is to describe the development of selected unemployment indicators in Bangladesh and to identify the impacts of selected factors on the unemployment rate. Based on the theoretical framework and relevant scientific literature, the main factors affecting the development of unemployment and its structure will be included.

Methodology

Within the practical part, I will use the selected methods for time series analysis and regression and correlation analysis. The empirical part is based on a secondary source of quantitative data, which is described below:

- The annual data will be ranged from 2010 – to 2021. The specific analysis will be done between 2019 and 2020 to see how the current pandemic situation has caused unemployment to a drastic increase.
- The data is taken from the World Bank, World data, and the Statistics Office of Bangladesh.

The proposed extent of the thesis

60-80 pages

Keywords

Unemployment rate, Inflation, Human capital, Human development Index, Foreign Direct Investments, Migration level.

Recommended information sources

- AKTER, N. Unemployment Problem in Bangladesh and Its Impact on Economic Growth. 2020. Dhaka, Dhaka Press. ISBN: 978-885-5123-423..
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Declaration

I declare that I have worked on my diploma thesis titled "**Statistical analysis of unemployment in Bangladesh** " by myself and I have used only the sources mentioned at the end of the thesis. As the author of the diploma thesis, I declare that the thesis does not break any copyrights.

In Prague on 30th March,2023_____

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Statistical analysis of unemployment in Bangladesh

Abstract

Unemployment is considered to be the major problem in almost every country; however, some level of unemployment demonstrated the health of economy. This study investigates the impact of macroeconomic variables such as (inflation rate, growth rate of economy, total export, total import, number of enterprises, tax rate, foreign direct investment inflow) impact the unemployment rate in Bangladesh. The author considers the time series data from the period of 2010 up to 2021. The thesis also focuses on the definition of unemployment and its types and what type mostly prevails in Bangladesh. The theoretical part covers the economic background of Bangladesh. The author runs the MLRM to see the correlation of all the mentioned variables with unemployment rate. The methodology chapter describes more detailed methods that are applied within empirical part. Moreover, the author highlights the overall impact of the mentioned macroeconomic variables and proposes own recommendations in the chapter of conclusion.

Keywords: Unemployment rate, Inflation, Human capital, Human development Index, Foreign Direct Investments, Migration level.

Statistická analýza nezaměstnanosti v Bangladéši

Abstrakt

Nezaměstnanost je považována za hlavní problém téměř v každé zemi; určitá míra nezaměstnanosti však prokázala zdraví ekonomiky. Tato studie zkoumá vliv makroekonomických proměnných, jako je (míra inflace, tempo růstu ekonomiky, celkový export, celkový dovoz, počet podniků, daňová sazba, příliv přímých zahraničních investic) na míru nezaměstnanosti v Bangladéši. Autor se zamýšlí nad daty v časové řadě od roku 2010 do roku 2021. Práce se dále zaměřuje na definici nezaměstnanosti a jejích typů a na to, jaký typ nejvíce převládá v Bangladéši. Teoretická část pokrývá ekonomické pozadí Bangladéše. Autor spouští MLRM, aby zjistil korelaci všech zmíněných proměnných s mírou nezaměstnanosti. Metodická kapitola popisuje podrobněji metody, které jsou aplikovány v rámci empirické části. V kapitole závěru autor navíc zdůrazňuje celkový dopad zmíněných makroekonomických proměnných a navrhuje vlastní doporučení.

Klíčová slova: Míra nezaměstnanosti, Inflace, Lidský kapitál, Index lidského rozvoje, Přímé zahraniční investice, Úroveň migrace.

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Introduction

Unemployment is considered as one of the crucial economic aspects of any economy on a global scale, which indicates an economic health of a state. Most industries have faced such a phenomenon, especially in poor countries. It is defined as a condition under which, population or individuals are not able to find a job or a work, however, actively searching for it. The most recognized problem of Bangladesh is the lack of technological development, which is directly linked to the economic growth, hence the unemployment as well. Additionally, the demographic change and its development, immigration from rural areas to urban areas, production of electricity. Yet, the problem of unemployment is caused by youth unemployment, which is vital for sustainable development. The graduates face a lot of obstacles to find a job, based on the recent data of World Bank (2018).

Khan (1985) has claimed that there is no other state that faces a problem of unemployment to such extent as Bangladesh. However, this statement is old enough to be true nowadays, the author is interested in knowing the roots of unemployment in Bangladesh. He also differentiates the unemployment phenomenon and people who are not able to accept an amount of income offered by an employer.

Rothiem (2007) describes that unemployment as an indicator that illustrates how the economy uses its domestic resources and capital to maximize the profit. When the economy is at its full potential and consequently the unemployment rate is lower than 1.5 %, people are able to work at a partial wage rate. The unemployment rate of Bangladesh since 2000's has been quite stable, however, after the impact of „Global Financial Crisis of 2008¹ the unemployment rate has slightly increased. The most recent crisis of COVID-19 had impacted the indicator in a negative

^[1] The 2008 financial crisis began with **cheap credit and lax lending standards that fueled a housing bubble**. When the bubble burst, the banks were left holding trillions of dollars of worthless investments in subprime mortgages. The Great Recession that followed cost many their jobs, their savings, and their homes.

way. This paper is prepared to demonstrate the effect of macroeconomic and microeconomic indicators on the development of unemployment over the period of 22 years, from 2000 to 2021.

1 Objectives and Methodology

1.1 Objectives

The main objective of the thesis is to evaluate the impact of macroeconomic variables such as inflation rate, growth rate of economy, total export, total import, number of enterprises, tax rate, foreign direct investment inflow and how they impact on the unemployment rate in Bangladesh.

1.2 Methodology

The chapter outlines the methods that were used in this study, the process of collection and analysis applied within the empirical part. Bangladesh is considered to be the most densely populated country in the world; however, its economy is considered to have developed traits. Still the unemployment rate is a serious problem of Bangladesh.

The thesis is divided into two parts, theoretical part and practical (empirical) part. The theory covers the essence of unemployment, its types, consequences, and the spillover effect of different macroeconomic variables on unemployment.

1.2.1 Estimation technique

The study is mostly based on the descriptive statistic, mostly on the quantitative data (discrete) which was available online, mostly from World Bank or Bangladesh Bureau of Statistics, annually. However, before running any test, the a must make sure that our model:

- **Normally distributed.**

Normality test assumes that the residuals of the model are normally distributed. It is highly important for hypothesis testing. It is a mandatory requirement of a linear regression model (Carlo, 2020) whereas:

H₀: Normally distributed.

H₁: Not normally distributed.

Usually, the violation of normally distribution of residuals happens when a sample size is small Strickland (2014). For bigger sample size, the theory of central limit comes into place.

- **Model Verification**

Before using, importing, or otherwise processing data, data validation refers to verifying the quality and correctness of the original dataset. Based on the limits or aims of the destination, many methods of validation can be carried out. Data cleansing also includes data validation. In this thesis, the model verification will be tested at 0.05 % alfa.

- **Autocorrelation**

It is known as serial correlation with the values ranging from -1 to 1. The value from -1 to 0 represents negative correlation whereas, values from 0 to 1, shows positive correlation. The mostly known test for autocorrelation is the Durbin and Watson statistical test.

Table 1: Durbin and Watson Test, interpretation.

<i>d</i>	<i>Interpretation</i>
<i>d = 2</i>	<i>No autocorrelation (p = 0).</i>
<i>d < 2 (d = 0)</i>	<i>Positive autocorrelation (perfect positive autocorrelation e.i p = + 1).</i>
<i>d > 2 (d = 4)</i>	<i>Negative autocorrelation (perfect negative autocorrelation i.e p = - 1)</i>

Source: (Broersen, Piet. M.T., 2006).

In order to calculate the autocorrelation, we need to determine the upper and lower critical values, which are dependent on the number of observations and the number of independent variables.

- **Multicollinearity**

Several explanatory variables in a model that are correlating from a statistical concept known as multicollinearity. If a pair of variables have a correlation degree of +/- 1.0, they are said to be perfectly collinear. Less trustworthy statistical judgments will be the result of multicollinearity between explanatory variables.

- **Heteroskedasticity**

2 Theoretical Part

This chapter is dedicated to the theoretical background which concerns “Unemployment” as a phenomenon that is taken as a negative effect in relation to an economy development. However, not all literature reviews consider “Unemployment” as a bad thing, some researchers and economists consider that as a vital part of economy. Thus, it is very relevant to study the phenomena from different angles.

2.1 Meaning of unemployment.

The unemployment is the phenomena that is explained by the fact that people are ready and physically are capable to perceive the effective wage level but are disabled to get employed. This is a part of an economic process that never equals to 0, as there are always some people who are unemployed, due to many reasons, such as economic instability of a country, physical disability of individual or just because of unwillingness of an individual (Bayer, 2011). Whereas, if unemployment rate reaches over 10 %, this

Mitchell (2017) claims that unemployment could be caused by several factors, such as: social, economic and politic factors, policies, education system and financial support, the mentioned factors are mentioned below, in **Table – 1**.

Table 2: Causes of unemployment.

Factors	Reasons
Social	Social implications of a country could massively impact the unemployment rate and hence making choices and its complications. This can certainly lead to negative things in life.
Economic and political factors	The availability of jobs could show how well the economy is doing and compensation from the work is impacted by it.

Policies	Policies can either complicate or help an employment process, however, overall policies should help people to find the employment.
Educational system	The lack of education increases the number of unskilled workforces that eventually limits getting an employment for population of a state.
Financial support	Employment is availed in case when there is a lack of both financial supports, individual funding and governmental spendings in the sector of education. A good financial support can improve education hence increases the skilled labor force.

Source: Adopted from Mitchell (2017).

A major aggregate determination of unemployment is directly linked to the labor size (Yenturk and Baslevent, 2007). Holding other factors constant, a greater number of people in the labor market mean a greater number of jobs required to allocate them. However, there are many research papers that were done to research a topic of unemployment.

Unemployment can harm any economy with a serious consequence if it is not addressed or fixed on time. It affects an economy in the long – run. However, the factors mentioned above are very much limited. For example, Baslevent et al. (2007) claimed that cultural factor is also sensitive for some nations, not allowing females to participate in school classes, which is a subject of “**Youth unemployment**”². The author will consider that factors, when analysing a working group age of Bangladesh. Additionally, personal factors of unemployment are also crucial for an overall subject of “unemployment”.

^[2] Youth unemployment – is expressed as a percentage of the youth labor force that is unemployed between the ages of 15 and 24. Those who report being unemployed, being available for work, and having actively sought employment in the previous four weeks are unemployed.

