

MACROECONOMIC FACTORS AFFECTING
UNEMPLOYMENT RATE IN CHINA

BY

CHEN LI XUEN
CHEW YUN BEE
RICK LIM LI HSIEN
TAN WAN YEN
TWE KAH YEE

A research project submitted in partial fulfillment of the
requirement for the degree of

BACHELOR OF BUSINESS ADMINISTRATION (HONS)
BANKING AND FINANCE

UNIVERSITI TUNKU ABDUL RAHMAN

FACULTY OF BUSINESS AND FINANCE
DEPARTMENT OF FINANCE

APRIL 2017

Copyright @ 2017

ALL RIGHTS RESERVED. No part of this paper may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, graphic, electronic, mechanical, photocopying, recording, scanning, or otherwise, without the prior consent of the authors.

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, or other institutes of learning.
- (3) Equal contribution has been made by each group member in completing the research project.
- (4) The word count of this research report is 11,862 words.

Name of Student:	Student ID:	Signature:
1. CHEN LI XUEN	13ABB03383	_____
2. CHEW YUN BEE	13ABB03359	_____
3. RICK LIM LI HSIEN	13ABB05488	_____
4. TAN WAN YEN	13ABB03443	_____
5. TWE KAH YEE	13ABB03377	_____

Date: 12th April 2017

ACKNOWLEDGEMENT

The completion of this research project required assistance of various personnel. We would not be that successful to complete this research without their helping hands. Thus, we would like to take this opportunity to express our deepest and sincere appreciation to those who guided, helped, supported, and encouraged us in the whole progress.

Firstly, we would like to express our sincere thanks of gratitude to our supervisor, Ms. Cheong Chee Teng for giving us the treasure opportunity to work with her. Thousands of thanks would have to deliver for her patience, enthusiasm, motivation and immense knowledge towards us. We are grateful to have our final year project done under her valuable time and guidance. She had provided us detailed guidance with her professional experience and knowledge.

Moreover, we would like to thank our second examiner, Ms. Nabihah binti Aminaddin for the comments before final submission of final year project. Her valuable advices and comments are helpful to us in making a better improvement on our final year project.

Furthermore, we would like to thank our project coordinator, Ms. Nurfadhilah binti Abu Hasan for coordinating the latest information to us. We sincerely appreciate her clarification whenever we are facing doubts or problems all the while.

Besides, we would also like to have a deepest thanks to all the lecturers and tutors who have taught us their knowledge throughout our duration of study in Universiti Tunku Abdul Rahman. Without them, we would not be completed our final year report successfully.

Lastly, special thanks to all the group members for the endless efforts, time, and hard-work in completing this research. We do appreciate full cooperation from every single of them. By that, this research can be completed successfully.

TABLE OF CONTENTS

	Page
Copyright Page.....	ii
Declaration.....	iii
Acknowledgement.....	iv
Table of Contents.....	v
List of Tables.....	ix
List of Figures.....	x
List of Abbreviations.....	xi
List of Appendices.....	xiii
Abstract.....	xiv
CHAPTER 1 RESEARCH OVERVIEW.....	1
1.0 Introduction.....	1
1.1 Research Background.....	2
1.2 Problem Statement.....	4
1.3 Objective of Study.....	7
1.3.1 General Objectives.....	7
1.3.2 Specific Objectives.....	7
1.4 Research Questions.....	7
1.5 Hypothesis of Study.....	8

1.6	Significance of Study.....	9
1.7	Chapter Layout.....	10
1.8	Conclusion.....	10
CHAPTER 2 LITERATURE REVIEW.....		11
2.0	Introduction.....	11
2.1	Theoretical Framework.....	11
2.2	Review of Literature.....	13
2.2.1	Dependent Variable – The Unemployment Rate.....	13
2.2.2	Independent Variable – The Inflation.....	15
2.2.3	Independent Variable – The GDP Growth.....	18
2.2.4	Independent Variable – The Population.....	20
2.2.5	Independent Variable – The Foreign Direct Investments.....	21
2.3	Conclusion.....	24
CHAPTER 3 METHODOLOGY.....		25
3.0	Introduction.....	25
3.1	The Data.....	25
3.2	Data Analysis.....	26
3.2.1	Unit Root Test.....	26
3.2.1.1	Augmented Dickey Fuller (ADF) Test.....	27
3.2.2	ARDL Bounds Tests for Cointegration.....	27
3.2.3	Diagnostic Checking.....	29

