MACROECONOMIC DETERMINANTS OF UNEMPLOYMENT IN DEVELOPED COUNTRIES

BY

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DECLARATION

We hereby declare that:

(1) This undergraduate research project is the end result of our own work, and that due acknowledgement has been given in the references to ALL sources of information be they printed, electronic, or personal.

(2) No portion of this research project has been submitted in support of any application for any other degree or qualification of this or any other university, orother institutes of learning.

(3) Equal contribution has been made by each group member in completing the research project.

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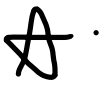
1. ALASTAIR ABISHA ONG HSIEN LERK	2002839	

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GDP	Gross Domestic Product
FDI	Foreign Direct Investment
PG	Population Growth
POLS	Pooled Ordinary Least Square
FEM	Fixed Effect Model
REM	Random Effect Model

PREFACE

In pursuit of fulfilling the prerequisites for obtaining a Bachelor of Economics (Hons) in Global Economics, this research study, titled "Macroeconomic Determinants of Unemployment in Developed Countries," is hereby submitted. This investigation helps in exploring how macroeconomic factors affects unemployment rate developed nations.

Within this study, Unemployment stands as the primary focus, while Gross Domestic Product, Inflation, Population and Foreign Direct Investment constitute the independent variables (IV). The examination of these macroeconomic variables aims to provide better understanding towards the unemployment in developed countries.

ABSTRACT

This study thoroughly investigates the macroeconomic determinants of unemployment in developed countries. The aim of this study is to understand the influence of independent variables (IV), including GDP, Inflation, Population and FDI have towards the dependent variable, unemployment. Data of 5 developed countries were collected and analyzed using econometric methods. The relationship of the independent variables and dependent variables were analyzed using the panel model which are POLS and Hausman test. The findings found that GDP and FDI have an insignificant relationship towards unemployment whereas inflation and population have a significant relationship towards unemployment. The results obtained offers solutions for policymakers to tackle the problem of unemployment.

Chapter 1: Introduction

1.1 Background of study

Unemployment issue has been a worrisome ongoing issue that many countries are still facing. Despite whether the country is developed, developing or underdeveloped countries, unemployment is still a concerning issue towards these countries. Unemployment can be defined as individuals who are jobless or are seeking for a job. According to Adam (2024), unemployment can be either voluntary or involuntary which can be categorized into 4 types of unemployment which are frictional, cyclical, structural or institutional unemployment. The natural rate of unemployment would never be zero even in a healthy and strong economical country due to the presence of the types of unemployment such as the frictional and structural unemployment. As it is the nature of the labor market, it is expected that the unemployment rate will never drop to zero in any economy. People changing careers or entering the labor for the first time result in a normal level of turnover, which leads to frictional unemployment. Technological advancements and changes in business demands lead to structural unemployment, which makes it difficult for people to adjust and learn new skills. A baseline level of unemployment is influenced by seasonal and cyclical variables, as well as voluntary unemployed due to considerations like early retirement or schooling. The difference in the skill sets might lead to skilled individuals in higher demand as businesses would demand for higher skilled individuals. Policymakers aim to achieve a lower unemployment rate, but a zero-unemployment rate is impractical as it would lead to an unstable economic status.

Besides that, unemployment plays a significant role as it indicates the status and the well-being of a nation’s economy. Not only that, it also helps to provide more details of the employment trend of a nation, such as the job availability in the market and the skills demanded in the job market as well. Elevated rates of joblessness may give rise to social barriers and disparities, which can affect people's economic security and social welfare (Amartya, 1997). Unemployment issue can lead to many various effects that could bring negativity towards a country such as higher rate of poverty, higher rates of crime and financial issues faced by the people (Hakim, 2009). According to Muzafar et al. (2014), there is a positive correlation between Malaysia's crime rate and unemployment rate, with both tending to rise significantly. Socially, being unemployed can lead to anxiety related to

finances, an overall decrease in psychological health, and a weakening of family bonds. Unemployment can be a serious issue when it leads to individuals facing problems such as losing the sense of value and the purpose in life which could worsen the societal issues. People's skills can deteriorate due to prolonged unemployment, which makes it harder for them to acquire new jobs and may even set off a vicious cycle of poverty. Hilary et al. (2005) report that they did a study in America and found that there would be a 0.4 to 0.7 percent increase in the poverty rate for every 1% increase in the unemployment rate. Higher unemployment could also worsen the economy of a country, which could decrease consumption and investment, thus leading to a decrease in government tax revenue and total output. Public finances are further burdened by the government's rising assistance spending for assisting those without employment. For several strong reasons, countries take the problem of joblessness seriously. Jakimovski (2010) stated that the problem of unemployment had cost the European countries in 1993 an estimated amount of 210 billion Euros due to the lost in taxes, the social transfers, the increasing cost for health and public services as well as the cost from the increase in crime.

Economically speaking, a high unemployment rate can be a sign of low productivity and insufficient use of human resources, two things that impede the growth of the world economy. Businesses and the stability of the economy are usually negatively impacted by lower consumer spending brought on by unemployment. Persistent unemployment can hinder a country's long-term development and competitiveness and result in a loss of human capital and skills. High unemployment rates can lead to social discontent, political uncertainty, and general personal dissatisfaction. Due to significant adverse effects on social well-being, and economy, the constant increase in unemployment had led to many nations felt the urge of handling this issue (Collins, 2009), and policymakers are obligated to address the issue of unemployment. Governments worldwide pursue policies and programs targeted at reducing unemployment, such as job creation efforts, education and training programs, and financial stimulus initiatives, to maintain political stability and social harmony. Around the world, policymakers have utilized unemployment rates as a gauge for a variety of issues, including economic progress and public contentment.

1.2 Problem Statement

The recent Covid-19 pandemic has injected fear towards many individuals as many businesses were shut down and employees were laid off during the pandemic and leading to a higher unemployment rate. Unemployment should be taken into account and to be seen as an issue that not only affects individuals but as well as the country. Developed countries are believed to have a more controlled unemployment rate but they are prompt to face unemployment issues as well. Most researchers are more focused on studying unemployment issue in developing countries instead of developed countries as developing countries faces development issues such as poverty or inequality more as compared to developed nations. It is crucial to understand the macroeconomic determinants of unemployment in developed countries especially for policymakers and economists so that effective action can be taken to reduce the issue of unemployment. Moreover, there has been more studies towards unemployment issue in developing countries but fewer towards unemployment in developed countries. Unemployment in developing countries is often seen as a more pressing issue as compared to developed countries. Developed countries have the insurance system where people who are facing unemployment have the have from insurance program which aims to aid those who are too sick to work but it is also taken advantage by those who are healthy too (Vodopivec, 2013). Despite being very developed, these countries face with high unemployment issues as well which were concerning for their economic status. The countries chosen for this study are France, Italy, Spain, Germany, and United States as they are the developed countries with high unemployment rate.

1.3 Objective

The general objective of this study is to examine factors contributing to unemployment in developed countries. The specific objectives of this study is to investigate the role of technological advancement, foreign direct investment, and demographic changes on unemployment.

1.4 Significance of study

This study contributes to the literature on the factors affecting unemployment rate in developed countries by examining the effects of GDP, Inflation, Population and FDI have

towards unemployment in developed countries, which provides a clearer perspective towards unexplored aspects in this issues. This paper aims to identify the significance of the relationship between the dependent variable and independent variables. The results obtained from this research can help future researchers who are examining the same topic to further explore the factors that affect the rate of unemployment. Besides that, with this research, recommendations and implication of policy will be suggested. In this research, we expect to provide adequate information on the factors affecting the unemployment rate in the developed countries. With this, it can help future policymakers as well as researchers to opt for the proper steps to be taken. A more effective steps can be taken to tackle the problem of unemployment from the deeper understanding of the relationship between unemployment and GDP, Inflation, Population and FDI. Policymakers can opt for a better macroeconomic strategies based on the research to tackle and improve the issue of unemployment.