2.2 Types of unemployment

Houser and Burrows (2018) Frictional, cyclical, structural, institutional, and seasonal unemployment are just a few of the several types of unemployment that exist. Both voluntary and involuntary unemployment are the foundation of both sorts of unemployment. When a person in a country willingly changes jobs, it is said that they are experiencing frictional unemployment. Unemployment and the length of time it takes to find another job are related; it may take some time before someone finds work. It may take some time for some people to find the desired work after moving to a new area to look for employment. The period of time before finding employment is also connected to frictional unemployment when new graduates start their job search. Depending on the availability of, the duration can be very short or longer.

2.2.1 Seasonal unemployment

Seasonal unemployment, influenced by the construction, tourism, agriculture, and other industries and sectors that provide seasonal goods and services. It occurs when people are jobless at specific seasons of the year when there is a lower-than-normal demand for labor. Seasonal unemployment is the term used to describe a brief period of time when there are fewer job opportunities for people.

Qachmas (2020) states that an agriculture industry would be the primary focus for the developing countries. Unless specifically stated, it is anticipated that a significant portion of the poor world would continue to experience seasonal poverty and food insecurity. It's safe to say that the majority of catastrophic famines around the world occur during the annual hunger season, a time when crop stocks from previous seasons have dropped, basic necessities are more expensive, and salaries are low due to a higher rate of unemployment in the sector (Chambers, 2009).

Crop failure, a meager yield, and extreme weather conditions frequently exacerbate agricultural seasonality. On the other hand, unlike deprivation, seasonal poverty may not be noticeable enough to cause a public uproar, even though it can have long-term, lasting effects on children's health and development and adult productivity.

Other than state economic diversity, basic changes in agro - climate and environmental endowments, in addition to agricultural seasonality, may alter the seasonality of household income and consumption. These ratcheting effects may also result from the many survival strategies adopted by poor households, such as mortgaging or selling their farm, lands, and other assets, and pre-selling crops and labor.

Crop failure, a meager yield, and adverse weather conditions frequently make agricultural seasonality-induced deprivation worse. Seasonal deprivation differs from scarcity and poverty in that it may not be noticeable enough to elicit public protest, yet it can have long-term, irreparable repercussions on children's health and development as well as adult productivity. These "ratchet" effects might also be the result of the various management techniques that poor families adopt to make ends meet, such as mortgaging or selling their land and other assets and selling crops and labor in advance. The underlying variations in agroclimatic and ecological endowments, state economic variety, and agricultural seasonality may affect the seasonality of income and consumption.

The consequences of seasonal shortages on overall poverty may not be captured by annual poverty metrics, and annual monitoring of national or local poverty may not help to establish the specific policies required to overcome seasonal deprivation. Like how local poverty can be exacerbated by seasonality in agriculture, seasonal poverty can likewise exacerbate local poverty in the sense that local poverty and seasonal poverty may be intertwined (Khandker & Samad, 2016).

2.2.2 Cyclical unemployment

Economic experts identified cyclical unemployment, often known as Keynesian unemployment or demand deficient unemployment. This kind of unemployment typically occurs when several businesses discover that their business is losing money and that their sales are dropping. Due to the retrenchment that the companies undertake to survive the recession, they will therefore cut budget on the production side, and employees start to lose their jobs (Solon and Michaels, 2009). They also claim that it is usually caused by a business cycle recession. Cyclical unemployment that resulted from a downturn in the business cycle. When the economic cycle

reaches its highest point and the base economy produces its greatest amount of total production, the cyclical unemployment level is often low. The economic cycle is at its trough when total output declines as measured by the GDP, and the cyclical unemployment rate rises. In addition, cyclical unemployment occurs when there aren't enough job openings for the number of people who are actively seeking employment during a recession. Lack of spending and consumption across the board contributes to a lack of employer demand, for instance, during non-winter months and housing booms, the housing sector hires more workers for sales and construction jobs.

2.2.3 Frictional unemployment

The time needed to match experienced resources with productive operations is credited with causing frictional unemployment. Since resources—most often labor—are moving from one manufacturing activity to another, this sort of unemployment develops. Employers look for workers in this situation, and workers are look for employers, therefore there is no fit between the two parties. Due to incomplete information, which is frequently brought on by the geographic separation between resources and producers, the observed mismatch occurred. It typically originates from college graduates, the unemployed, and people who are actively looking for work (Layard and Jackman, 2005). The time needed to match experienced resources with productive operations is credited with causing frictional unemployment. Since resources, most often labor, moves from one production activity to another, this sort of unemployment develops. Employers look for workers in this situation, and workers look for employers, therefore there is a fit between the two parties. Due to incomplete information, which is frequently brought on by the geographic separation between resources and producers, the observed mismatch occurred. It typically originates from college graduates, the unemployed, and people who are actively looking for work.

Every economy requires this kind of unemployment badly since it indicates the health of the economy. Frictional unemployment is typically associated with rapidly increasing economies that are characterized by a labor force that is becoming more mobile, adaptable, and flexible.

Workers greatly benefit from frictional unemployment because it offers individuals the chance to look for jobs that are a great fit to them (Passarides, 1990). As there is always a drive to work more in the new job leading to higher production, this encourages quality in the creation of products and services, resulting in a stable economy. Since it allows them to choose among the top talents, it is also advantageous to businesses and corporations. In the event that an economy lacks frictional employment, workers would be stuck in their current positions indefinitely, which would result in a system that is not only uninnovative but also rusticates skills. It is essential to an economy because it balances the market by matching the supply and demand for labor (Kim, 2010).

2.2.4 Structural unemployment

When there is a new change in how a business operates, in technology, and in manufacturing, structural unemployment occurs. Employees who lack the necessary abilities for the new adjustments will be let go when a corporation adjusts to a new technology system or process. Retraining of staff or employees will be required so they can use the company's new systems (Wolcott et al., 2020). Another reason for structural unemployment is an agreement between countries.

Trade agreements like the North American Free Trade Agreement are a second factor. Many factories moved to Mexico after NAFTA³ first loosened trade restrictions. They failed to provide a job for their former workers. One of the fundamental reasons for unemployment in the country was revealed to be the agreement (Alrasheedy, 2019).

There are several factors to consider that directly impact on a change of the structural unemployment, See, **Table – 3**.

^[3] NAFTA – North Atlantic Free Trade Agreement - is an international agreement signed by the governments of Canada, Mexico, and the United States, creating a trilateral trade bloc in North America. The agreement came into force on January 1, 1994. The goal of NAFTA is to eliminate all tariff and non-tariff barriers of trade and investment between the United States, Canada and Mexico.

Table 3: Driving factors of unemployment

Driving factors	Detail
Improving economic cycle	Could ensure a greater long-term employment presence for the labor class that had previously struggled to find long-term employment (and vice versa for opposite phases)
Active labour market policy	Supporting population groups actively who are denied permanent employment because they lack the necessary certifications and skills
Policy	An older population with fewer young people could compositionally record lower unemployment; the exit of significant ageing population groups from the labor market could at least temporarily result in increased hiring of previously excluded groups in the labor market; however, overall, ageing and a decline in working-age population
Improvements in education and human capital aspects	This can result in a drop in unemployment and a structural gain in employment.
Mobility of labor and other factors that contribute to the efficient labor market	Higher labor mobility makes it simpler and quicker to match job openings with those who are already unemployed, which lowers the unemployment rate.
Labour productivity growth	Productivity of labor might immensely contribute to the wealth of trade and might bring a country’s competition level on another level, resulting in higher aggregate and labor supply.
Employment strictness of protection legislation.	High expenses associated with terminating employees could increase unemployment rates; as mentioned above, a moderate level of protection may be advantageous for fostering growth in overall productivity.

Source: All based on different literature review combined together, the whole list will be listed in the section of “References”.

2.3 Literature review on “Unemployment”

Calmfors and Holmlund (2000) studied the relationship between economic growth and unemployment, a partial survey was conducted that eventually demonstrated the equilibrium unemployment components and in relation to long-term growth and unemployment. The relationship between long-term growth and unemployment was proven to be ambiguous. The authors also showed that there might be both positive and negative effects of unemployment on long-term growth.

Cashell (2004) did a study and noted the correlation between inflation and unemployment. Study years were 1997 to 2001. The author discovered that there was relatively little sensitivity of inflation to changes in unemployment. He came to the conclusion that current natural rate calculations indicated that rates of unemployment below 5% would ultimately increase the rate of inflation.

Kitov (2006) examined a report on the relationship between inflation, unemployment, and labor force changes in the USA between 1960 and 2004. The dependent variable chosen by the author was unemployment, and the explanatory variables were inflation and changes in labor. He explained how the Census Bureau of the United States' estimate of the population was a crucial tool for analyzing long-term trends in job shifts. Additionally, economic expansion and inflation were separate phenomena that were both driven by a large number of individuals.

In a study published in 2006, Khaliq, Soufan, and Shihab examined the relationship between GDP growth from 1994 to 2010 and unemployment in 9 Arab nations. To build the long-term model, they used the unit root test methodology and Pooled Estimated Generalized Least Squares, EGLS (Cross-Section Least Seemingly Unrelated Squares, SUR). They found that the rate of unemployment was significantly and adversely affected by economic growth. The figures showed that a 1% rise in economic growth would result in a 0.16% decrease in the unemployment rate.

In new European Union member states, the relationship between inflation and unemployment was examined from 1994 to 2005, according to Pallis (2006). Annual statistics were reported to the new 10 EU member states from the European Commission in 2004. The price deflator of

GDP at market prices, nominal pay per employee, and total employment rate (%) were the variables considered in this study. For the analysis, the author employed the nonlinear least squares method and E-views techniques. According to the study's findings, the application of similar policies throughout the economy may be in doubt because they have a variety of effects on unemployment and prices.

In a research published by Wajid and Kalim (2010) studied the impact of economic growth, trade openness, urbanization, and inflation on unemployment in Pakistan over the period of 1973 to 2010. They used the Johansen-Juselius Maximum Likelihood Approach to determine the effect of explanatory variables on unemployment and the Augmented Dicky Fuller Test to examine stationarity. They discovered that long-term inflation significantly increases unemployment, and both long-term and short-term economic growth had significant negative effects.

Tunah (2010) did research and looked at the macroeconomic factors influencing Turkey's unemployment rate. For this study, data were gathered on a quarterly basis from 2000 to 2008. In order to do the analysis, the author employed the Augmented Dicky Fuller test, the Phillip-Perron test, Johansen's Cointegration, and the Granger causality technique. The findings supported a substantial relationship between real GDP, the consumer price index, and the unemployment rate's prior rate of unemployment. The findings also showed that unemployment is unaffected by the real exchange rate.