3.2.3.1	Jarque-Bera Test.....	29
3.2.3.2	Lagrange Multiplier Test (LM Test).....	30
3.2.3.3	Ramsey’s RESET Test.....	31
3.2.3.4	CUSUM and CUSUMSQ Test.....	31
3.3	Conclusion.....	32
CHAPTER 4	DATA ANALYSIS.....	33
4.0	Introduction.....	33
4.1	Unit Root Test.....	33
4.2	ARDL Bound Cointegration Test Model.....	35
4.3	The Long-Run Relation of Unemployment Rate and Its Determinants in China.....	36
4.4	Results of Diagnostic Checking.....	37
4.4.1	Normality Test.....	37
4.4.2	Autocorrelation.....	39
4.4.3	Specification Error.....	40
4.4.4	CUSUM and CUSUMSQ.....	41
4.5	Conclusion.....	42
CHAPTER 5	DISCUSSIONS, CONCLUSION, IMPLICATIONS.....	43
5.0	Introduction.....	43
5.1	Summary of Major Findings.....	43
5.2	Limitations.....	45

5.3 Recommendations.....	46
5.4 Policy Implications.....	47
5.5 Conclusion.....	48
References.....	50
Appendices.....	60

LIST OF TABLES

	Page
Table 1.1: Unemployment Rate in China.....	5
Table 3.1: Chi-square Distribution Table.....	30
Table 4.1: Augmented Dickey-Fuller Unit Root Test.....	34
Table 4.2: F-Statistic Bound Test.....	35
Table 4.3: Long-Run Relation for UN and Its Determinants.....	36
Table 4.4: White Test for Heteroscedasticity.....	38
Table 4.5: Breusch-Godfrey Serial Correlation LM Test.....	39
Table 4.6: Ramsey RESET Test.....	40
Table 5.1: Summary of Diagnostic Checking.....	44

LIST OF FIGURES

	Page
Figure 1.1: Unemployment Rate in China, 1982-2014.....	4
Figure 2.1: Framework of Macroeconomic Factors Affecting Unemployment Rate in China from 1982-2014.....	12
Figure 4.1: Jarque-Bera Normality Test.....	37
Figure 4.2: CUSUM (5%).....	41
Figure 4.3: CUSUM-Square (5%).....	41

LIST OF ABBREVIATIONS

ADF	Augmented Dickey Fuller
AIC	Akaike Information Criterion
ARDL	Autoregressive Distributed Lag
ARMA	Autoregressive Moving Average
CUSUM	Cumulative Sum of Recursive Residuals
CUSUMSQ	Cumulative Sum of Recursive Residuals of Square
ECT	Error Correction Term
EPL	Employment Protection Legislation
EQ	Equation
FDI	Foreign Direct Investment
G7	Group of Seven
GDP	Gross Domestic Product
GNP	Gross National Product
INF	Inflation
IVF	In-Vitro Fertilisation
JB	Jarque-Bera
LM	Lagrange Multiplier
MENA	Middle East and North Africa
POP	Population

RESET	Regression Specification Error Test
UECM	Unrestricted Equilibrium Correction Model
UN	Unemployment Rate
US	United State
VAR	Value at Risk
WHO	World Health Organization

LIST OF APPENDICES

	Page
Appendix 1: Augmented Dickey-Fuller Test.....	60
Appendix 2: ARDL Bounds Test.....	63
Appendix 3: ARDL Cointegrating and Long Run Form.....	64

ABSTRACT

This study determines macroeconomic factors affecting unemployment rate in China by studying the long-run relationship from year 1982 to 2014. Data are obtained from World Development Indicators. Factors such as Inflation, GDP growth, Population and Foreign Direct Investment are brought into discussion. Methodologies like Unit Root Test and Augmented Dickey Fuller (ADF) Test are applied before the use of Autoregressive Distributed Lag (ARDL) approach. ARDL is used to study the long-run effect between unemployment rate and related factors. This approach can only be used when Unit Root Test and ADF Test have been passed. As a result, GDP growth and Population are significant to unemployment rate which proven that long-run relation exists between them whereas Inflation and Foreign Direct Investment show insignificant relationship towards unemployment rate. Possible reasons to obtain such outcomes are data constraints and excluding relevant variables. Thus, some recommendations suggest to future researchers or policy makers which are increase the sample size and use panel data analysis so that further judgment can be made on the validity of research towards various countries other than focusing on China.

CHAPTER 1

RESEARCH OVERVIEW

1.0 Introduction

In research overview, a brief introduction towards the research topic will be brought into discussion. Unemployment is a big league and critical issue across various countries including China. Thus, all the relevant ideas, key factors and concepts would be discussed at first including the macroeconomic factors that affect the unemployment rate. Based on official unemployment rate reporting by the government of China, near 4% of unemployment rate be announced and carried along for five years. However, Fathom Consulting, an independent macro research which contributes macro economy's advices and guidance to various leading corporate mentioned unemployment rate in China possible to be tripled across years in fact. Therefore, the investigated problem will be described in the following components of the chapter. The problems and research objectives should be related clearly to engage well to the core objective of the study particularly in order to bring out the main investigation of this paper which is the macroeconomic factors influencing unemployment rate varies. Following up with the identification of research questions and hypotheses, this is to provide a brief guideline of the study to the reader on the main research. Furthermore, each chapter of this research will be outlined in chapter 1. A summary of chapter 1 would be made before the start of chapter 2.