There have been very little studies of the macroeconomic determinants of unemployment in developed countries. Many people have thought that unemployment in developed countries is less worrying and expected them to have a better employment rate as they are well-developed as compared to those who are developing. In fact, developed countries also faces the same problem despite their better performing economic growth. Therefore, in a nutshell, this research aims to provide information to understand deeper towards the macroeconomic determinants of unemployment in developed countries for a better decision-making in the future.

1.5 Chapter Layout

Chapter 1

In this chapter, the background of study will be explained. The problem statement will then be further explained along with the general objective and the significance of study. This chapter aims to provide more understanding on the purpose of this study which is the study of macroeconomic determinants of unemployment in developed countries.

Chapter 2

This chapter focuses on the literature review. It provides information and analysis on past similar studies. It provides the current information available on this topic and the gaps as well as the differences of results which justify the need of this study.

Chapter 3

In this chapter, the methodology of the study will be discussed. It will contain the data collection method and details of the research instrument. This chapter will provide information of the model and tests required in the study which is used to identify the relationship between the independent and dependent variables.

Chapter 4

This chapter focuses on the results obtained from the study. It will provide detailed analysis of the results and interpretation of the results obtained through the process from the research tests and methods.

Chapter 5

This chapter servers as the final chapter of this study which will provide summary of the whole study. It will also provide implications from this study. This chapter will also discuss the limitations of the study as well as recommendations for future researchers when conducting study on related or similar fields.

Chapter 2: Literature Review

2.1 Unemployment

Unemployment has been a concerning issue ever since the occurrence of the Great Depression as economist identified that unemployment was one of the most important factors towards a country's economy (Hall et.al, 1970). Based on Cain (1979), he believes that unemployment rate is a useful statistic to measure or predict the changes over time and it is also seen to be tool of comparison between nations. A few of analysts have identified unemployment as the result of the supply and demand mismatch. It is a fact that even individuals that are skilled or not are also facing problems of inequalities in the labour market. The Covid-19 issue has led to a great shock in the economy impacting the labour market. The pandemic had resulted in the unemployment issue where there is an increase in jobseekers, large re-allocation of job sectors as well as companies relying on

technology which affects those who are less-skilled in the job market that worsen the skill-mismatch issue leading to an increase in unemployment issue (Cruz *et.al*, 2022).

2.1.1. Inflation

The Phillips Curve is a theory introduced by an economist named A.W. Phillips in 1958. In this theory, it suggests that when inflation rises, unemployment will fall or when unemployment rises, inflation will fall. This implied that the inflation and unemployment have an inverse relationship according to this theory. According to Gruen *et.al* (1999), the Phillips Curve has become a standard tool for many economists when conducting research. Despite many criticisms as well as adaption of the tool, it has remained an important tool to understand the relationship of inflation and unemployment.

The Phillips Curve is a method to analyse the effect of inflation have towards the unemployment rate. It has been discovered that there is an inverse relationship between the inflation rate and the unemployment rate. When inflation increases, unemployment would decrease or when inflation decreases, unemployment would increase (James & Mark,2008). Inflation is also hard to be predicted where this Phillips curve is a tool that could bring more understanding on how these two variables have a relationship which could provide a better decision making for policymakers in the future. Inflation has an influence towards unemployment. According to Maximova (2015), the Phillips Curve was accurate to determine the world leading countries during the study made in 1950-1960s. The higher cost of living as well as growth in the salaries are part of the increase in the inflation rate. Philip Curve also works closely with the supply and demand situation where when a country has low unemployment rate, it would lead to the demand for higher wage where firms would require increasing the price of their goods and services which could further result in an inflation.

Andrew and Lee (2001) had constructed two forecasts which are NAIRU and naïve forecast for the last 15 years where it is found that the naïve forecast is seen to be more accurate as compared to the NAIRU forecast. James and Mark (2008) had studied the Phillips Curve inflation forecasts and had concluded that in their analysis, the accuracy based on the forecast from the Phillips Curve is short: forecasters would probably been more accurate using a univariate forecast in some situations (like the mid-1990s), but in others (like the late 1990s) Phillips curve forecasts outperformed univariate forecasts. According to Alisa (2015), rate of inflation and rate of unemployment could indicate the economy of the country. Inflation would tend to increase the price of a good, but unemployment would decrease the purchasing

power of an individuals. This could be determined by the Philips Curve which would result in an inverse relationship of inflation towards unemployment. When there is an increase in inflation, unemployment rate tends to decrease or when there is a decrease in inflation, unemployment rate would increase. The purchasing power of an individual would be determined by the unemployment rate. When there is a low rate of unemployment, it would lead to a higher purchasing power and a greater spending which would result in a higher pricing of goods, hence, result in a higher inflation. On the other hand, when there is a higher rate of unemployment, individuals tend to spend less, and businesses are required to lower their price of goods which could decrease the rate of inflation as well.

According to Edmund (2008), inflation and unemployment has an inverse relationship which a rise in inflation would lead to a decrease in unemployment. In this theory, when there is low unemployment rate, it would result in a higher wage for employees by the firms which in return would require the firms to increase their price for goods and services. This would lead to an increase in the inflation rate. On the other hand, when unemployment rate is high, wages are low which prices for goods and services can be reduced that would lower the rate of inflation.

For many years, many concepts have been established to clarify how both inflation and unemployment are related. There has been a numerous theories that stated that the Phillips Curve as a tool to study this concept. It is simple to assert that Phillips curve has existed in Nigeria for the majority of its history. Comparably, there have also been times when both inflation and unemployment proceeded in the same direction and times when they did not (Daniel S.U et.al, 2021).

Besides that, according to Beretsen, et.al (2008), they have concluded that between the rate of unemployment and inflation, a relationship that is positive does exist. Another reason to be concerned about the connection in the long run is that it provides a more precise explanation for occurrences that take place at a lower rate, making it less susceptible to complexity-related errors like insufficient data or indicate elicitation issues. This study have come into a conclusion that a positive correlation occurs between inflation and the unemployment rate based on low frequency data.

Using Germany as an example, a long run relationship has been discovered between the rate of unemployment and inflation. An inverse relationship does occur between the both variables in the long run for Germany. The outcome demonstrated that increasing liquidity would cause substantial inflation, which will essentially reduce unemployment. Improved efficiency and lower budget deficits will also help to reduce inflation and have a

minimal impact towards unemployment rate. A study of the European Countries conducted by Karanassou et.al (2003) and Schreiber & Wolters, (2007)., they have concluded that there is a long run trade off relationship between the unemployment rate and inflation, but the result was indicated as slow which results in the impact of the monetary policy on unemployment being stronger.

It is believed that the increase in the inflation in Greece will also lead to an increase in their employment rate which in return will overall improvise their economic situation in the country. After conducting test, it is found that there is no occurrence of the inflation and unemployment rate in the long run in Greece, but it is forecasted to have a long run relationship in the future (Dritsaki, & Dritsaki, 2012).

According to Jonathan. et.al (2021), it is related to the demand where employees would seek for a higher wage which would result in firms to increase their price of goods and services. It has also been discovered that the relationship between the unemployment rate and inflation are slowly weakening over the years due to other various factors that could also be affecting them.

According to Al-Zeaud & Al-Hosban (2015), their research has found that the relationship between unemployment and inflation is nonlinear and negative. This trade-off suggests that decisionmakers can focus on either low inflation or low unemployment, but not both. Based on the thesis's conclusions, it is evident that Jordan faces a trade-off between unemployment and inflation. Stated differently, empirical evidence offered additional evidence for the presence of the Phillips Curve in a developing nation like Jordan.

2.1.2 GDP

Okun’s Law on the other hand is a theory introduced by Arthur Okun in 1962. This theory is a tool used to determine the relationship between unemployment and GDP. In the Okun Law, it had suggested that a fall in unemployment will result in an increase in GDP which was found to be a useful tool for many countries (Lancaster and Tulip, 2015). Ever since Okun (1962) first proposed the empirical regularity that would become known as "Okun's law," the negative relationship between GDP and the rate of unemployment has been the focus of numerous scientific studies. Although opinions differ on the precise quantitative size of this connection, the majority are in agreement that Okun's law has empirical support (Jim, 2000 and Jesus 2003) Jim had conducted a study to examine the relationship of the Okun’s Law with the 16 OECD countries which consists of Australia, Canada, Belgium, Austria, France,

Denmark, Germany, Finland, Japan, Netherlands, Italy, Norway, Switzerland, Sweden, UK and the US by using the two alternatives approaches which the gap model and the first difference. The result obtained supports the validity of the Okun's Law, but it is found that the results were not as robust as Okun (1970) statement.