In a study they did by Aurangzeb and Asif (2013) looked at the macroeconomic causes of unemployment. Pakistan, China, and India were the countries that authors picked for the analysis. From 1980 through 2009, data were gathered. Unemployment, inflation, gross domestic product, the pace of change, and the rate of population growth are among the study's factors. They built a model based on theoretical research and empirical literature and employed the co-integration approach, granger causality analysis, and regression analysis.

The impact of unemployment and inflation on the GDP in Jordan was researched and explored by Jaradat (2013). Data was gathered between 2000 and 2010. The author tested the relationship between the dependent (GDP) and independent variables using the SPSS program (inflation

and unemployment). The study's model was a linear regression one. The results showed an inverse relationship between unemployment and GDP and a positive relationship between GDP and inflation.

Chowdhury and Hossain (2014) claimed that unemployment, or underutilization of human resources, is a key factor in the expansion of economies. They looked into macroeconomic factors affecting Bangladesh's unemployment rate from 2000 to 2011. To investigate the causes of unemployment, they employed the SSELRM, or Simple Single Equation Linear Regression Model. They used the unemployment rate as a dependent variable, the GDP growth rate, the exchange rate, and the inflation rate (based on the CPI) as explanatory factors. The regression analysis produced meaningful results for them. According to the study's findings, GDP growth rate and exchange rate had an opposing effect on unemployment, but inflation had a positive influence on it. They encouraged policymakers to enhance income distribution in order to improve the influence of growth on the employment rate.

The effects of economic development, exports, and foreign direct investment inflows on unemployment in Turkey were researched by Bayar (2014). The study period, according to the author, was from 2000 to 2013. He used the Augmented Dicky-Fuller test to determine whether time series were stationary and the Autoregressive Distributed Lag (ARDL) and Error Correction Model (ECM) to look into the long- and short-term relationships between unemployment and economic growth, exports, and inflows of foreign direct investment. He found evidence of a long-term link between the factors. He also revealed that unemployment had a positive relationship with foreign direct investment inflows and that it had a negative relationship with economic development and export. However, depending on whether they were green field or brown field investments, FDI inflows often had a different impact on unemployment. Due to the fact that Turkey had been a brown field investment, FDI inflows did not lead to the creation of jobs there. The author suggested that Turkey implement strategies to draw green field investment for job creation.

Abbas (2014) studied how Pakistan's economic expansion affected unemployment there. 1990 to 2006 was the study period. They used the boundaries testing method known as

Autoregressive Distributed Lag (ARDL). The study's findings showed that there is a long-term, significant, and inverse relationship between growth and unemployment, but there is no such relationship in the short term.

In the short run, the parameter coefficient was insignificant. A number of diagnostic tests were used to confirm the calculated model strength, including the Autoregressive Conditional Heteroscedasticity (ARCH) test to determine heteroscedasticity, the Lagrange multiplier test to determine whether or not the model had serial correlation, and the Jarque-Bera test to determine whether or not the residuals were normal. The results showed that the residuals were normally distributed and that there was no serial correlation or heteroscedasticity in the model. The study suggested that actions be done to make economic growth a long-term influence in lowering unemployment.

In a study titled "Unemployment and Economic Growth of Developing Asian Countries: A Panel Data Analysis" by Imran et al. (2015), the link between unemployment and economic growth was examined using novel regression estimations. The study period lasted from 1982 to 2011, and the authors chose 12 Asian nations. The production level (i.e., per capita GDP) in this study was shown to be a function of both labor supply (measured by the nation's labor force) and capital (measured by Gross Capital Formation). They employed fixed effects, the Pooled Ordinary Least Square (OLS) approach, and time effects to determine how unemployment affected these nations' economic growth. They found that rapid increase in GDP per capita was inversely related to high unemployment rates. The study's conclusions also examined the supposedly considerable impact on economic growth of other factors, such as inflation, population growth, trade openness, etc.

Makun and Azu (2015) looked at the connection between investment, unemployment, and economic growth in Fiji. For this investigation, they gathered data from 1982 to 2012. The long-term relationship between growth and unemployment was the subject of the authors' investigation. They used the unit root test, the dynamic error correction model, and the Johanson Cointegration test. According to the study, investments have a favorable impact on economic growth in the long run and that there is an inverse relationship between output growth rate and

unemployment. Investment remained one of the key factors in lowering unemployment and, thus, promoting economic growth. According to the authors, economic policies should be strengthened in order to boost investment. Cheema and Atta (2014) used time series data from 1973 to 2010 to explore The Economic Determinants of Unemployment in Pakistan using the ARDL bound technique. They discovered that while unemployment is positively correlated with the output gap, economic uncertainty and productivity are inversely correlated with gross capital investment and trade openness, accordingly.

Strat et al. (2015) examined the connections between FDI inflow and unemployment. For this study, which examined the most recent thirteen EU member states, data were gathered annually from 1991 to 2012. They used the Toda Yamamoto (T-Y) method to investigate the short-term causal relationship between FDI and unemployment. They employed this technique because level Vector Autoregressions (VARs) may apply it to account for normality and co-integrated parameters. They looked into the temporal causal relationship between FDI and unemployment. The article's findings indicate that there is neither causal relationship between FDI and unemployment in six countries, while there is one for the remaining states.

There have been multiple studies conducted on the relationship between unemployment and other macroeconomic variables, but fewer have sought to identify the factors that affect unemployment, or the key variables that influence unemployment. Based on data from Bangladesh's economy, this study aims to investigate the factors that contribute to unemployment.

2.4 Determinants of unemployment

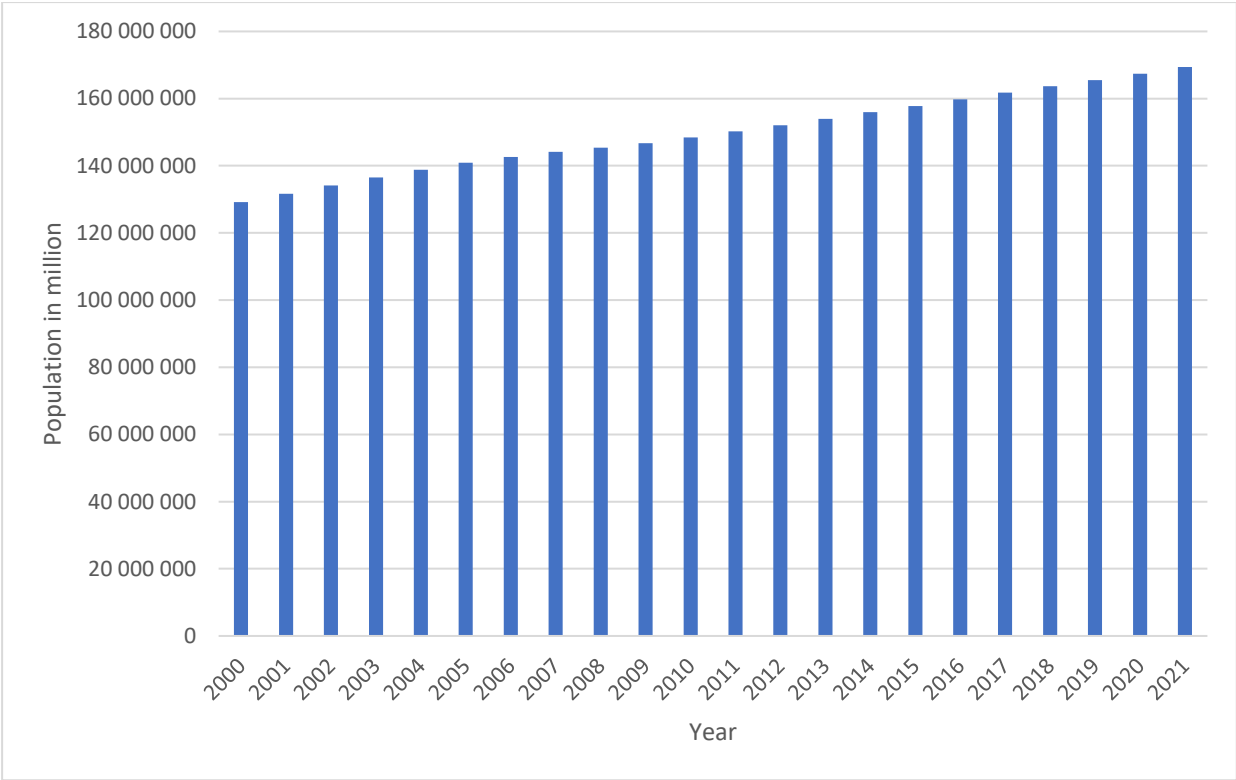
This chapter is devoted to explaining the main factors that impact an unemployment rate in Bangladesh. These factors either directly or indirectly possess the impact, thus it highly important to describe those factors in order to understand the volatility of unemployment rate in Bangladesh.

2.4.1 Population or overpopulation, what is better?

Population is considered to be one of the main factors of unemployment rate. It is almost impossible to have the balanced population within a country. However, it is considered that a population rate increases or should be increasing annually by 2% to 7 %. Although, having an overpopulated country could potentially lead to a massive unemployment and consequently big poverty rate, which subsequently decreases the level of life in such cases. So, it is neither good nor a bad case scenario for Bangladesh. The high unemployment rate in Bangladesh is mostly due to a faster pace of population increase and general overcrowding. People are moving here in increasing numbers. More than 18 million people currently reside there. This is a major issue. Bangladesh experiences a lack of investment in comparison to the overall inhabitants of the nation. Numerous people struggle to obtain employment due to the big population. There is a lack of open positions due to rising overpopulation. Population growth is having a detrimental effect on advancement and is already being felt (Akter, M., 2018).

As seen on the **Figure – 1**, the population of Bangladesh has been constantly increasing, however. This particular indicator will be analyzed in the relationship with the unemployment rate in the empirical part.

Figure 1: Population of Bangladesh, trendline from 2000 to 2021



Source: Own processing, data retrieved from WorldBank (2022)

2.4.2 Economic Growth of Bangladesh

Bangladesh's economy is still underdeveloped, but it is advancing. Three factors are crucial to Bangladesh's economy: remittances, the reserve money guarantee program, and agriculture. These four places were affected by overpopulation (Alam Nur Alam and Hoque, 2020). That's not what's best for Bangladesh. To lessen the pressure placed on these industries, Bangladesh must innovate in a wide range of various labor domains. Following that, people will be employed.