1.1 Research Background

One of the major economic problems facing by various developing countries is unemployment. According to Cai & Chan (2009), global economic crisis 2008 – 2009 affect greatly on the employment of urban workers in China. Residents in countries to get a job have been getting harder from time to time due to higher jobless rate. Such condition is far worse and getting more concern by policy makers as well as economists across years. Both parties are constantly monitor and evaluate on the current situation and take adequate actions when needed based on the reliability and availability of information and statistics.

Determination of few main influences causes unemployment in China majoring on the macroeconomic factors explaining on the main objective of this research. This may be brought into discussion of the significant relationship among those variables with unemployment meanwhile. On top of that, long-run relationship will be tested in our research though. According to previous researchers, there are four common factors which affect greatly towards unemployment rate. Those factors are inflation (INF), GDP growth (GDP), population (POP) and foreign direct investment (FDI).

Inflation can be taken into consideration of the main disaster to affect employment rate most of the time. It can be categorized into the fundamental part of the market economy. It is proven that inflation and unemployment has a negative relationship according to the studies of Li and Liu (2012), Vermeulen (2015) and Yelwa, David, and Awe (2015). Philip Curve contributes valuable understanding and comprehension for policy makers when it comes to the analysis between inflation and unemployment (Furuoka & Munir, 2014). However, there is research denying on the validity of Phillip Curve as well. Based on Alisa (2015), Philip Curve did not apply to short or long run. Countries have to pass through a level of stabilization before achieving economic stabilization and full employment.

In economics, some of the researchers believe in significant relationship between the growth rates of GDP of an economy versus unemployment rate. This explanation can be obtained from Abdulla (2012) and Zivanomoyo & Mukoka (2015). Okun's Law states both real GDP and unemployment rate having negative relationship in theoretical point of view. However, there are empirical results disclosed that Okun's Law does not completely giving strong confirmation for unemployment rate and economic growth all the time based on the research from Kreishan (2011) and Dunsch (2016).

The growth of GDP of an economy can significantly give impact on the relationship of population growth with unemployment rate (Orumie, 2016). An increment or decrement in unemployment rate could be related to population growth. Without an adequate control over population of a country may cause employment problems by giving inequality of income distribution to all residents in that country. This proven population and unemployment rate has a significant relationship (Imoisi, Olatunji, & Ubi-Abai, 2014). According to Aqil, Qureshi, Ahmed, and Qadeer (2014), a negative relationship of population growth rate affect unemployment rate significantly.

Foreign direct investments (FDI) has become a concern and increased importance to researchers and policy makers in influencing the economy. Inflows of foreign direct investments can be the factor that boosts economic growth and significantly impact on unemployment rate of countries as higher unemployment reflects higher inflow of foreign direct investments (Strat, Davidescu, & Paul, 2015). In fact, FDI has both positive and negative effects either direct or indirect on employment of an economy in the sense of quantity, quality and location.

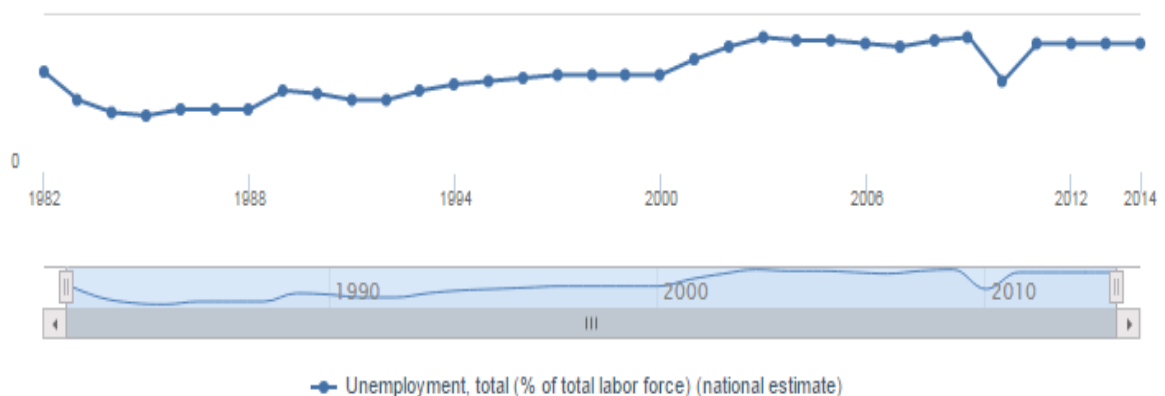
As unemployment of a country does not reflect a healthy sign to economy, therefore, this study is to figure out determinants majoring on macroeconomic that influence the unemployment rate in China across years. On top of that, long-run effect will be figured too.