Okun Law is believed to have a relationship towards the growth of an economy as well as the rate of unemployment. When growth is facing problems and is slowing down, it will cause a reaction towards the unemployment as it would slowly increase when growth slows down (Edward 2007). Besides that, there is a relationship that occurs in the unemployment and GDP that could link the two variables to study their relationship towards each other. It has also been discovered that there is an asymmetric relationship occurred between GDP and unemployment where the effect of GDP would highly affect the unemployment rate of a country (Cuaresma, 2003). The Okun's law is mostly used to determine the relationship of the GDP and unemployment.

Based on Rigas, et.al (2011) and Farzio & Quade (2003), Okun Law is an important theory in the economic sector. In this theory, Okun Law believes that with the country continuing expanding and growing in the different economic sectors, unemployment rate can be controlled or lower down. It is also believed that the growth of an economic has a relationship with unemployment as when an economic is growing, the unemployment rate would decrease as more job opportunities are being created. They had conducted a research to test the validity of the Okun's Law in our economical world that we are facing today. With a research on a period from 1960 to 2007, of a few European countries, they have concluded that an inverse relationship occurs between the rate of unemployment and the Gross Domestic Product (GDP).

According to Haririan, et.al (2009), they had conducted a research of GDP and unemployment for a few selected MENA countries which are Egypt, Israel, Jordan and Turkey. The results of research on this interaction remain ambiguous and the relationship between GDP growth and unemployment is extremely complicated. However, there is disagreement among empirical researchers about the inverse link between GDP growth and unemployment rate, analysis has typically indicated that these two variables are negatively correlated. In fact, research on this link has produced some fascinating findings, even if the data mostly verify the relationship's empirical validity. It should be noted, nevertheless, that institutional constraints in the employment market and demographic variables may prevent the relationship from existing.

A research was conducted to examine if the Okun's Law exist between the GDP and unemployment based on the economy of Malaysia. In this paper, it has come into conclusion that a negative relationship does exist between the two variables (Noor, et.al, 2007). On the other hand, according to Ma'in et.al (2021), GDP has no significant relationship with unemployment based on their studies. A study of Malaysia has been conducted by Omar & Nor (2020) to identify the relationship between the GDP and the rate of unemployment. They had utilized the time series data by gathering information from 2006 up to 2016. Contradicting with their expectations, they had identified that an insignificant relationship occurs between the GDP and the rate of unemployment.

According to Conteh. (2021), his study aims to investigate the relationship between unemployment rate and economic growth in Liberia from year 2001 to 2019. In his study, he had used the Auto Regressive Distribution Lag to determine the long run relationship of the GDP and unemployment. The result obtained had indicated the long run relationship does not occur between the unemployment and economic growth.

Recent study conducted by Juan and Constanza (2012) have stated that the recent relationship among the changes in GDP with unemployment are different. The recent Great Recession had seemed to change the law. They have discovered that a 0.5 decreased in GDP had led to a 3 percent rose of unemployment which by the Okun's Law, it is supposedly only rising by 1.5 percent. Their researched had concluded that there has been changes in the relationship between GDP growth and the unemployment rate which had led to doubts to predict a more accurate unemployment rate in the future due to the changes.

2.1.3 FDI

On the other hand, Mucuk and Demirsel (2013) had investigated on the relationship between FDI and the rate of unemployment which they have found that there is no significant relationship in the short run but in the long run, it exists. Matthew and Johnson (2014) and Irpan (2016) stated that there is a negative relationship between foreign direct investment (FDI) and unemployment rate. This indicates that the increase in FDI will lead to a decrease in unemployment rate. There were also a few researchers who argued that these two variables had a positive relationship. For example, Trimurti *et.al* (2015) had found that an increase unemployment rate was resulted from an increase in FDI.

The primary driver of economic globalisation at the moment is foreign direct investment. Even though Turkey's economy is becoming more integrated into the global economy, until the early 2000s, Turkey's foreign direct investment (FDI) performance lagged behind that of many other emerging nations. Despite Turkey's rapid economic expansion in the 2000s and the substantial FDI inflows that accompanied it, high rates of unemployment in the nation continued, if not worsened. It is yet unknown how these FDI inflows affected Turkey's unemployment rate at this time. Foreign direct investment (FDI) generates new job opportunities within the investment sector; yet the rate of change is too small for FDI to be an answer for Turkey's unemployment problem (Mehtap et.al, 2014).

The governments of different nations are now seeing foreign direct investments as one of the most important methods to promote their economies' expansion. Within the literature on FDI research, the interdependencies between FDI and employment market issues are an important issue. Although the majority of research in this field indicates that foreign direct investment lowers the unemployment rate, the connections between these two occurrences are still not entirely clear from the results that have been created. That being said, it is evident that the relationships between foreign direct investment and employment or the unemployment rate differ considerably between nations. The fact that a sizable number of research show no causal relationship between these two events is also significant (Vasile et.al, 2014).

According to Said et.al (2022), he has suggested the relationship between the FDI and unemployment are found to be inversed. However, in his research, the theory by Ricardo and Pigou have opposed to it suggesting that there is a positive relationship. According to Hisarcikililar et.al (2014), a study of Turkey FDI and their unemployment rate employing the panel data from the year 2000-2008, they have found a positive but weak relationship.

According to Mustafa and Azizun (2020), they believe that foreign direct investments can affect the rate of unemployment in nations. They have conducted a study of the impact of the FDI towards unemployment in six middle eastern and northern African countries with a high unemployment issue such as Egypt, Jordan, Lebanon, Turkey, Morocco and Tunisia in which they have found out that FDI does reduce the rate of unemployment in the long run but show no relationship in the short run.

2.1.4 Population

Arslan and Zaman (2014) had stated that one of the important factors affecting unemployment is population growth. As the development of the population will lead to a positive influence towards the unemployment rate. Masturah.et.al (2021) stated that there is a positive relationship between the population growth with the rate of unemployment in the educated sectors. Aqil et.al (2014) had contradicted by stated that population growth had an inverse relationship on the employment rate in Pakistan that higher population lead to lower unemployment rate. Loku and Dena (2013) had proven that there was a negative relationship between population and unemployment rate as well.

In relation to population growth or reduction, the unemployment rate may rise or fall correspondingly. The rise in the unemployment rate is almost always associated with population growth. In Nigeria, where population growth is increasing and the economy is experiencing an alarming recession, the rate of unemployment is unbelievably high (Orumie, 2016 and Habiba 2017). Habiba (2017) had concluded that the population has a strong relationship with unemployment, and it is assumed that they have a positive relationship. A simple regression analysis yielded a very significant result, indicating that population growth contributes to the increase in unemployment in Nigeria. This suggests that an increase in population growth is correlated with an increase in unemployment. While it's true that population growth has many beneficial benefits, it's equally critical to recognize that these effects are greatly outweighed by disadvantages. A large population typically puts a nation beyond its carrying capacity, meaning that it can no longer provide resources and employment opportunities for its population.

Besides that, as unemployment are associated with the crime rate, Mohammad et.al (2019), had conducted research towards population with unemployment and the crime rate. The findings indicate that the rates of crime in the districts of Punjab, Pakistan, are positively impacted by both unemployment and population density. Unemployment is believed to be the main reason for crime as they stated and according to this study, the best solution is for their government to reduce unemployment and population density while simultaneously boosting industrialization, social infrastructure, and remittance inflow to reduce crime.