Every type of preparation for economic development must include a study of economic growth. Despite numerous challenges such as common instinctual crises, corruption, diplomatic turmoil, and undoubtedly with an encounter of the a disastrous armed conflict in 1971 and the massive burden of a large number of poorly competent inhabitants, Bangladesh, once one of

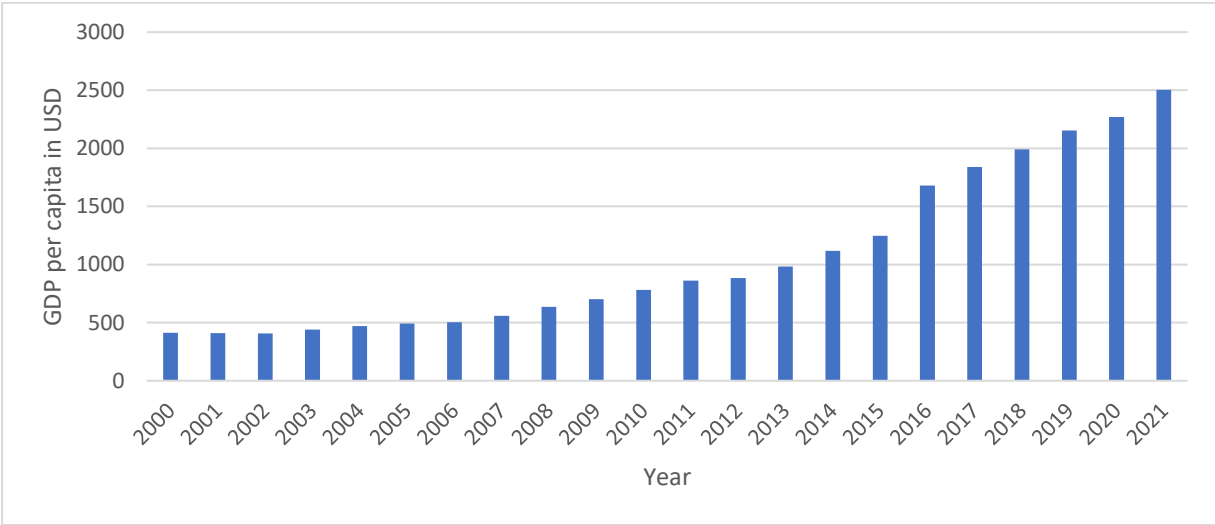
the poorest states in the world, has obtained significant economic growth over the last two decades and today viewed to possess a member of the "Next 11" nations to power the world economy (Goldman Sachs, 2015). With a growth rate of 7.86%, it is currently one of the world's five fastest-growing economies after Henry Kissinger had called it a "never-ending carrier" (Dhaka Tribune, 2018).

Bangladesh's economy was divided into 3 main sectors: agriculture, industry, and services (Rahman et al. 2011). The three parts are occasionally referred to as the primary source of national economy. Firstly put (agricultural), secondary (SME), and tertiary (service) sectors (Nipa, 2012). Agricultural consists of fishing, forestry, and farming. Garments, mining, manufacturing, energy generation, and building are all examples of industry (Nipa, 2012). The government, communications, transportation, banking, and any other private economic operations that don't generate tangible items are all included in the service sector (CIA, 2019). A reminder that every year, the Ministry of Finance produces a macroeconomic assessment that breaks down Bangladesh's economy into five sectors: agricultural, industry, state-owned companies, power and energy, and transportation and communication. However, the Ministry of Finance (2019) listed main sectors where most of the employed people are involved:

- Mining and quarrying
- Manufacturing
- Utility sector (waste management, water supply, electricity)
- Wholesale and retail trade
- Financial insurance services and financial activities
- Real estate activity
- Scientific and technical activities
- Administrative and support services
- Public administrations (hospitals, military services, defense, education).

However, most of the employed sector of Bangladesh is the agrarian sector because it has experience structural reforms which focused on manufacturing and services. However, besides that, Bangladesh's economy is one of the world's fastest growing. But it didn't happen overnight. Bangladesh was impoverished once it gained independence in 1971. The GDP growth rate in 1972 was -14%, and the country was unstable in terms of annual Growth rate in the first decades after freedom. In the time period, political turmoil was widespread, and the country was ravaged by recurrent disasters and hunger. However, after 1975, it really never faced negative economic growth, and the economy stabilized after 1980. More significantly, it has preserved an approximately 5% growth rate over the past two decades. Bangladesh's GDP growth rate is now expected to reach 8% in 2020, the highest in any Asian country (World Economic Forum, 2019).

Figure 2: GDP per capita, time series, 2000 - 2021.



Source: Own processing, data adopted from WorldBank (2022).

The GDP per capita has been growing as the economy has become more stable. The slowing of population growth is also contributing to a rise in per capita income.

The biggest shift occurred from agriculture to industry and manufacture. Agriculture's proportion of GDP has decreased from 62.5% in 1971 to 14.42% in 2020, while industry's part has climbed from 6.5% in 1971 to 26.2 % in 2020. The construction sector's contribution has

also expanded dramatically. The growth in government expenditures on creating necessary facilities, as well as people's expenditures on homes as their wages rise, generates such a boom in the construction sector. The ratio of agricultural employment has decreased as agriculture's part of GDP has decreased. Nonetheless, it remains one of the most important job sectors of Bangladesh, employing 37.64% of the total working age population.

Table 4: Contribution of each sector to GDP (in %)

Economic sectors	1972	1980	1990	2000	2010	2020
Agriculture	62.15 %	50.1 %	40.9 %	23.25 %	19.5 %	14.42 %
Industry and Mining	6.5 %	10.5 %	10 %	20.1 %	23.5 %	26.2 %
Constructions	3.7 %	6.1 %	6.5 %	9.8 %	8.5 %	10 %
Power, Gas and Water services	0.5 %	0.3 %	1.2 %	2.2 %	1.7 %	1.9 %
Transport, Storage and Communication	9 %	8.7 %	13.2 %	11.25 %	14.2 %	12.5 %
Trade Services	9.2 %	9.7 %	9.5 %	16.6 %	17.6 %	16.9 %
Public Services	2.5 %	3.8 %	5.7 %	3.5 %	4.8 %	5.6 %
Banking and Finance services	1.5 %	1.25 %	2.5 %	2 %	4.2 %	5.1 %

Source: Own Processing, World Bank (2020).

Khan et al. (2018) claims that the economy of Bangladesh is unevenly distributed across the country and its regions, each region performs at its own pace. For example, many researchers for example, reveal that there is a significant gap in the income inequality and other macroeconomic factors such as educational attainment, enrolment in academic system,

employment rate, and so on among all areas of Bangladesh. Even those indicators illustrate the disparity in the economic growth of Bangladesh.

Regional disparities in economic growth are a typical phenomenon that is seen in both developed and developing countries since economic growth does not occur at the same rate in all parts of a country (Bangladesh Planning Commission, 2018). Nonetheless, localized concerns are critical for a country's growth plan (Khan, 2009). Regional development concerns are essential on every country's legislative agenda. Regional inequalities hamper a country's capacity to encourage economic development and societal unification, whereas regional development is a fundamental factor of economic progress and income and social improvements (Habanik et al. 2013).

2.4.3 Lack of Capital and Investment's potential

Bangladeshis have virtually little savings due to their poor per capita income. According to the government, the income per capita is quickly rising and has surpassed \$2500 USD. The truth, on the other hand, is quite different. The residents are struggling to make ends meet. Because of the excessively high cost of everyday necessities. Individuals struggle to save funds due to their low salary. They are unable to invest in fledgling businesses. They are looking for work with the firm. As a result, the unemployment problem is worsening. (Ahmed, A, Islam, R. and Barynsul, S., 2019).

Not only the investments inside the country are able to change the situation, however, the inflow of FDIs might improve the situation. Bangladesh's FDI stock was at \$16.9 billion in 2019, with the United States leading the way with \$3.5 billion in total investment. Bangladesh got \$1.6 billion in foreign direct investment in 2019. The FDI intake percentage was 0.53 percent of GDP, which was among the smallest in Asia.

Bangladesh has made considerable headway in removing certain investment obstacles, such as improving electrical reliability, but poor infrastructure, restricted financing instruments, bureaucratic red tape, loose compliance of labor laws, and corruption continue to hinder international investment. Government initiatives to enhance the business climate have shown

promise in past years, but execution still needs to materialize. Slow adoption of alternative dispute resolution procedures and cumbersome court processes impair contract enforcement and corporate conflict settlement. (Rana, S., 2021)

According to Rana (2021) Bangladesh can provide with its strong points, however, weak points also prevail towards the FDI's:

Strong points:

The main assets of economy of Bangladesh are:

- Macroeconomic stability and its growth rate of over 7 % in 2019 and 3,2 % in 2020.
- Open and diversified economy (IMF, 2020).
- Cheap labor costs
- Geographic position (Big neighbors in terms of economic stability, China, Asia Pacific regions)
- Value chain (ports and accessible transportation pathways)
- Strong legislative environment, law.

Weak points:

There are main problems that could turn around an investor, such as:

- A business climate hampered by the government's poor infrastructure, onerous bureaucracy, high corruption risk, insufficient transparency, and the sluggish speed of the court system.
- Weakened financial sector.
- Every year, several natural disasters strike Bangladesh. River erosion, floods, and cyclones are making life difficult in Bangladesh. Natural disasters are disrupting

Bangladesh's investment. Natural disasters have caused great distress among Bangladeshis (Tanha, 2018)

- An economy that is heavily reliant on the clothing industry and has a low per capita income.
- Political chaos is stifling the Bangladeshi economic system. This affects acquiring investments harder for Bangladesh. As a result, employment sectors cannot keep expanding. It makes new investors wary of investing in new enterprises (Shimu and Islam, 2018).
- Corruption - every business in Bangladesh has evidence of bribery and corruption. It is hampering the nation's economic overall progress. Corruption may be found at every level of the corporate process. Foreign investors see dissatisfaction as a result of corruption (Rehman, 2016).

High dependency on particular economic sectors

As it has been mentioned, the agricultural field provides with a majority of employment and its either person who are directly involved by working on farms and fields, and people who are involved in the supply chain of such products. Shafiullah et al., (2019) claimed that it is kind of unwise to rely only on two or three sectors of economy.

RMG⁴ industry is the second industry which employes most of its population. The RMG industry employes both genders men and women. Which is unsafe thing to do.

^[4] Ready-made garment (RMG) industry is flourishing in Bangladesh because of its export-quota system and cheap labour. The main diversifications of the ready-made garment industry in Bangladesh are exportations to the United States and the European Union.

Limited land is another obstacle which might get the country into troubles as it is limited. The reason is that the global population increases daily, but the land doesn't. Thus, it later, will show negative consequences to such point, where there is going to be not enough land for the expanded population. The land is under a lot of stress. In more rural areas, many people depend only on the agriculture for livelihood (Rahman et al., 2020). There is a very limited quantity of land available in relationship to the density of people. It exacerbates the problem of unemployment for a substantial quantity of people whose income is dependent on agriculture.