1.2 Problem Statement

People in today’s competitive market are actively searching for jobs and mentally prepare to any kind of jobs provided at any level of wages are so called unemployment. Large population often an issue towards unemployment rate within a country. As the lack of absorption capacity, such issue becomes a subject matter to countries in recent decades. Generally, Government aims on the creation of working opportunities with all the available resources in the productivity industries. Government regularly pays lots of attention and concern on this issue as unemployment not only can affect socio-economic problems of a country, it could highly lead to high migration though. If residents unable to get a job in their home country, they attempt to work oversea if there are opportunities offer to them. Thus, economic growth of a country would greatly being affected. In long-term, issues such as financial problems, crimination, poverty, inequality standard of living and mentality may occur (Maqbool, Mahmood, Sattar, & Bhalli, 2013).

According to the data retrieved from World Development Indicators (Figure 1.1), unemployment rate in China does not fluctuate much and had slightly increment over the years. However, China had a sharp decrement of unemployment rate to 2.90 % in year 2010. This can assume to be resulted due to GDP of China grew 10.3% and decrement of inflation to 3.3% in year 2010 as per official announcement by China. After that, it goes up to 4.10 % and hovered for years till current.

Figure 1.1: Unemployment Rate in China, 1982 - 2014



Source: World Development Indicators

Table 1.1: Unemployment Rate in China

Year	Unemployment Rate, %	Percent Change, %	Year	Unemployment Rate, %	Percent Change, %
1982	3.20	-	1999	3.10	0
1983	2.30	-28.125	2000	3.10	0
1984	1.90	-17.391	2001	3.60	16.129
1985	1.80	-5.263	2002	4.00	11.111
1986	2.00	11.111	2003	4.30	7.500
1987	2.00	0	2004	4.20	-2.326
1988	2.00	0	2005	4.20	0
1989	2.60	30.000	2006	4.10	-2.381
1990	2.50	-3.846	2007	4.00	-2.439
1991	2.30	-8.000	2008	4.20	5.000
1992	2.30	0	2009	4.30	2.381
1993	2.60	13.043	2010	2.90	-32.558
1994	2.80	7.692	2011	4.10	41.319
1995	2.90	3.571	2012	4.10	0
1996	3.00	3.448	2013	4.10	0
1997	3.10	3.333	2014	4.10	0
1998	3.10	0			

Source: World Development Indicators

Despite of the official announcement by China regarding unemployment rate in China, most of the economists and researchers doubt and disagree on the data provided. They claimed that this is unacceptable and it is possible to be tripled up over the period from 2011 to 2014, according to Fathom Consulting.

There are a group of economists making collaboration related to such matter. According to Feng, Hu and Moffitt (2014), they were estimated the real unemployment rate of China.

There are few reasons contribute towards the insensitivity to economics fluctuations as well as low level of “registered” unemployed people over total labor force participation rate. One of the reasons is lacking of *Hukou* status by the residents. Besides, low standards of employment benefits provided people to omit registration with local employment service agencies. Moreover, there might be data falsification and errors in aggregation (Feng et al., 2014).

In a nutshell, labor force participation rate is significant for the estimation of true unemployment rates based on their research. The unemployment rate of China remained mysterious over years for the reason of underestimation of the true levels of unemployment and trend-biasing. Due to data limitations, Feng et al. (2014) claimed that the research they did was only stage one over a full understanding of the Chinese labor market over last few decades. Anyhow, few studies figured out statistics of China are generally least usable and informative based on the research of the validity of China’s GDP figures (Fernald, Hsu, & Spiegel, 2014; Holz, 2014).

Assuming that the real rate of unemployment in China could be higher over years as stated by Fathom Consulting, then factors influencing unemployment rate are important to address for such relationship as most of the researchers claimed that those factors are inflation, GDP growth, population and foreign direct investment. Most of the empirical findings in this study were delivered with this hypothesis which subjected to the question.

1.3 Objective of study

1.3.1 General Objectives

Analysis of macroeconomic factors affecting the unemployment rate in China by studying the long-run effects for year 1982 to 2014 is the objective of this study generally.

1.3.2 Specific Objectives

Specifically, objectives of this study are as following:-

- 1) To study the relationship and long-run effect between inflation and unemployment rate.
- 2) To study the relationship and long-run effect between GDP growth and unemployment rate.
- 3) To study the relationship and long-run effect between population and unemployment rate.
- 4) To study the relationship and long-run effect between foreign direct investment and unemployment rate.