Conclusion

The complex relationship between high unemployment rates and inflation in industrialized nations necessitates careful research and targeted interventions. Stagflation, or high

unemployment and inflation, is a common phenomenon in modern economies. The increased pressure on the labor markets brought on by rapidly expanding populations and shifting demographics exacerbates worries about unemployment. The challenges come from needing to control technological developments that could upend well-established industries of employment while still producing enough jobs to feed the expanding labor population. It is necessary to do a thorough analysis of the complex relationship between population increase and unemployment, accounting for factors such as labor market flexibility, technological adaption, and education and training. Elders who face difficulties in adapting to the technology changes such as using computers might face issues of getting laid off as most businesses in developed countries opt to find employees who can use computers for a faster and more efficient work. Moreover, foreign direct investment is often connected to job creation or expansion of the economy, its impact towards unemployment might differ. High unemployment rates could be caused by a mismatch between the abilities that industries receiving foreign direct investment (FDI) demand and the skills that the local labor possesses. Furthermore, FDI's enhanced automation and efficiency may result in worker displacement in some industries, deepening the problem of unemployment.

Chapter 3: Methodology

Introduction

The methodology that is used to examine the study will be discussed in this chapter. In this chapter, the specification model will be explained. Pooled Ordinary Least Square, Fixed effect Model and Random Effect Model will be explained as well as the Hausman test. Collection of data will be made accordingly as well as the types of tests needed will be conducted accordingly as well. The countries that will be used for this study are France, Spain, Italy, Germany, and United States. The data collected will be annually from the year 2000 to 2022.

3.1 Model Specification

This study closely follows (Masturah *et.al*, 2021) to study the unemployment rates model are as follows:

$$\text{Unemployment Rate}_{it} = \alpha_i + \beta_1 \text{GDP}_{it} + \beta_2 \text{Inflation}_{it} + \beta_3 \text{Population}_{it} + \beta_4 \text{FDI}_{it} + \varepsilon_{it}$$

The unemployment rate *it* is the dependent variable in this study. It represents the individuals who are unemployed seeking for jobs. αi is the entity-specific fixed effect capturing unobservable, time-invariant differences between countries. β1, β2, β3, β4 represents the coefficients representing the impact of GDP, inflation, population, and FDI on the unemployment rate. The reason these 4 independent variables are because these 4 macroeconomic variables are the important economic indicators for a country. Unemployment is closely related to these 4 macroeconomic variables. These 4 macroeconomic variables are also affected by policies implemented by governments which studying these 4 variables can help in the implications of policies at the end of this chapter. ε_{it} is the error term capturing unobserved factors affecting the unemployment rate that are not included in the model.

The expected relationship between GDP with unemployment is that when GDP increases, it will lead to a decrease in unemployment according to the Okun's Law as economic growth is increasing leading to more job creations. Inflation and unemployment are expected to have an inverse relationship as supported by the theory of Phillips Curve. Population and unemployment is expected to have an inverse relationship as more population growth will lead to more demand for goods and services leading to more job creation. The relationship between FDI and unemployment is expected to be having an inverse relationship because it is believed that FDI can create and enhance the economic status, hence, leading to more job creations which can decrease the unemployment rate.

3.2 Panel Model

A panel data set is a dataset that contains observations on several entities across a range of different time periods. It is often referred to as longitudinal or cross-sectional time-series data. This study examines the factors affecting the unemployment rate which are GDP,

Inflation, Population and FDI. Five developed countries have been chosen which are France, Italy, Spain, Germany, and United States, thus, panel model is used in this study. Panel data is unique in that it can monitor changes over time within each entity as well as variations between entities, giving a complete picture of changes in processes. Panel data helps in analyzing the relationship between the variables and the trends in the data collected. The reason a panel is used is because panel data can provide more information, more variability as well as more efficiency. Based on Gujarati's Basic Econometrics (2003), panel data is preferrable in studies of dynamic changes as well as detecting and measuring effects that cross-section and time series data are incapable of. According to Moussa and Ceesay (2021), the panel data techniques that would be used to conduct research would be the fixed effect, random effect and the pooled OLS.

3.2.1 Pooled OLS

Pooled Ordinary Least Square (OLS) is a method used when there is a cross-sectional or time series data from various countries or companies that is observed in a set period. Pooled OLS is employed when there is individual homogeneity, time-invariant variables, significant cross-sectional variance, efficiency considerations, and balanced panel data. It is frequently used as a baseline model to compare the performance of different models in panel data analysis. The method is used to estimate coefficients, examine goodness-of-fit, and evaluate the connection between variables in panel datasets. According to Wooldridge, pooled OLS is used when a different sample for each period of the panel data is selected. As the Pooled OLS is determined from the reducing squared residuals, it provides accurate estimation. However, the Breush-Pagan LM test can be used to identify the suitability of the pooled OLS where if the data is homoscedasticity, pooled OLS would be the preferred method and if the data is heteroskedasticity, the Hausman test would be required.

Ho: No cross-sectional dependence

H1: There is cross-sectional dependence.

If p-value < significance level, reject the null hypothesis, cross-sectional dependence is present.

If p-value > significance level, fail to reject the null hypothesis as there is no cross-sectional dependence.

When the null hypothesis is rejected, Hausman test is required to identify whether the random effect or fixed effect is more suitable for the data.

3.2.2 Hausman test

After conducting the Pooled OLS and using the Breush-pagan LM test, when the null hypothesis is rejected indicating that cross-sectional dependence is present, the Hausman test is the next step. This test helps to identify whether the fixed effect model or the random effect model is more accurate and preferable in this study. It helps to determine the best model that fits the study and. The correlation between the explanatory variables and the individual-specific effects is evaluated. In the event that the test favours the fixed effects model, it means that unemployment is influenced by unobserved individual-specific characteristics.

H0: Random effect model is preferred.

H1: Fixed effect model is preferred.

If P value is less than significance level, reject the null hypothesis, fixed effect model is preferred.

If P value is greater than significance level, fail to reject the null hypothesis, random effect model is preferred.

The fixed effect model is utilized when the individual-specific effect is assumed to be correlated with the independent variables. This method is useful when focusing on small sets of countries as it helps in enhancing the data by using the dummy variables which would help in the missing variables. In my study, the fixed effect model accounts for unobservable factors as it controls the country-specific effect which can provide a more detailed relationship between the dependent variable and independent variables. It includes a separate intercept for each country which can account for unobserved heterogeneity that might be present. This helps to provide a more accurate estimate between the variables. Based on Gujarati's Basic Econometrics (2003), fixed effect where it is because that the intercept may be different across the country, but it does not differ over time. With the dummy variable, we are able to tell the difference between the intercept and the variables. Based on the countries chosen, the equation would be:

$$unemployment_{it} = \beta_0 + \beta_1 GDP_{it} + \beta_2 inflation_{it} + \beta_3 population_{it} + \beta_4 FDI_{it} + \alpha_i + u_{it}$$

The unemployment_it represents the unemployment rate for the countries *i* and a specific time t. The GDP_*it,* inflation_*it,* population_*it*, and FDI_*it* represents the independent variables where β_0 is the intercept. β_1, β_2, β_3, and β_4 are the coefficients for the independent variables. α_*i* is the country-specific fixed effect and u_*it* is the error term. The country specific fixed effect α_*i* captures the unobserved time-invariant heterogeneity that varies across the countries. This allows the estimation to capture the unique effect of each countries.

In FEM regression models, the intercept might vary between individuals to account for unique properties of each unit. To accommodate for different intercepts, utilise dummy variables. The FEM with dummy variables is referred to as the least-squares dummy variable (LSDV) model. FEM is useful for cases in which the individual-specific intercept is associated with one or more regressors. When there are a high number of cross-sectional units (N), FEM could take up a lot of degrees of freedom, requiring the use of N dummies.

Random effect model is used when the country-specific effects are assumed to be uncorrelated to the dependent and independent variables. The unobserved time-invariant heterogeneities across the countries are not related to the independent variables. In a random effects model, the unobserved country-specific effects are treated as random quantities, allowing for difference in the effects of the independent variables across countries. Based on Gujarati's Basic Econometrics (2003), random effect is where the dummy variables actually represent the insufficient knowledge towards the true model, a random effect model can be introduced. The equation would be:

$$unemployment_{it} = \beta_0 + \beta_1 GDP_{it} + \beta_2 inflation_{it} + \beta_3 population_{it} + \beta_4 FDI_{it} + \mu_i + \varepsilon_{it}$$

The unemployment_it represents the unemployment rate for the countries *i* and a specific time t. The GDP_*it,* inflation_*it,* population_*it*, and FDI_*it* represents the independent variables where β_0 is the intercept. β_1, β_2, β_3, and β_4 are the coefficients for the independent variables. The u_*i* represents the random effect for each countries and ε_*it* represents the error term. u_i, is a random variable that represents the unobserved time-invariant heterogeneity that varies across countries, and it is assumed to be uncorrelated with the independent variables.