2.4.4 Factors affecting FDI

In this chapter, the author describes the factors, that could massively affect FDI's attraction. Thus, it has a spillover effect on unemployment rate as claimed by Rana (2021), FDI inflows decreases unemployment, gives strength to economy and boosts consumption level across the country. She named a few reasons that could affect the FDI's.

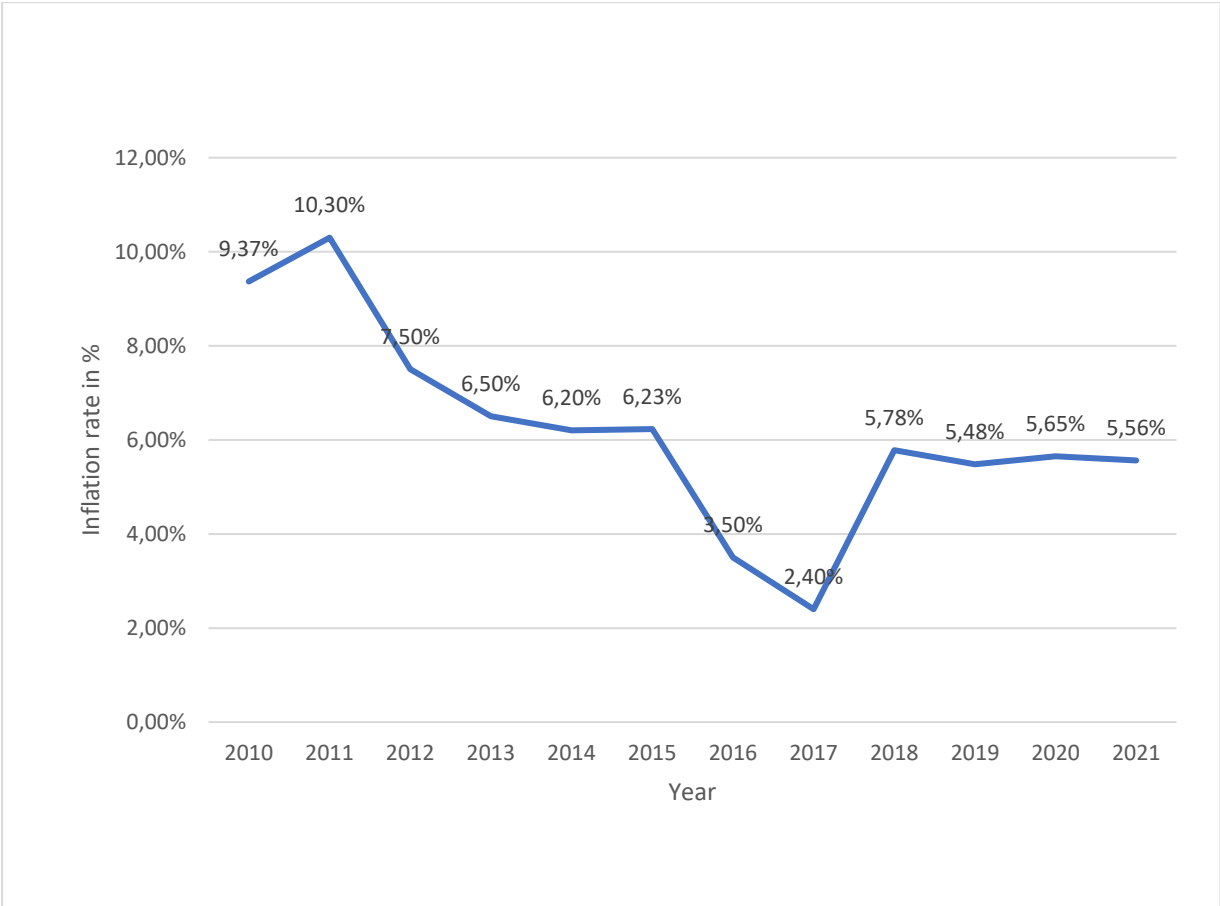
- National Income
- Inflation
- Restrictions of government
- Exchange rate

Those, 3 numeric determinants could massively effect FDI's inflow, however, one categorical determinant and is fully based on the decisions of government.

As per say of Rana (2021) if a country's **inflation rate** rises comparative toward the nations in which it invests, its capital account is predicted to fall, everything else being unchanged. Due to rising national inflation, consumers and firms in that nation would most likely purchase more products or invest more in abroad, whereas exports to other countries and foreign investment will drop.

Even though, it is clear to consider the inflation and its impact on the economic growth, hence, a spillover effect on unemployment, still, the inflation rate of Bangladesh has been quite stable.

Figure 3: Inflation rate in Bangladesh, time series.



Source: Own processing, Excel.

If a country's **income level** (national income) rises by a greater proportion compared with other countries, its financial stability is predicted to fall. Consumption of products rises as personal wages (adjusted for inflation) rises. A portion of the rise in spending will almost certainly be attributed to increasing demand for foreign investment.

A nation's **government** can restrict or restrict foreign investment. The government disturbs investment flows by implementing restrictive limitations. Bureaucratic entanglement, intellectual property rights extrapolation, and fiscal policy changes are three of the main regularly utilized investment restrictions. A government can also lower its country's investment by applying the rules or setting a highest level which can be invested.

The exchange rate is also one of the biggest impactful tools that could be applied by other currencies of exchange rates. The value of currencies could fluctuate due to internal and external consequences, market expansion, government forces and etc. If a country's currency increases in comparison with the other currency, its capital account balance should actually decrease, and the rest are being equal. If a currency strengthens, investment to such country will be more expensive, thus, investors can change their decision whether to invest or not. The question to answer is, what investment partners are the main partners in the receiving countries. In Bangladesh's case, its top foreign investors, especially USA, China, Germany and Netherlands.

However, too much of FDI's inflow, could eradicate the competitiveness of the domestic firms, which eventually might even increase the number of unemployed people, the government should take a full control of investment plans and its expansion level (Sayeem, 2021).

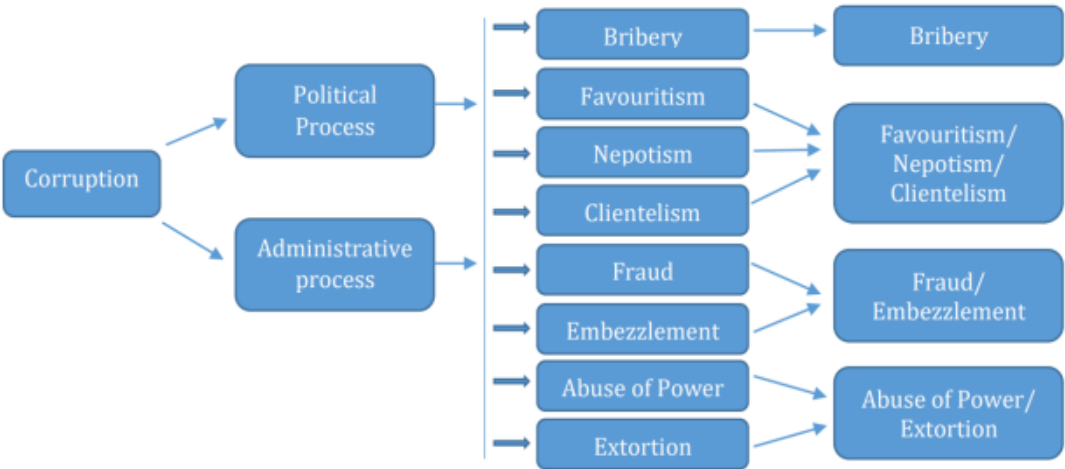
2.4.5 Corruption

The overwhelming body of research demonstrates that corruption has a detrimental effect on economic growth. Pope (2000) describes corruption as an enduring problem that has existed since the beginning of the human experience and cannot be totally eradicated. Analyzing the material by Jain (2001), and Aidt (2003), it was discovered that corruption and economic growth are negatively correlated. According to Shleifer and Vishny (1993), corruption has a significant detrimental effect on total socioeconomic and social development (Dreher & Herzfeld, 2005).

The sole topics included in several research (Pulok, 2010; Akhter, 2015) were corruption and economic development in Bangladesh. In Bangladesh, Paul (2010) discovered a link between corruption and growth. To learn more about the nature of the relationship, he performed research among the various governmental administrations between 1972 and 2009. He created a regime-wise corruption perception index to quantify the corruption. Since Bangladesh's transition to a market economy in 1977, when private investors were given the opportunity to invest in the home country, the relationship has been substantial. Consumer class income increased, and producer investment opportunities were booming as well, but infrastructure and

several regulatory organizations were not ready to cope with the scenario. Thus, he concluded that corruption and the overall growth of the economy are positively correlated. Unfortunately, all forms of corruption prevail in Bangladesh (Rezvana et al., 2018), the **Figure – 4**, depicts the forms of corruption.

Figure 4: Forms of corruption in Bangladesh



Source: Rezvana et al., (2018).

On the other hand, a different study performed on Bangladesh by Pulok (2010) had demonstrated that corruption has a damaging impact on several economic indicators. He demonstrates the long-term link between economic prosperity and corruption. The analysis confirms a long-term relationship between corruption, GDP per capita, and perhaps other factors affecting GDP during the observation timeframe. According to its long-term projections, corruption directly lowers per capita GDP. It suggests that corruption has a detrimental effect on Bangladesh's economic progress. The study also shows that a 1% increase in corruption led to a 10% decrease in Bangladesh's per capita GDP. This indicates that Bangladesh's socioeconomic progress is being negatively impacted by corruption.

4 Empirical Part

This part is devoted to analyzing secondary data where it has been processed in IBM SPSS Statistics program.

4.1 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 – GDP increase

A rise in the quantity of goods and services produced through one time period to the next is known as economic growth. Since it takes into account the economy's whole productivity, the overall gross domestic product (GDP) is the ultimate tool to gauge economic expansion. This study looks at the effect of income progress on unemployment in Bangladesh since it helps to reduce unemployment. The study uses economic growth as the GDP growth rate (annual%) as one of the explanatory variables.

Inflation

According to the International Labor Organization (ILO), unemployment is the proportion of the labor force that is made up of persons who are not employed but are actively seeking employment (age between 15-64). In Bangladesh, one of the most prevalent issues is unemployment. In this study, unemployment is considered a dependent variable.

Foreign Direct Investments

The value from inward direct investment made by foreign entrepreneurs in the reporting economy, including capital invested and intra-company loans, is known as FDI net inflows. This figure is calculated after deducting capital that has been returned and loan repayments.

Import Total

An import is an item or service that is purchased outside of its nation of origin. International trade is made up of imports and exports. A country has a negative trade balance, or a trade deficit, if the value of its imports exceeds the value of its exports.