1.4 Research Questions

Headers of this study are to response the following research questions:-

1. Is there a significant and long-run effect relationship between inflation and unemployment rate?
2. Is there a significant and long-run effect relationship between GDP growth and unemployment rate?

3. Is there a significant and long-run effect relationship between population and unemployment rate?
4. Is there a significant and long-run effect relationship between foreign direct investment and unemployment rate?

1.5 Hypothesis of Study

Hypothesis 1

H_0 : Inflation has significant and long-run effect relationship on unemployment rate.

H_1 : Inflation has no relationship on unemployment rate.

Hypothesis 2

H_0 : GDP growth has significant and long-run effect relationship on unemployment rate.

H_1 : GDP growth has no relationship on unemployment rate.

Hypothesis 3

H_0 : Population has significant and long-run effect relationship on unemployment rate.

H_1 : Population has no relationship on unemployment rate.

Hypothesis 4

H_0 : Foreign direct investment has significant and long-run effect relationship on unemployment rate.

H_1 : Foreign direct investment has no relationship on unemployment rate.

1.6 Significance of Study

A threefold significance of this paper explained generally. Main research is to explore the relationship of unemployment rate towards GDP growth, inflation, population and foreign direct investment (FDI). Such significant relationships among variables are proven by performing autoregressive-distributed lag (ARDL) bounds testing approach. Literature reviews and related journals and articles are searched to support our findings though.

Firstly, by analyzing the effects of GDP growth, inflation, population and foreign direct investment (FDI) on unemployment rate, significant relationship may be proven whether those variables are significantly providing effects. Thus, this may benefit to future researchers or scholars whenever they would want to further explore on the factors which may affect unemployment rate.

Secondly, throughout the whole of research in related to the research problems, recommendations and implications would be suggested at the end of this research. It is expected to contribute informative findings to policymakers, researchers or economists on the factors that affecting unemployment rate in China. By this, they may get to know the current influencing factors which affect unemployment rate. This would provide effective recommendations to policymaker the action which can be taken according to the nature of relationship of unemployment over GDP growth, inflation, population and foreign direct investment (FDI). Similarly, policymakers could adjust national macroeconomic strategies based on the significant variables that affect long-run unemployment rate in China.

In short, real unemployment rates of China often a concern over periods. However, only few researchers did research particularly towards on it, yet it may only consider as an introduction towards the real unemployment rate of China. Therefore, this study may provide brief ideas to researchers or economists on factors influencing unemployment rate. By this, future researches may attain variables which affect greatly towards unemployment rate to predict real unemployment rate somehow.

1.7 Chapter Layout

There are five chapters to be discussed in this paper. Chapter 1 contributes a whole and general review of the paper in explaining the study of which including of research background, problem statement, research questions and objectives, hypothesis of study as well as significance of study. Chapter 2 contains description of empirical and theoretical literature reviews regarding to each variables used in this research obtained from related journals and articles. Next, the methodologies of the research are the main focus in Chapter 3. Then, Chapter 4 provides analyses and reports from estimated model. Meanwhile, this chapter describes, discusses and explains the patterns and outcomes of the analysis in comparative to the hypothesis of our studies. Lastly, Chapter 5 focuses on the summary of major findings, limitations, recommendations and policy implication of this paper for the sake of future researches.

1.8 Conclusion

In a nutshell, the research background and brief introduction to the unemployment rate in China have been explained complying with the problem statement in our studies. Furthermore, the general and specific objectives, significance of study and hypotheses of study have been addressed with clear direction in investigating and determining the long-run effects of macroeconomics factors over unemployment in China. Thus, relevant empirical studies by past researchers will be discussed in Chapter 2.

CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

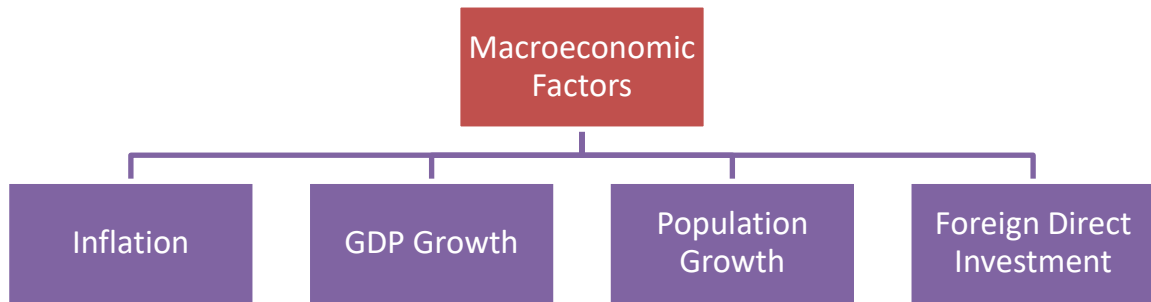
The previous chapter was explained and discussed regarding on the research background provided with the related issues of the research, research questions, research objectives, hypotheses and importance of this study. Therefore, by referring to the above information, relevant empirical studies and theoretical framework would be further discussed in order to support the research in current chapter. Empirical studies are basically literature review that done by previous researchers on the study chosen which are the factors which give impacts on the unemployment rate in China. This section may provide proven evidences on our research based on the hypotheses of our study. It also provides guidance for researchers to obtain more understanding on our research for further studies in the future. On top of that, theoretical framework related to factors impact on unemployment rate in China will be presenting in this chapter as well. At last, short summary will be presented at the end of the chapter.