REM is an alternative to FEM. In REM, individual units' intercepts are considered to be drawn randomly from a larger population with a constant mean value. Individual intercepts are expressed as deviations from the constant mean value. REM is more efficient than FEM in terms of degrees of freedom since it eliminates the need to estimate N cross-sectional intercepts. We simply need to estimate the intercept's mean value and variance. REM is suitable for cross-sectional data with random intercepts that are uncorrelated with regressors.

Fixed effect and Random effect have always been a challenges to choose from where if the $\epsilon i$and the X's are uncorrelated, the random effect is preferred but if they are uncorrelated, the fixed effect is preferred. Fixed effect captures the effects of variables that remain constant overtime whereas random effects capture the variables that vary randomly. Based on Gujarati's Basic Econometric (2003), we can understand that the Fixed Effects is preferred in this scenario as both the time series data and number of cross-sectional units are small. Tests will be conducted in Chapter 4 to support the facts by Gujarati.

3.3 Diagnostic test

3.3.1 Heteroscedasticity test

When there is heteroscedasticity in a regression analysis, it means that there are variations in the residuals' variance, or the discrepancies between the values that were observed and those that were predicted, at every level of the independent variable (s). In another way, as the values of the independent variable(s) fluctuate, so does the residuals' dispersion or spread. There are two tests that can be used to test for heteroscedasticity, which are the Breusch-Pagan test or White test.

Ho: No heteroscedasticity

H1: Heteroscedasticity

If p-value < 0.05: Reject the null hypothesis. There is heteroscedasticity.

If p-value ≥ 0.05: Do not reject the null hypothesis. There is no heteroscedasticity.

In the case where heteroscedasticity occurs and the null hypothesis is rejected

3.3.2 Multicollinearity test

When two or more independent variables in a model have a high degree of correlation, a phenomenon known as multicollinearity occurs in regression analysis, making it difficult to evaluate each variable's impact on the dependent variable independently. Overstated standard errors and unpredictable coefficient estimations might result from multicollinearity. A few test can be used to detect multicollinearity which are the Variance Inflation Factor (VIF) and the tolerance level. The variance inflation factor (VIF) indicates the degree to which a regression coefficient's variance increases with predictor correlation. A high VIF (often greater than 10) signifies multicollinearity. As the opposite of the VIF, tolerance measures the percentage of variance in an independent variable that cannot be accounted for by another variable. Multicollinearity is indicated by a low tolerance, usually less than 0.1.

Ho: No multicollinearity

H1: Multicollinearity exists.

If VIF value greater than 10, there is multicollinearity.

If VIF is smaller than 10, there is no multicollinearity.

3.4 Data collection

The data collection method is a secondary data collection method where information is collected. It is where the data has been collected in the past from resources such as journals, articles, government publications etc. Secondary data are data available on publications where the data that will be collected for the variables of this research will be from the World Bank Data. The data collected will be from year 2000 to year 2022 and it will be a yearly data collection. The developed countries that will be used in this research are Spain, France, Italy, Germany and the United States.

Variable	Description	Source of Data
Unemployment Rate	The rate of unemployment	World Bank

	refers to the percentage of total labor force based on the national estimate where the labor force is currently jobless but is available and seeking for employment	
Gross Domestic Product (GDP)	GDP growth (annual %) which is the percentage of the GDP growth rate annually at market prices based on a fixed currency which is the US dollars.	World Bank
Inflation	The inflation is based on consumer price and annual percentage where the Consumer Price Index measures the percentage change annually in the cost of a fixed basket of goods and services for the average consumer.	World Bank
Population	The population growth is based on	World Bank

	annual percentage where it is the total residents of age populations regardless of the citizenship or the legal status	
Foreign Direct Investment (FDI)	The net inflow based on percentage of GDP where it is the new investment inflow in the country from foreign investor which is then divided by the GDP to get the percentage	World Bank

Chapter 4: Results

4.1 Pooled Ordinary Least Square

Table 4.1 Pooled Ordinary Least Square

Dependent Variable: UNEMPLOYMENT
Method: Panel Least Squares
Date: 03/28/24 Time: 14:59
Sample: 2000 2022
Periods included: 23
Cross-sections included: 5
Total panel (balanced) observations: 115

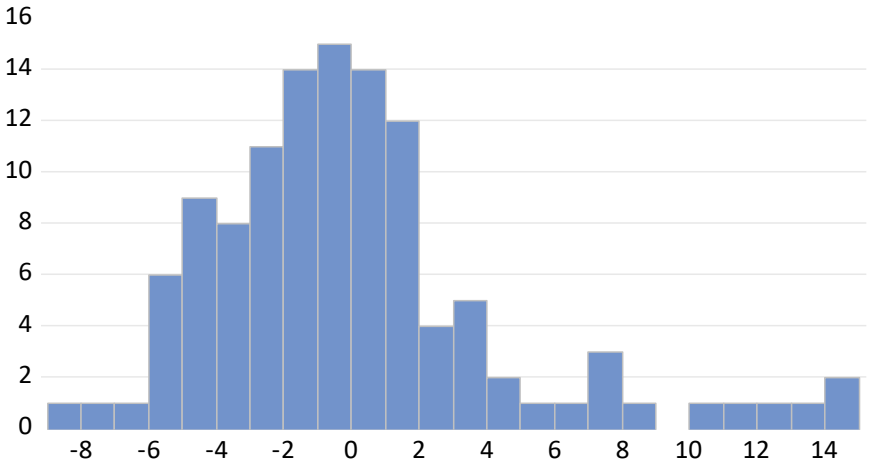
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	10.09891	0.869632	11.61285	0.0000
GDP	-0.182271	0.165925	-1.098513	0.2744
INFLATION	-0.441331	0.288538	-1.529543	0.1290
POPULATION	-1.136051	0.784384	-1.448334	0.1504
FDI	0.374468	0.276893	1.352390	0.1790

R-squared	0.079367	Mean dependent var	9.262939
Adjusted R-squared	0.045890	S.D. dependent var	4.561649
S.E. of regression	4.455753	Akaike info criterion	5.868774
Sum squared resid	2183.911	Schwarz criterion	5.988119
Log likelihood	-332.4545	Hannan-Quinn criter.	5.917216
F-statistic	2.370760	Durbin-Watson stat	0.126188
Prob(F-statistic)	0.056799		

GDP, inflation and population has a negative coefficient whereas FDI has a positive coefficient. The 4 variables are not statistically significant due to the probability being 0.2744 for GDP, 0.1290 for inflation, 0.1504 for population and 0.1790 for FDI at a 5% significance level. The R-squared statistic measures how well a regression model correlates with the data. In this situation, the R-squared is 0.0794, indicating that the model only covers around 8% of the variation in unemployment whereas the adjusted R-squared is 0.0459 which both are considered to be low. The F-statistic on the other hand is 2.3707 and the probability of the F-statistic only accounts for 0.0568 indicating that the overall data is not statistically significant. On the other hand, the Durbin-Watson stat indicating a 0.1262 which is considerably to be low might suggest a positive autocorrelation in the residuals which indicates that the errors from the past and current data are correlated. The overall result suggests that the independent variables are not statistically significant and has evidence of the autocorrelation in the residual which suggests that it is not the appropriate method, which would require the Hausman test to be conducted.

4.1.1 Normality POLS

Table 4.1.1 Normality POLS



Series: Standardized Residuals	
Sample 2000 2022	
Observations 115	
Mean	8.57e-16
Median	-0.742453
Maximum	14.71376
Minimum	-8.332508
Std. Dev.	4.376884
Skewness	1.319104
Kurtosis	5.207951
Jarque-Bera	56.71030
Probability	0.000000

Based on the normality test for the POLS model, the mean is 8.57e-16 with a negative median of -0.742453. The maximum and minimum value are 14.71367 and -8.332508 respectively which suggests the range of the residuals. The skewness is 1.319104 which suggests a positive skew value with more on the left side which in other words suggests more negative residuals over positive residuals. The Kurtosis valued at 5.207951 which is higher than the normal value of 3 suggests that is has a heavier tail or more on one side. The Jarque-Bera test is 56.71030 and a probability of 0.000000 which suggests that the residuals are not normally distributed.