Total Export

Exports are products and services made in one country and supplied to customers in another. Imports and exports together constitute global markets. Countries frequently deliberately look out foreign markets around the world for business, providing for additional revenue and transactional prospects, as opposed to limiting themselves within their own geographic limits.

Number of registered enterprises

The number of registered enterprises represent all types of business that run their business activities in any field and employ people. This particular variable will be presented in a number value of “thousands” to see how exactly it effects the unemployment in Bangladesh. However, due to the fact that the number of registered enterprises increases, it will probably be hard to judge, whether the variable is relevant for consideration in the model.

This study aims to examine the link between unemployment and macroeconomic factors in Bangladesh's distinct economic operation from 1991 to 2018 by employing the following model, which has an influence on the country's unemployment rate. Annual statistics on the unemployment rate and other independent variables such as inflation rate, economic growth in % on annual basis, and foreign direct investment as a % of GDP, assessed in terms of GDP and the GDP deflator, total important in as a ratio of total GDP, total export as a ratio of total GDP, number of registered enterprises, income tax, are derived from the Bank of Bangladesh and the World Bank's annual reports (2010-2021), see the Dataset at the **Appendix – 2**.

Table 5: Variables of Empirical part

Variable	Unit	Data Source
Unemployment	Annual percentage	World bank annual data, retrieved
Foreign Direct Investments Inflows, of GDP	Annual inflow of FDI in Percentage, the ratio of total GDP.	World bank inflows in USD, own computation as a ratio to GDP.
Inflation rate %	Annual inflation	World Bank annual data, retriever
Total Export of GDP	Percentage ratio of total GDP	World Bank annual data, retriever
Total Import of GDP	Percentage ratio of total GDP	World Bank annual data, retriever
Annual Change in GDP	Percentage	World Bank annual data, retriever
Number of registered enterprises in thousands	Numeric, number.	Bangladesh Statistical Data
Income Tax	Numeric	Bangladesh Statistical Data

Source: Own processing, actual source is mentioned in the column 3.

As seen from the **Table – 5**, all variables are measured in percentage, either as a ratio of the total GDP, or percentage change of such variables such as: Unemployment, Inflation rate % and extra.

4.2 Mode specification

A widely accepted economics theory holds that **unemployment** and **economic growth** have a negative relationship. It is known as Okun's Law, particularly the alternative form of Okun's Law, and was first presented and articulated by Arthur Melvin Okun in 1962. There is an empirically proven correlation between unemployment and gross domestic product (GDP). The

alternative formulation of Okun Law, which can be expressed as follows, states that the rate of unemployment varies from one quarter to the next with quarterly real output growth:

Apparently, the Okun's law captures how growth rate of output changes simultaneously with unemployment rate change. Knotek (2007) says that "One would expect the Okun's coefficient to be negative in relation to the rapid output growth, eventually decreases unemployment level and controversially, a decreased output growth will most likely to affect the unemployment rate in a negative way, meaning that unemployment will increase. The formula is given in the table below:

Equation 1: Okun's Law

$$\Delta U_t = \beta_0 + \beta_1 * \Delta Y_t + \varepsilon_t$$

Source: (Louail, B. and Benarous, D., 2021)

Whereas:

U_t – is unemployment rate.

U^* – natural rate of unemployment.

Y_t – is the actual output.

Y^* – is the potential output.

ε_t – Error term.

The applicability of Okun's Law and the relevance of the relationship between the unemployment rate and the rate of economic growth vary depending on the nation and the time period.

Another variable that will be considered is the inflation rate. The relation between the inflation rate and unemployment was studied by Phillips Curve (1959) in United Kingdom, during the years of 1861 to 1957. He provided with an evidence of having a negative association of

unemployment rate would slowly increase wages and in controve, a low unemployment level would increase wages much faster. Philips Curve demonstrates the relation of short – run between the inflation and unemployment, however, in the long – run, the relationships is barely noticeable.

Based on the already existing literature, the author added three more variables for consideration, such as Foreign Direct Investments (which were precisely described in the theoretical part, total import and total export). The model looks in the following way:

$$UNEMP = f(\text{Inf}, \text{FDI's}, \text{GDP}, \text{TI}, \text{TE}, \text{NORE})$$

$$UNEMP_t = \beta_0 + \beta_1 INF_t + \beta_2 FDI_t + \beta_3 GDP_t + \beta_4 TI_t + \beta_5 TE_t + \beta_6 NORE_t + \beta_7 IT + E_t.$$

Where:

UNEMP – Unemployment rate.

Inf – Inflation rate (%).

FDI – Foreign Direct Investment Inflow as a % of total GDP.

GDP – GDP annual growth in (%) as a proxy economic growth.

TI – Total Import.

TE – Total Export.

B₀ – Intercept term.

NORE – Number of registered enterprises

IT – Income Tax

B₁, B₂, B₃, B₄, B₅, B₆ – Partial Regression Coefficients.

t – Time period (2000 – 2021).

E – Error Term.

The **hypothesis** concerning the above-mentioned model are the following:

- a. The association between unemployment rate and the economic growth as stated above in Okun's law supposed to have negative roots. Increased output of production deems to employ more people hence, shows negative effect on growth of unemployment.
- b. Inflation, according to Phillips Curve also has inverse relation with the unemployment rate. When the demand for labor increases due to monetary expansion, the rate of unemployment would be decreasing, therefore, generating a trade-off between inflation and unemployment.
- c. Foreign Direct Investment tend to decrease unemployment as capital inflow deem to employ more people, because the Bangladesh can provide with a cheap labor. Thus, the Foreign Direct investments should have a inverse relation with unemployment.
- d. Considering import and export, the author assumes that both of those macroeconomic indicators will negatively impact on the unemployment rate, meaning that the unemployment rate will decrease when import or export will increase and controversially, if either import or export will decrease, hence the unemployment rate might increase.
- e. The "number of registered enterprise" if increase, meaning that more people will be employed in the country. Thus, the relationship will be inverse as well, the greater number of registered enterprises will be, the less unemployment will be in Bangladesh.

4.3 Estimation Technique

For the model, the study employed descriptive data. Since the original study information are trend study, it is necessary to check the data for normality before doing a multiple regression. Several methods can be used to test a unit root problem to see if it is normally distributed or not. (ADF)⁵ test was used in this investigation. After ensuring normality, if necessary, the

⁵ Augmented Dicky – Fuller test.

Ordinary Least Square (OLS) method is used to examine co-integration and the effects of economic growth, inflation, FDI's, import and export, number of registered enterprises.

Table 6: Descriptive Statistics of Unemployment rate

		Statistic	Std. Error	
Unemployment %	Mean	4.3959%	0.14102%	
	95% Confidence Interval for Mean	Lower Bound	4.1026%	
		Upper Bound	4.6892%	
	5% Trimmed Mean	4.3682%		
	Median	4.3700%		
	Variance	.437		
	Std. Deviation	0.66143%		
	Minimum	3.24%		
	Maximum	6.10%		
	Range	2.86%		
	Interquartile Range	0.65%		
	Skewness	.598	.491	
	Kurtosis	1.035	.953	

Source: Own processing, in IBM SPSS Studio (2023).

Normal distribution is equated as: *Mean = Median = Mode.*

$$MO = 3MD - 2M, = 3(4.37) - 2(4.39) = 13.11 - 8.78 = 4.33$$

Note: Almost equal, slight deviation.

We could do also test it by the level of Skewness and Kurtosis, which are highlighted in the **Figure – 5**. By using $Z - Score = Skewness/Kurtosis$.

$$Z - Score = .598 / .491 = 1.217$$

$$Z - Score (Kurtosis) = 1.035 / .953 = 1.086$$

Note: (within the score of -1.96 and to 1.96) the test are falling into this numeric value.

However, the author will depict the test of normality which was processed by the Shapiro Wilk test.

Table 7: Test of Normality

Tests of Normality						
	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Unemployment %	.123	22	.200*	.967	22	.632

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Source: Own processing, in IBM SPSS Statistics (2023).

The significance of Shapiro – Wilk, demonstrated the p – value of bigger than 0,05 alpha level, thus, we accept H_0 , which states the data is normally distributed, **See Index – 2 – 3.**

The author identified that the dependent variable and its residuals are normally distributed. Thus, the author is able to continue with the following tests.

4.4 Diagnostic check

The model will use the following tests, such as: Jarque – Bera test, for checking the normality of the data. Breusch – Pagan test for checking heteroscedasticity. Variance inflation factor (VIF) for checking whether in the model, there is a presence of multicollinearity.

Durbin and Watson [d] statistic for testing the autocorrelation, see for more, **Methodology chapter.**

4.4.1 Descriptive statistics

Table 8: Descriptive statistics of all variables

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Unemployment	12	3	5	4.39	.542
FDI	12	0	2	.99	.466
Inflation Rate	12	2	10	6.21	2.170
Total export	12	10	21	15.62	3.617
Total import	12	16	24	19.83	2.517
Annual change in GDP	12	3	8	6.37	1.108
Income tax	12	25	30	28.33	2.462
Registered enterprises	12	192.00	628.00	481.4167	146.94245
Timeseries	12	1.00	12.00	6.5000	3.60555
Valid N (listwise)	12				

Source: Own processing, in IBM SPSS Studio (2023).

Table – 6 illustrates the descriptive statistic of dependent variable as well as independent variables (Inflation rate, Foreign Direct Investments Inflows, Annual Growth of GDP, Total Import, Total Export and Number of Registered Enterprises). The study has 12 years of observations. We could see biggest gap for the observed period in the variable of FDI's, the min and max, however, the author already can assume that the Foreign Direct Investments is the field, which could improve the situation. Inflation also swings around 11 % and 2 %, which can mean that, the government is not in a full control of inflation, rather unstable inflation is present for the observed period.

4.4.2 Regression Analysis

The estimation of the study's regression model is displayed in the following table. The Ordinary Least Squares Method is used to estimate (OLS).

Table 9: Coefficients of the model

		Coefficients ^a								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95,0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1	(Constant)	6.567	.528		12.449	.001	4.888	8.246		
	FDI	.656	.103	.564	6.352	.008	.327	.984	.105	9.509
	Inflationrate	-.060	.019	-.239	-3.129	.052	-.120	.001	.142	7.030
	Totalexport	.065	.020	.437	3.290	.046	.002	.129	.047	21.269
	Totalimport	-.050	.014	-.230	-3.489	.040	-.095	-.004	.190	5.268
	AnnualchangeinGDP	-.208	.016	-.425	-13.039	.001	-.258	-.157	.781	1.281
	Incometax	-.087	.012	-.395	-7.206	.006	-.125	-.048	.276	3.623
	Registeredenterprises	-.001	.001	-.180	-.904	.433	-.003	.002	.021	47.667
	Timeseries	.248	.033	1.649	7.500	.005	.143	.353	.017	58.374

a. Dependent Variable: Unemployment

Source: Own processing, in IBM SPSS Studio (2023).