2.1 Theoretical Framework

There is no single matching model could explain about unemployment. However, in related to the Walrasian model, full employment is said to happen in a homogenous market expectedly. In other way round, there should be no

unemployment. Therefore, this benchmark of neoclassical economics does not provide strong and evidence information (Parker, 2010).

Figure 2.1: Framework of Macroeconomic Factors Affecting Unemployment Rate in China from 1982-2014



Macroeconomic factors are significant to affect unemployment rate though. One of the best explanations to describe between inflation and unemployment rate is Phillips Curve. It demonstrates an inverse and negative relationship between unemployment rate and inflation of an economy in short-run while no effect on unemployment in the long run as it assumes natural unemployment rate in long term. An unemployment rate of an economy increases as inflation decreases, or vice versa.

Okun's Law comes across in explaining the relationship of GDP growth and unemployment rate. Theoretically, for every 1% increase in unemployment rate, GDP of a particular country will about to decrease additionally 2% than its potential GDP, holding other variables constant. This relationship is expected to be negatively related to one another. There are few reasons on the higher changes of GDP as compared to unemployment rate. For instances, reduce in the multiplier effect as money supply increases, decrease the amount stated in unemployment statistics as unemployed persons most probably to exit the labor force, shorter working hours and low labor productivity as employers need more workforce.

The Malthusian Theory describes population growth. An increase in birth rate will increase population growth exponentially. According to Malthus (1798),

prevention checks and positive checks such as diseases and poor living and working environment may lower the growth of population rate of a country. Thus, he expected that uncontrolled population growth will cause higher unemployment. In short, large population increases unemployment rate of an economy.

Foreign direct investments can be considered as reinvested earnings or other capital of a company. This investment can also be known as “greenfield investment or brownfield” (Gorg & Greenaway, 2004). Greenfield investment is basically the expansion of an existing plant whereas brownfield investment is buying or renting an existing factory which does not operate efficient or fully utilize. By performing these investments, new production happens. An increase in FDI would then increase the GDP of an economy at the same time decrease unemployment (Eldeeb, 2015).

2.2 Review of the Literature

2.2.1 Dependent Variable – The Unemployment Rate

Bennett (2011) says that individuals with low and high-skilled individuals in the labour market facing inequalities in current decades. Employment Protection Legislation (EPL) becomes a hot topic to be discussed as it tends to be an extra barrier on employment because of the increase in labour costs and limitations to flexibility in adapting economic changes. However, EPL may also reduce unemployment risks by expanding job relations which have been commenced. Throughout the findings, flexible EPL is highly related to the security of labour markets with dynamic transactions of employment and unemployment while strict EPL provides insecure and unstable job relations in relevance to highly-skilled workforce.

Obi (2007) did research on the relationship of fiscal policy on unemployment in Nigerian economy and found that there is an association between them. With the

help of equilibrium model, experiential findings was figured out and brought to a conclusion that fiscal policy brings impacts to inflation and unemployment. Meanwhile, inflation further affects unemployment negatively. At the end of the research paper, Obi (2007) suggested policy makers to consider the distribution of income in coming future implementation.

Furthermore, inflation and unemployment rate fluctuate in both continuous and discrete period. Inflation fluctuates around the increment of nominal money supply with the reflection towards monetary policy whereas unemployment rate fluctuates around its natural rate. In studying of the hypotheses, inflation is negatively affected not only by its rate of change, but also a country's unemployment rate which dynamically cause unstable of an economy (Todorova, 2012).

Moreover, unemployment rate has an insignificant relationship towards the productivity growth. This can be explained by the action taken by Nigerian government on the rising of unemployment rate in Nigeria was significant low. As a suggestion, government of Nigeria may take adequate actions on the increment of unemployment rate as unemployment can affect greatly towards the social progress. Besides, unemployment is generally a waste of resources to economy which bring impact towards a country's productivity (Amassoma & Nwosa, 2013).

Asif (2013) explore the macroeconomics factors affecting unemployment in three countries including India, Pakistan and China. Tests such as granger causality, regression analysis and co-integration were conducted by them. Based on the findings and results, GDP growth, population and exchange rate are significantly affecting unemployment in all three countries in the analysis of regression. GDP and unemployment rate show positive and significant relationship in Pakistan due to the poverty level and lack of utilization of foreign investment of that country. There is no granger causality among those variables for all three countries. However, long-term relationship does bring impacts for all variables in Pakistan, China and India.