4.2 Cross section dependence test

Table 4.2 Cross section dependence test

Residual Cross-Section Dependence Test
Null hypothesis: No cross-section dependence (correlation) in residuals
Equation: Untitled
Periods included: 23
Cross-sections included: 5
Total panel observations: 115
Cross-section effects were removed during estimation

Test	Statistic	d.f.	Prob.
Breusch-Pagan LM	35.29164	10	0.0001
Pesaran scaled LM	5.655384		0.0000
Bias-corrected scaled LM	5.541747		0.0000
Pesaran CD	3.506751		0.0005

The hypothesis for the cross-section dependence test is:

H0: No cross-section dependence

H1: Cross section dependence occurs.

If p-value < 0.05, reject the null hypothesis as there is cross-section dependence.

If p-value > 0.05, fail to reject the null hypothesis as there is no cross-section dependence.

The cross-section dependence test is used to indicate whether there is cross-section dependence in the data. In this test, the results of all the test have a low p-value which is lower than the significance level of 5%. This suggests that the null hypothesis (no cross-section dependence in residuals) is rejected as there is strong evidence that cross-section dependence occurs in the data. With the cross-section dependence being present, the pooled OLS method will not be efficient and reliable which on the other hand supports the usage of Hauman test to determine whether the fixed effect or random effect model is preferred.

4.3 Hausman test

Table 4.3 Hausman test

Correlated Random Effects - Hausman Test
Equation: Untitled
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	302.099839	4	0.0000

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
GDP	-0.094974	-0.182271	0.000180	0.0000
INFLATION	-0.512544	-0.441331	0.000746	0.0091
POPULATION	-3.074910	-1.136051	0.056800	0.0000
FDI	-0.216285	0.374468	0.004570	0.0000

Cross-section random effects test equation:
Dependent Variable: UNEMPLOYMENT
Method: Panel Least Squares
Date: 03/28/24 Time: 15:10
Sample: 2000 2022
Periods included: 23
Cross-sections included: 5
Total panel (balanced) observations: 115

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	12.26264	0.486589	25.20125	0.0000
GDP	-0.094974	0.087185	-1.089336	0.2785
INFLATION	-0.512544	0.152273	-3.365964	0.0011
POPULATION	-3.074910	0.471845	-6.516776	0.0000
FDI	-0.216285	0.158857	-1.361506	0.1762

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.760875	Mean dependent var	9.262939
Adjusted R-squared	0.742827	S.D. dependent var	4.561649
S.E. of regression	2.313312	Akaike info criterion	4.590267
Sum squared resid	567.2499	Schwarz criterion	4.805087
Log likelihood	-254.9403	Hannan-Quinn criter.	4.677461
F-statistic	42.16024	Durbin-Watson stat	0.550890
Prob(F-statistic)	0.000000		

As the Hausman test helps to determine whether a fixed effect or random effect model is preferred, the above is the result of the Hausman test. Based on the hypothesis of: H0: Random effect model is preferred

H1: Fixed effect model is preferred.

The p-value of the cross-section random is 0.0000 which is lower than the significance level of 5% indicating that the null hypothesis is rejected. There is strong evidence that the fixed effect model is preferred. Besides that, the Chi-sq statistic is 302.099839 with the degree of freedom of 4 suggests that there is a possibility that the random effects errors terms are not correlated with the independent variables which might lead to a biased estimate. Therefore, the fixed effect model is preferred.

Based on the fixed effect model is preferred, a unit increase in GDP will lead to a decrease in unemployment by 0.094974, however, it is not statistically significant. A unit increase in inflation will also lead to a decrease in unemployment by 0.512544 which has strong evidence that it is statistically significant. On the other hand, a one-unit increase in population will lead to a decrease in the unemployment rate by 3.074910 and has strong evidence that it is statistically significant. FDI lastly indicated that a one unit increase in FDI would lead to a decrease in unemployment by 0.216285 but it is not statistically significant. The F-statistic is 42.16024 with a prob (F-statistic) of 0.000000 which indicates that the overall model is statistically significant.

4.4 Fixed Effect

Table 4.4 Fixed Effect

Dependent Variable: UNEMPLOYMENT
Method: Panel Least Squares
Date: 03/28/24 Time: 15:09
Sample: 2000 2022
Periods included: 23
Cross-sections included: 5
Total panel (balanced) observations: 115

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	12.26264	0.486589	25.20125	0.0000
GDP	-0.094974	0.087185	-1.089336	0.2785
INFLATION	-0.512544	0.152273	-3.365964	0.0011
POPULATION	-3.074910	0.471845	-6.516776	0.0000
FDI	-0.216285	0.158857	-1.361506	0.1762

Effects Specification

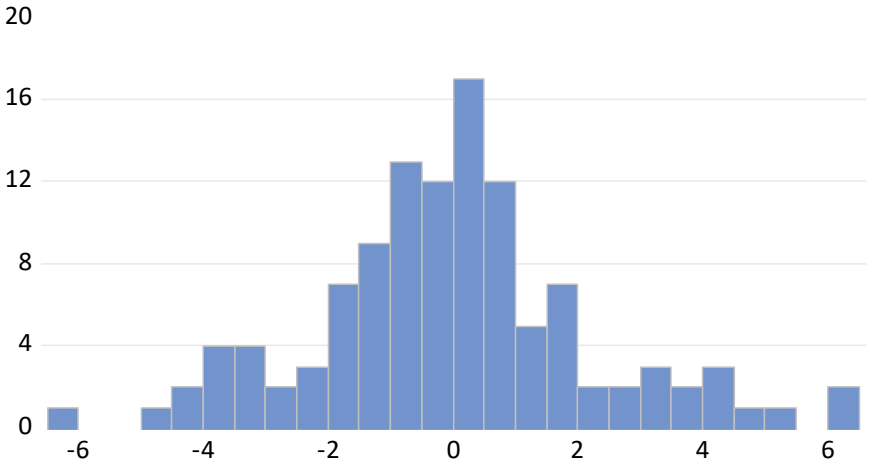
Cross-section fixed (dummy variables)

R-squared	0.760875	Mean dependent var	9.262939
Adjusted R-squared	0.742827	S.D. dependent var	4.561649
S.E. of regression	2.313312	Akaike info criterion	4.590267
Sum squared resid	567.2499	Schwarz criterion	4.805087
Log likelihood	-254.9403	Hannan-Quinn criter.	4.677461
F-statistic	42.16024	Durbin-Watson stat	0.550890
Prob(F-statistic)	0.000000		

In this fixed effect model, all the coefficients are negative. The coefficient for GDP, inflation, population and FDI are -0.094974, -0.512544, -3.074910 and -0.216285 which suggests that the dependent variable has a negative relationship with the independent variables. The p-value for GDP, 0.2785 is more than the significance level of 5%, it suggests that it is not statistically significant. Inflation on the other hand has 0.0011 p-value which is less than the significance level that suggests that it is significant along with population which has 0.0000 p-value which has strong evidence of statistically significant. FDI has a p-value of 0.1762 which is more than the significance level of 5% which suggests that it is not statistically significant. The R-squared and adjusted R-squared are 0.760875 and 0.742827 respectively which suggests a 76% and 74% of the variance of the independent variable in explaining the dependent variable. The F-statistic is 42.16024 with a prob (F-statistic) of 0.000000 which indicates that the overall model is statistically significant. The Durbin-Watson statistic is 0.550890 which is also low and suggests that there is a positive autocorrelation.