Based on the results of the coefficients, the assumptions almost were met and the model look like the following:

$$UNEMP_t = 6,567 - 0.060 * INF_t + 0.656 * FDI_t - 0.208 * GDP_t - 0.50 * TI_t + 0.065 * TE_t - 0.001 * NORE_t - 0.087 IT - E_t.$$

Table 10: Model Summary

Model Summary										
Model	R	Adjusted R Square	Std. Error of the Estimate	R Square Change	F - Change	df1	df2	Sig. F Change	Durbin-Watson	
1	.813 ^a	.661	0.45599%	.661	4.864	6	15	.006	2.186	

a. Predictors: (Constant), Number of enterprises in Ths., Total Import, Foreign Direct Investments Inflows, Inflation rate %, Annual growth, Total Export

b. Dependent Variable: Unemployment %

Source: Own processing, in IBM SPSS Studio (2023).

There is a positive relationship of inflation rate, which make sense, when inflation increases, the prices for products increase as well, hence, the overall expenses go up and firms, whether

domestic or foreign pay more operating expenses. Thus, the options might be limited. By reducing numbers of employed people or keep production for a domestic consumption.

The Foreign Direct Investments seem to have negative correlation, which is also logical, the more capital inflow to the country, the higher chance of being employed. However, the variable that has been considered within this model, meant only foreign direct investments, meaning, the type of investments which comes with its capital, production sites, facilities etc. Thus, the hypothesis is accepted, the more of FDI's, the less unemployment rate. Annual growth in GDP also seems to have a negative impact on the unemployment rate, as the more prosperous economy becomes, the less unemployed people will be in such a country. This is exactly the case of Bangladesh.

The next variables, total export, and import, each, seem to have two different impacts, negative and positive. Total export seems to have positive correlation with unemployment, whereas total import seems to decrease it.

The last variable is the “Number of registered enterprises” which is constantly increase based on annual data. Because of an actual numeric number (not the % ratio) the number of registered enterprises seem to have positive correlation with unemployment rate, which is a bit illogical. The author decided to exclude the variable even though, the F – Test for such model seem to be significant, $F - test = 0.006 < 0.05$.

The author, however, excludes the variable of “Number of registered enterprises” to see the correlation without it. So, it is necessary to run a model again.

The same method was applied (OLS) to build a Multiple Regression Model.

Table 11: Coefficients of the model 2.

Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients		t	Sig.	95,0% Confidence Interval for B		Collinearity Statistics	
	B	Std. Error	Beta				Lower Bound	Upper Bound	Tolerance	VIF
1 (Constant)	6.520	.513			12.714	.000	5.096	7.944		
FDI	-.661	.101	-.568		-6.565	.003	.381	.940	.105	4.479
Inflation rate	.050	.015	-.199		-3.269	.031	-.092	-.007	.214	4.681
Total export	.051	.012	.340		-4.396	.012	.019	.083	.132	4.587
Total import	-.046	.013	-.213		-3.452	.026	-.083	-.009	.207	4.821
Annual change in GDP	-.204	.015	-.417		-13.611	.000	-.245	-.162	.843	1.186
Income tax	.088	.012	.399		7.498	.002	-.120	-.055	.279	3.590
Timeseries	.220	.011	1.461		20.796	.000	.190	.249	.160	3.247

a. Dependent Variable: Unemployment

Source: Own processing, in IBM SPSS Studio (2023).

The final model is the following:

$$UNEMP_t = 6,520 - 0.661*FDI_t + 0.050*INF_t - 0.51*TE_t - 0.46 *TI_t - 0.204*TE_t + 0.88IT_t + E_t$$

Table 12: Model Summary - 2.

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	Change Statistics			Sig. F Change	Durbin-Watson
						F Change	df 1	df2		
1	.998 ^a	.997	.991	.051	.997	180.275	7	4	.000	1.450

a. Predictors: (Constant), Timeseries, Annual change in GDP, Income tax, Inflation rate, Total export, Total import, FDI

b. Dependent Variable: Unemployment

Source: Own processing, in IBM SPSS Studio (2023).

Table – 9 and 10, demonstrates the regression results of the study. The intercept value of unemployment is 6.502 considering all the independent variables of the model are constant. To check, whether the coefficients are statistically significant, the *T – test* was used.

The p - value of **inflation rate** is .031, which is lower than p – value, 0.05. The inflation rate is significant to the variable of unemployment rate. The relationship is negative, meaning that the increase in inflation rate by 1 unit, will increase the unemployment rate by **0.219 %**. So, the model of Phillips Curve does not hold for Bangladesh.

The next variable (**FDI**) shows the negative relation towards unemployment and if it changes by 1 %, the unemployment will decrease by 0.661 %, however, it is statistically significant, with its p value of 0.03.

The variable of **GDP growth** holds true based on the Okun’s law and his inverse link, between unemployment and economic growth. The model demonstrates the negative relation which means that, if GDP annual change by 1 %, the unemployment will decrease by 0.204 %. Moreover, it is statistically significant as its p – value equals to .000

The **total import** is also seemed to have significant roots at 5 % alpha, the variable is significant. Thus, if the total import increases by 1 %, the unemployment decreases by 0.462 %.

The **total export** has a positive impact on unemployment rate, which is a bit illogical. First of all, it is being a part of GDP together with the total import, and hence, increases an economic growth. However, the variable is significant, with its p – value, 0.026.

The **Income Tax** hasn’t changed much, as its mean is 28.33. For the 12 years, the income tax hasn’t varied much, there was an increase in income taxation in 2018, for 30 %, however, the government had monitored that the level of unemployment started increasing, and thus, decided to get it back to 25 %. However, it is significant to the model with its p – value of 0.002, which

is lower than 0.05 % significance level. If, the Income tax increases by 1 %, the unemployment rate would increase by 0.088 %.

Multicollinearity

In order to test the model for multicollinearity, the author consider the “Variance inflation factor”, see **Table – 11**. Based on the results, the medium multicollinearity is seen between the Total Import and Total Export. However, it is not high, so the author can state, that the model doesn’t hold any multicollinearity issues.

The R – Square equals to 0.99, or 99 %. It shows that the 99 % of variation in unemployment is explained by the variation of explanatory variables (Inflation rate, GDP growth, FDIs inflow, Total Import and Total Export, Income Tax,). F – statistics shows the overall significance of the model. It is 0.00 %, which is < 0.05. Overall, it can be concluded that the model is significant.

Durbin – Watson d – statistics: In order to detect the first order serial correlation. Durbin Watson d – statistic is used. The critical value, d_u and d_L , for several explanatory variables can be found from Durbin Watson d – statistic table. Based on the Durbin Watson = 1,45. There is no evidence of positive autocorrelation, at $n = 12$, and $k = 7$, at 0.05 % alpha.

Heteroskedasticity

Table 13: ANOVA

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3.220	7	.460	180.275	.000 ^b
	Residual	.010	4	.003		
	Total	3.230	11			

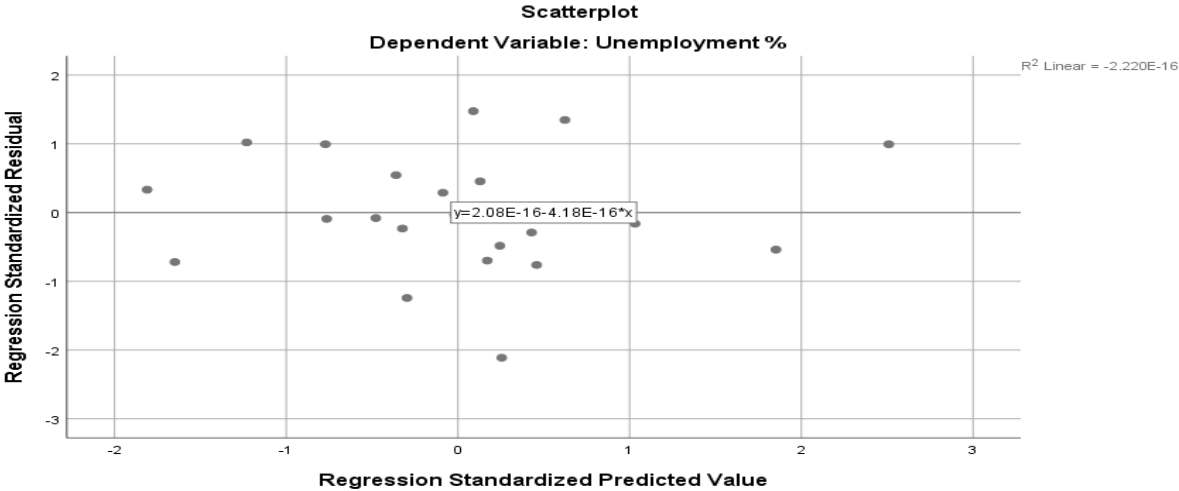
a. Dependent Variable: Unemployment

b. Predictors: (Constant), Timeseries, AnnualchangeinGDP, Incometax, Inflationrate, Totalexport, Totalimport, FDI

Source: Own processing, in IBM SPSS Studio (2023).

The chart below shows the dispersion of variables, so the model has a heteroskedasticity problem. The p – value is 0.035 which is lower 0.05, meaning that heteroskedasticity is present in the model.

Table 14: Scatterplot



Source: Own processing, in IBM SPSS Studio (2023).

5 Discussions and Recommendations

Finding of this study has confirmed that unemployment rate is a significant problem and is dependent on so many macroeconomic factors such as inflation rate, import and export, and FDI were found to have a significant effect on the unemployment rate.

- Inflation has been found to have a positive effect on the unemployment rate which confirms the study of (Bayer, Y., 2014) who also found the similar effect. However, the problem of Bangladesh is that is lack a good monetary policy for achieving a stable inflation rate that could minor effect unemployment. It is a good sign to detect such a mistake, however, the decision should be made by the government and banks of Bangladesh to monitor the fiscal and monetary policies and its effect closely and more carefully in relation to unemployment.
- Another finding was between Foreign Direct Investments and unemployment rate that foreign direct investment negatively impacts on the unemployment rate, meaning the more of it comes into the country, the better it is, and it certainly has a spillover effect on the annual GDP growth, as it impacts both. However, again, the government should pay more attention to FDI's flow, as it should be balanced, in order to prevent its full dependency on FDI's.
- The volume of a country's imports and exports may influence its Gross Domestic Product (GDP), its exchange rate, and its degree of inflation. The value of a country's currency might suffer when the trade imbalance continues to widen at its current pace of accumulation. A higher rate of inflation may also have an effect on a country's exports since it has a direct influence on the price of various inputs, including labor and materials. The devaluation of a country's currency, which may have a significant effect on the inhabitants of that country's day-to-day lives, is the result of the trade imbalance. This is due to the fact that the value of a nation's currency is one of the most important factors that determines that nation's economic output and its gross domestic product (GDP).