There is study shows as increase of a country's growth, export and inflation may decrease unemployment rate whereas decrement in exchange rate, money supply

and interest rate between interbank would result in rising of unemployment rate (Dogan, 2012). Recently, Bartolucci, Choudhry, Marelli, and Signorelli (2015) investigate the changes of GDP affecting unemployment in taking into considerations on the impact of financial crises. Generally, this paper analyzing high income countries based on low-income countries. Empirical results show some of the financial crises such as banking and exchange rate crises may have additional effect on unemployment rate significantly.

Studies from Al Amarat (2016) discussed on the significant relationship of foreign direct investments towards unemployment rate in Jordan. Besides, factors that leading foreign direct investments to be constrained have been studied in his research as well. Based on his findings, low levels of foreign direct investments may affect the legislation which encourages foreign investments in Jordan. Through the results, he suggested government to allocate more resources on the department of services and infrastructure so that they can create more informative investment opportunities to the Jordanian. Despite of the great increment on investment and growth rates, employment rate in Jordan does not seem to have much effect.

2.2.2 Independent Variable – The Inflation

Dritsaki and Dritsaki (2012) states that increased in inflation will lead to have an increased in employment rate hence improve the economic growth in Greece. Reasons that cause this circumstances due to increase in taxes, less investment activities, uncertainty in monetary strategy and governmental corruption. From Dritsakis' paper, there is no occur theory of unemployment & inflation in the long term situation in Greece. However, from the test that they conducted which is Granger causality test, the long term relationship exists in unemployment and inflation. The data forecast for 10 years showed that inflation shocks will decrease unemployment rate for the first year and they will be slightly going up on the following years.

Haug and King (2014) took 1952 to 2010 years into observation to conclude that increase in unemployment will always lead to a higher inflation about three years later which mean there is a positive correlation of inflation towards unemployment rate. There is positive value in the significant correlation. Monetary and fiscal policy will not affect the long term relationship of unemployment and inflation due to its stable relationship.

The purpose of Karanassou and Sala's paper (2010) is to investigate the long term relationship of unemployment and inflation. They used two empirical models which is generalized method of moments and structural vector autoregression to provide proof for this relationship. The result showed that over the 1963–2005 period, they evaluated the strength of a descending sloping long-run Phillips curve acquired by a chain response auxiliary model for the US. We evaluated the long term relationship in inflation-unemployment tradeoff in the scope of -2.57 and -4.32 , which is in accordance with the discoveries of the reviews for the US.

According to Safdari, Hosseiny, Farahani, and Jafari (2015) state that inflation acts distinctively in both short or long time scales. Besides, unemployment reacts variously towards big and small inflation fluctuations. This perception was justified because when there is high unemployment, there is recession in economy. Inflation is a recurring situation in all economies; however, in some economies it has powerful influence to a high level of employment.

It is more important on focusing the long term relationship between inflation and unemployment when comes to the welfare and policy point of view (Berentsen, Menzio, & Wright, 2008). Another reason for concerning over the long term relationship is because it has a clearer meaning for what happens at a lower frequency, which is less likely to be deceived by complexity for example those incomplete information and signal elicitation problem. Based on the low frequency data, this paper concluded that there is positive relationship of inflation on unemployment rate.

Alisa (2015) discusses on the inflation-unemployment relationship by using the Phillips curve study. Policy makers focus on the Phillips curve because it provides

critical foresight for them. There is no perfect macroeconomic which price stability, zero unemployment and growth stability exist in short run situation. Government has to choose either monetary policy or fiscal policy to solve certain economic problem which any of it will lead to either high unemployment or high inflation. It is impossible to remove the phenomena. Alisa concluded that to balance the market it still need to have certain extent of inflation and unemployment. Based on the statistics in this paper, Russian circumstances is not suitable by applying Phillips curve.

On the other hand, according to Karanassou, Sala, and Snower (2007) examine that monetary policy will bring permanent effect on long term tradeoff between unemployment and inflation. This author assess the tradeoff by evaluating the influences of output, growing in money, deficit of budget and trade on inflation and unemployment during roaring nineties in US. Result showed that growing in money will lead to a high inflation which basically lowered the unemployment. In addition, growing in productivity, reduction in budget deficit will lower the inflation and influence unemployment slightly.

From the test that conducted by Umair and Ullah (2013) shows that inflation and unemployment have positive effect. With positive correlation showed that inflation is insignificant affecting GDP and unemployment. Inflation in Pakistan embraces with the role of influential however it had insignificance levels in macro-economic factors.