4.4.1 Normality Test FEM

Table 4.4.1 Normality Test FEM



Based on the normality test for the fixed effect model, the mean is -1.16e-17 with a negative median of -0.057088. This suggests that the mean and median are distributed almost symmetrically around zero. The maximum and minimum value are 6.484130 and -6.135593 respectively which suggests the range of the residuals. The skewness is 0.337413 which suggests a slightly positive skew value with slightly more towards the right, but it is almost symmetrical. The Kurtosis valued at 3.715898 which is slightly higher than the normal value of 3 which also suggests moderate peaked and not very heavy on one side. The Jarque-Bera test is 4.637854 and a probability of 0.098139 which is more than the significance level of 5% which suggests that the residuals are normally distributed.

4.5 Random Effect

Table 4.5 Random Effect

Dependent Variable: UNEMPLOYMENT
Method: Panel EGLS (Cross-section random effects)
Date: 03/28/24 Time: 15:10
Sample: 2000 2022
Periods included: 23
Cross-sections included: 5
Total panel (balanced) observations: 115
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	10.09891	0.451491	22.36792	0.0000
GDP	-0.182271	0.086144	-2.115885	0.0366
INFLATION	-0.441331	0.149802	-2.946108	0.0039
POPULATION	-1.136051	0.407232	-2.789689	0.0062
FDI	0.374468	0.143756	2.604887	0.0105

Effects Specification		
	S.D.	Rho
Cross-section random	5.27E-07	0.0000
Idiosyncratic random	2.313312	1.0000

Weighted Statistics			
R-squared	0.079367	Mean dependent var	9.262939
Adjusted R-squared	0.045890	S.D. dependent var	4.561649
S.E. of regression	4.455753	Sum squared resid	2183.911
F-statistic	2.370760	Durbin-Watson stat	0.126188
Prob(F-statistic)	0.056799		

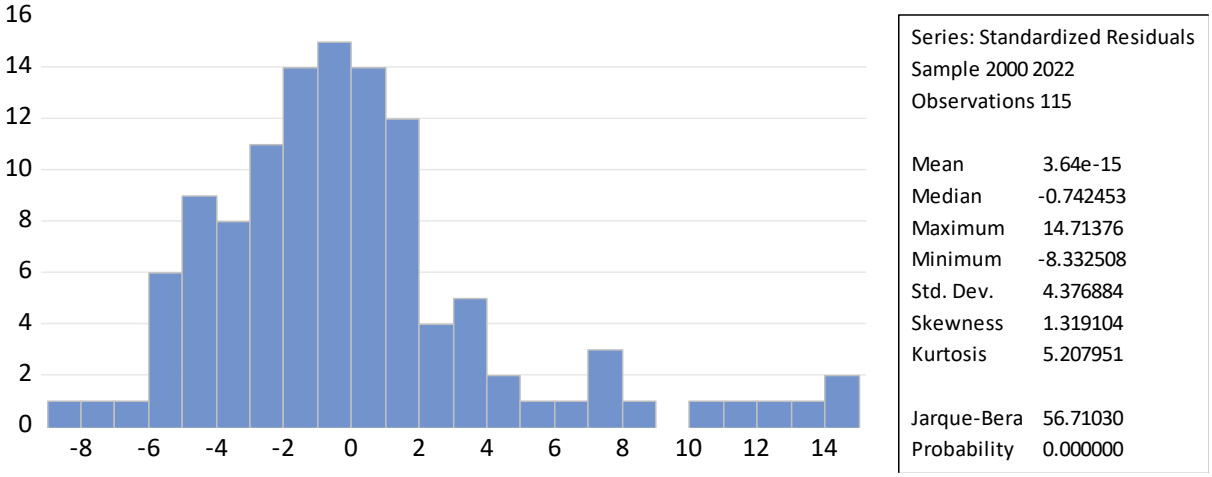
Unweighted Statistics			
R-squared	0.079367	Mean dependent var	9.262939
Sum squared resid	2183.911	Durbin-Watson stat	0.126188

GDP, inflation and population has a negative coefficient whereas FDI has a positive coefficient. The 4 variables are statistically significant due to the probability being 0.0366 for GDP, 0.039 for inflation, 0.0062 for population and 0.0105for FDI at a 5% significance level. The R-squared statistic measures how well a regression model correlates with the data. In this situation, the R-squared is 0.0794, indicating that the model only covers around 8% of the variation in unemployment whereas the adjusted R-squared is 0.0459 which both are considered to be low. The F-statistic on the other hand is 2.3707 and the probability of the F-statistic only accounts for 0.0568 indicating that the overall data is not statistically significant. On the other hand, the Durbin-Watson stat indicating a 0.1262 which is considerably to be low might suggest a positive autocorrelation in the residuals which indicates that the errors from the past and current data are correlated. However, as a random

effect model, the effects specification plays a role to determine the significance of the model. The cross-section random has a rho of 0.0000 which suggests that random effect model is statistically insignificant and has a standard deviation of 5.27E-07 which also suggests a very small variance, which is very close to zero.

4.5.1. Normality Test REM

Table 4.5.1 Normality Test REM



Based on the normality test for the Random effect model, the mean is 3.64e-15 with a negative median of -0.742453. The maximum and minimum value are 14.71367 and -8.332508 respectively which suggests the range of the residuals. The skewness is 1.319104 which suggests a positive skew value with more on the left side which in other words suggests more negative residuals over positive residuals. The Kurtosis valued at 5.207951 which is higher than the normal value of 3 suggests that is has a heavier tail or more on one side. The Jarque-Bera test is 56.71030 and a probability of 0.000000 which suggests that the residuals are not normally distributed.

4.6 Multicollinearity

Besides that, the multicollinearity can be calculated through the usage of the VIF.

Ho: No multicollinearity

H1: Multicollinearity exists.

If VIF value greater than 10, reject the null hypothesis as there is multicollinearity.

If VIF is smaller than 10, there is no multicollinearity.

With the formula to calculate VIF is 1/(1-R2), we can obtain the value of the VIF. Through the calculation, the value of the VIF 4.1819, which is smaller than 10 and below the threshold of 5 indicating that the concern for multicollinearity is low (Ringim et.al, 2012). Thus, we fail to reject the null hypothesis as there is sufficient evidence that there is no multicollinearity.

4.7 Redundant Fixed Effects Test

Table 4.7 Redundant Fixed Effects Test

Redundant Fixed Effects Tests
Equation: Untitled
Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	75.524960	(4,106)	0.0000
Cross-section Chi-square	155.028367	4	0.0000

The redundant fixed effect test is used to understand whether the fixed effect model is preferred over model without fixed effect. The p-value for both cross-section F and cross section Chi-square has a 0.0000 value which indicates that the fixed effect model is statistically more significant than others.

4.8 Heteroscedasticity test

P value for cross section test = 0.000

P value for period test = 0.000

Table 4.8 Heteroscedasticity test

Diagnostic Test	Result	Decision
Ho: Residuals are not heteroskedasticity HA: Residuals are heteroskedasticity	P-value: 0.0000	Since p-value (0.0000) < α 0.05, reject $H0$.Thus, there is heteroskedasticity in the residuals

Conclusion

In this chapter, the Pooled OLS and Hausman test are conducted to determine the suitable model for this research. Based on my results from the Hausman test, it can be concluded that the Fixed Effect Model is preferred in this. The cross-section dependence test is conducted as well to determine whether the variables have a cross-sectional dependency, and it is found to have it. The redundant Fixed Effect Test is also conducted which determines that the fixed effect model is preferred over those models without fixed effects. The normality test for fixed effect also concluded that the residuals are normally distributed as compared to the POLS and Random Effect Model. Thus, the fixed effect model is preferred in this research.

Chapter 5: Discussion, Implications, Limitations and Recommendations

Introduction

In this chapter, we will discuss on the findings and provide a conclusion for our findings. A detailed explanation will be provided for the relationship between the unemployment rate

and GDP, inflation, population and FDI. An implication of study will be done along with the limitations of this study. Recommendations will also be provided to address the issue of our research to tackle the issue of unemployment.

5.1 Discussion

In the history of economics, unemployment issue has been a serious issue for countries and has been a hot topic ever since. In this paper, we have conducted a study of the macroeconomic determinants of unemployment in developed countries to have a deeper understanding of which factor influences the rate of unemployment. Through the deeper understanding, a better policy decision can be suggested to tackle the issue of unemployment. Therefore, the study on the macroeconomic determinants of unemployment for developed countries has been conducted with 5 developed countries which are Italy, Spain, France, Germany, and United States from the year 2000 to the year 2022. The macroeconomic determinants chosen for this research are GDP, Inflation, Population and FDI which is believed to be the important factors affecting unemployment.