5.1 Limitations of the study

Because to time and resource constraints, the amount of data that was utilized was very restricted. Further study may be done by incorporating age, gender, qualifications, sector, earnings, and other factors as variables in order to get a more comprehensive understanding of unemployment and the factors that contribute to it.

Another limitation is that unemployment rate hasn't been studied by many researchers previously. It was slightly hard to find the proper data that could be related to the unemployment. The author would either skip some of the years and take an average of available data, or just, don't consider some of the variables at all. In case of Exchange rate, at the beginning, the author wanted to consider such an effect, but found that the data for the years 2015,2017 and 2019 were not available. Thus, the variable was excluded from the research.

5.2 Further research

The further research could be done for a longer period of observation, for example 30 – 40. Another thing to consider is the following variable to see the co – dependency of unemployment between:

- Exchange rate
- Mean years of schooling
- Corruption Index
- Human Development Index
- Balance of Trade as a % of GDP.

6 Conclusion

The topic of this master thesis dealt with the “Unemployment rate” in Bangladesh where an author has considered the variables that have been studied before, such as: annual growth rate of GDP, total import and total export of GDP, inflation rate, FDI’s inflow as a % of GDP, number of enterprises, and income tax. The results are shown in the [Chapter – 5](#).

Using yearly data for the time period spanning 2010 to 2021, this study investigates the factors that contribute to Bangladesh's high unemployment rate. According to the findings of the research, factors such as economic growth, inflation, and foreign direct investment all have an impact on unemployment. The findings of the regression indicate that economic development has only a minimal and beneficial influence on unemployment, therefore indicating that Bangladesh is now dealing with an unfavorable position. The results of the analysis show that economic progress has only a little and positive influence on unemployment, which indicates that Bangladesh is in an adverse position as a result of the current state of affairs.

The research is fully based on the quantitative data, of secondary character. The author has used the IBM SPSS Statistics program, to run all the analysis.

The research has demonstrated that the variable of Inflation rate had a positive effect on the unemployment in Bangladesh, which doesn’t confirm the theory of Phillips Curve, particularly in Bangladesh. As inflation tends to increase unemployment and also leads to lower investments, which eventually deteriorates the economy.

Overall, unemployment is a big issue and unfortunately, the government hasn’t found the right solution to solve its issues at once. It is a long – term process that should be established by all institutions inside the country. Thus, in the “Further” research, it would be a good idea to consider the mentioned variables for a better orientation across the factors that impact unemployment.

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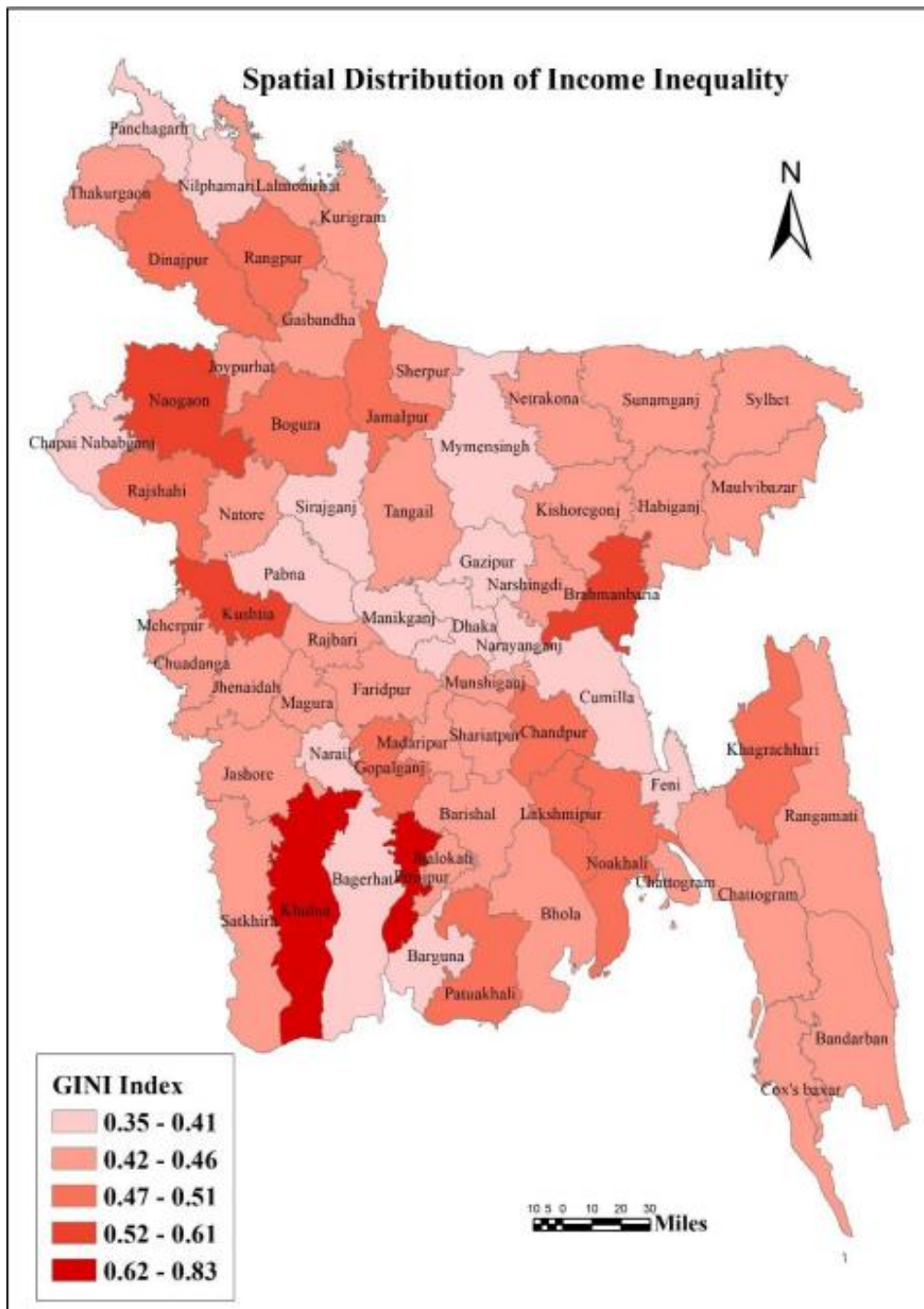
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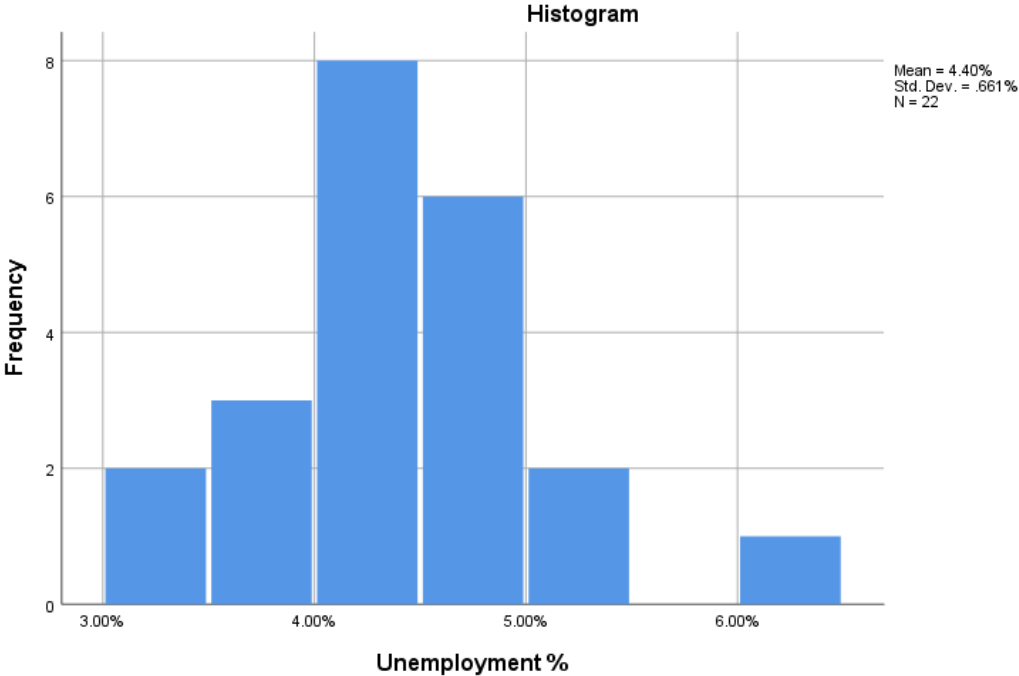
8 Index

Index: 1: Spatial Distribution and Income Inequality



Source: Bangladesh Bureau of Statistics.

Index: 2: Histogram of Unemployment



Index: 3: Normal Q-Q plot of Unemployment



Correlations

		Unemployment %	Inflation rate %	Foreign Direct Investments Inflows	Annual growth	Total Import	Total Export	Number of enterprises in Ths.
Pearson Correlation	Unemployment %	1.000	.475	-.417	-.313	-.264	-.041	.405
	Inflation rate %	.475	1.000	-.374	.122	.402	.492	.053
	Foreign Direct Investments Inflows	-.417	-.374	1.000	.213	.174	.156	.122
	Annual growth	-.313	.122	.213	1.000	.667	.511	.221
	Total Import	-.264	.402	.174	.667	1.000	.816	-.036
	Total Export	-.041	.492	.156	.511	.816	1.000	.049
	Number of enterprises in Ths.	.405	.053	.122	.221	-.036	.049	1.000
Sig. (1-tailed)	Unemployment %	.	.013	.027	.078	.117	.429	.031
	Inflation rate %	.013	.	.043	.294	.032	.010	.407
	Foreign Direct Investments Inflows	.027	.043	.	.171	.219	.244	.294
	Annual growth	.078	.294	.171	.	.000	.008	.161
	Total Import	.117	.032	.219	.000	.	.000	.436
	Total Export	.429	.010	.244	.008	.000	.	.415
	Number of enterprises in Ths.	.031	.407	.294	.161	.436	.415	.
N	Unemployment %	22	22	22	22	22	22	22
	Inflation rate %	22	22	22	22	22	22	22
	Foreign Direct Investments Inflows	22	22	22	22	22	22	22
	Annual growth	22	22	22	22	22	22	22
	Total Import	22	22	22	22	22	22	22
	Total Export	22	22	22	22	22	22	22
	Number of enterprises in Ths.	22	22	22	22	22	22	22