The Pooled OLS is conducted as this research is a panel data analysis. From the POLS, we can determine the cross-section dependency with the cross-section dependence test. In the cross-section dependence test, it is concluded that the p-value was 0.0000 which is less than the significance of 5%, hence, the variables are cross-section dependency which we reject the null hypothesis as cross-section dependency occurs. When there is cross-section dependency, the Hausman test is required to determine whether the fixed effect or random effect model is preferred in this study.

The Hausman test helps us to choose whether the fixed effect model or random effect model is preferred in this study. After conducting the Hausman test, it is found that the p-value of the cross-section random is 0.0000 which is lower than the significance level of 5% indicating that the null hypothesis is rejected which is random effect model is preferred. There is strong evidence that the fixed effect model is preferred.

In the fixed effect model, it can be concluded that both the GDP and FDI are not statistically significant, but inflation and population are statistically significant. The GDP and FDI might mean that they do not have a great impact on unemployment rate and that other unmeasured variables might influence the rate of unemployment. One of the reasons for GDP to be insignificant is due to the reason of the structural unemployment. When GDP increases, it will lead to more growth in the economy leading to better technological advancements which

would result in mismatch of skills in the structural unemployment. The lack of necessary skills in each sector would result in those lacking skills to face unemployment. Another reason would be the fictional unemployment. Frictional unemployment is the temporary period of time when people face unemployment as they are changing their jobs. As more people enter and exit the labour force, frictional unemployment is unavoidable, even in expanding economies with rising GDPs. Due to this, there may not be obvious relationship between GDP growth and unemployment rates because short-term economic indicators may not adequately reflect labor market turbulence. FDI is frequently directed into particular economic sectors. The employment impact can be minimal if these industries are not extremely labor-intensive or lack the knowledge and abilities of the local labor force. For instance, foreign direct investment (FDI) in high-tech sectors may generate jobs for highly skilled individuals but not necessarily generate jobs for the low-skilled individuals.

On the other hand, inflation and population indicates that the inflation rate does have an impact towards the rate of unemployment and that population would also impact the unemployment rate. This indicates that GDP and FDI have insufficient evidence to support that an increase in GDP and FDI will lead to a decrease in unemployment, however, inflation and population decrease will lead to an increase in unemployment rate based on the results. The result of GDP has supporting evidence from Ma'in et.al (2021) and Omar and Nor (2020) which they have found that GDP has insignificant relationship with unemployment. The relationship between FDI and unemployment, however, can be supported by the findings by Mucuk and Demirsel (2013), where there is no significant relationship between the FDI and unemployment. Aqil et.al (2014) and Loku and Dena (2013) has proven that population has an inverse relationship with unemployment which supports the evidence for my results. The findings from the relationship between inflation and unemployment can be supported by the theory of Philip Curve where inflation and unemployment have a significant relationship which is inverse (James and Mark (2008), Alisa (2015) and Edmund (2008).

5.2 Implication of Study

In this study, we aim to provide adequate information to address the issue of unemployment rate. With this study, policymakers can understand more towards this issue and to take better decision-making to tackle this issue. Understanding the effects of GDP, Inflation, Population and FDI can help policymakers to implement effective policies to tackle the issue. With the

findings that GDP and FDI are not statistically significant, indicates that there is not enough evidence to prove that an increase in GDP and FDI will result in a decrease in unemployment. There could be other various factors that affect the GDP and FDI which might need to be taken into account for, therefore, policymakers would need to be extra careful towards making decision based on our results. Despite validating the usage of Okun's Law, there is insufficient evidence to conclude that GDP and unemployment's relationship in my study.

On the other hand, inflation and population with a negative coefficient have a statistically significant relationship indicating that with a decrease in inflation or population can lead to an increase in unemployment. In the inflation policy, it supports the theory of Philip Curve where it suggests that inflation and unemployment rate have an inverse relationship. It is believed that a higher inflation rate would lead to instability in the economy and but also decreasing the purchasing power of individuals which will lead to a lower rate of unemployment (Chicheke,2009). During a lower rate of unemployment, individuals tend to have more spending power which would raise the price of goods but on the other hand when higher unemployment rate, there is less purchasing power leading to a pressure to reduce the price of goods. In order to tackle this issue, policymakers should balance the inflationary rate and the unemployment rate. A way is to adopt the expansionary monetary policy to boost economic activities to create more job opportunities, but expansionary monetary policy is to be done cautiously to prevent a very high inflation rate for the country (Altavilla and Ciccarelli, 2009). It is difficult to address both issues together as they have an inverse relationship so decision makers should ensure that balancing both the factors to prevent either a too high inflation rate or too high unemployment rate which could negatively affect a country.

Besides that, an increase in population would lead to a decrease in unemployment. This can be seen that as population grows, it would lead to more labor forces in the labor market. However, demographic factors will also lead to a different demand in the labor market, hence, it is important for policymakers to ensure effective employment policies are to be implemented (Wang and Li, 2021). Increasing population eventually leads to increase in demand for goods and services which would require businesses to increase supply, therefore, increasing the job opportunities in the job market. It is essential for policymakers to ensure that education is an important factor in the growing population as labor market often demand for higher skills worker. Therefore, policymakers can invest in education, ensuring that everyone can get equal education to meet the demands to prevent skill mismatch. Moreover, growing population would need more infrastructure which policymakers can invest in better

and more infrastructure to support the growing population as well as creating more job opportunities at the same time (Bivens, 2014).

In a nutshell, GDP and FDI on my findings are not statistically significant which we believed that there could be other factors affecting it. Therefore, policymakers should take extra precautions in addressing the relationship between unemployment and GDP and FDI. Inflation and Population does have an inverse relationship which supports the Philips Curve as well. Policymakers should maintain a balance and moderate rate of inflation and unemployment to prevent either one of it from being higher. Policymakers should also invest in education and infrastructure to address the growing population to tackle the unemployment issue in the growing population.

5.3 Limitations of study

One of the limitations to my study is the limited countries chosen for my study. As I have only chosen 5 developed countries, the result may lead to a different finding in other developed countries due to the difference of countries. The data are not accounted for the economic policies or other economic conditions which may lead to an accurate result. As the determinants chosen were GDP, Inflation, Population and FDI, there could be other unobserved time varying factors in determining these variables which might lead to a bias estimate or the validity of my results. There could also be an estimated bias where government policies or technological advancements that are not accounted for in the variables. There could be bidirectional results where unemployment rate that are high might lead to higher GDP and FDI which is not accounted for.

Another limitation would be the data constraint for our study. As our data period are small and sample size are small, it may lead to error term where it is not normally distributed (Das and Imon, 2016). Besides that, there could be other various macroeconomic determinants of unemployment which was not conducted in this study. According to Mukisa et.al (2020), other various factors such as trade openness, external debt, and gross national expenditure are also major factors affecting the unemployment rate.

Besides that, the data collected are the developed countries with high unemployment instead of a mixture of the ones with low unemployment. Concentrating on developed countries only with high unemployment might lead to unfavorable assumptions or misrepresentations of the economic performance of the countries. As they are categorized underdeveloped

countries, most developed countries have low unemployment rate as they have been controlling it due to the difference in policy implementation.

5.4 Recommendations for Future Research

When future researchers are conducting the same study, it is recommended that a larger sets of countries and a longer period of time is taken into account to enhance the results and the robustness of the results. In order to avoid variable biasness in this study, researchers might additionally include more instrumental variables that have a correlation with the independent variables. For the purpose of accounting for unobserved variation between the countries, control variables like government spending can be included. To avoid inconsistent outcomes, be sure the source of the data you obtain is reliable. Data collection from World Bank and IMF are the two reliable sources for national data collections. Future researchers can opt to collect data for developed countries even with low unemployment rate to generalize the results obtained from the analysis. Studying both high and low unemployment rates in developed countries can also help researchers to have a deeper understanding towards the policies implemented and to provide a better solution to tackle the issue of unemployment.

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