Al-Zeaud (2014) states that there is no trade-off unemployment and inflation relationship exist in Jordan. This is due to the calculation of unemployment rate is not included foreign workers. It may impede the government to analyze the tradeoff relationship in short term.

The study of Furuoka and Munir (2014) support the theory of Phillips curve. The result of this study provides proof that unemployment is negative correlated with inflation in Malaysia. Phillips curve showed a tradeoff relationship between unemployment and inflation. It relies on demand and supply in labor. When there is a

higher demand in labor than supply, the wages will increase which will lead to an increase in inflation and occur lowered unemployment.

2.2.3 Independent Variable – The GDP Growth

The GDP growth rate showing how fast the economy is growing from one year to another. It is one of the most important indicators that used to measure any improvement or decrement of a country's economic condition by looking at one quarter of the country's financial yield (GDP) to the last.

Some of the researchers believe that the relationship between growth and unemployment comes from Okun's Law which explains an opposite relationship of output level on unemployment rate. Okun's Law is a famous idea in macroeconomics theory and it was proposed by Arthur Okun in year 1962. This theory describes a relationship between the movement the unemployment rate and the change of real gross domestic product (GDP). Okun quantified this relation into a statistical relation that indicates the extent to which the percentage of unemployment is inversely related to the real increase in the economy's output (GDP) by using US GNP data.

Rigas, Theodosiou, Rigas, and Blanas (2011) study whether the Okun's Law still applicable in today's economic environment by using the data with regard to the unemployment and the real GDP over the period from 1960 to 2007 of three countries which are Greece, France, and Spain. Based on their findings, it showed that an inverse relationship towards unemployment and GDP by using the model of first differences but the form of this relationship in the case of Greece is quite different from France and Spain due to the disparity in their productivity growth rates in these countries.

According to Mosikari (2013), he studies the impacts of unemployment on GDP in South Africa by using the time series data from year 1980 to 2011. A negative relationship is bound around unemployment rate and GDP growth but no

causality has been found between these two variables. Based on Mohd Noor, Mohamed Nor, and Abdul Ghani (2007), there is an existence of negative relationship among real GDP and unemployment in Malaysia. Besides, they also found that there is two-way causality between unemployment rate and GDP in Malaysia by applying granger causality test.

Malley and Molana (2007) carry out a study where they were studying the relationship between the output level and the unemployment rate from G7 countries from year 1960 to 2001. The study revealed that negative relationship between output level and unemployment rate only exist in Germany by taking into account the trends, cyclical changes and breaks.

Haririan, Huseyin Bilgin, and Karabulut (2009) investigate the long term connection between unemployment and GDP growth for MENA countries such as Egypt, Israel, Turkey and Jordan within the period 1975 to 2005. According to their findings, GDP growth has an inverse impact on unemployment. They also explained that inverse relationship in Egypt and Turkey is much stronger than in Israel and Jordan. Based on their cross-country analysis, they analyzed that there are also many causes of unemployment rather than GDP growth.

In accordance to Abdul-Khaliq, Soufan, and Shihab (2014) reported, the economic growth has inverse and significant impact on the unemployment rate in Arab countries. Ball, Leigh, and Loungani (2012) argue that Okun's Law explained changes of unemployment rate in short-run significantly. With the research, Okun's Law is said to be confirmed a strong and stable relationship in most countries even though during the Great Recession.

On the other hand, there are also some researchers observe that Okun's Law cannot be applied to most of the country in the world appropriately. For example, Lal, Muhammad, Jalil, and Hussain (2010) examined and revealed that Okun's Law is not applicable in some developing countries in Asian due to the asymmetric problems in the countries.

Neely (2010) suggests that the unemployment rate in most industrialized countries tend to vary less for a given movement in GDP. This can be explained that the labor markets of these countries is less heavily regulated in which the employers can lay off their workers easily during economic downturn. He also argued that the Okun's coefficient is subjected to the changes over the period due to other factors such as technology, laws, and preferences.

Furthermore, Raurich and Sorolla (2014) examine the long-run relationship between GDP growth and employment based on real wage inertia. In their result showed a reduction in GDP growth rate can permanently reduce the employment rate by taking into account the wage inertia.

Lastly, Sorolla-i-Amat (2000) claim that there is a weak relationship around GDP growth and unemployment in long-run because there is a common variable which influences both rates in the long run. However, a negative relationship may exist between these two variables if the previous wages is taking into account when setting the wage.

2.2.4 Independent Variable – The Population

Population growth defined as the average annual percentage change in population size, which counts all residents regardless of citizenship or legal status, in a given time period. Arslan and Zaman (2014) argue that the population growth is an important factor in affecting the unemployment. Population growth shows a positive impact towards the unemployment rate and it had contribution towards unemployment.

Maqbool et al. (2013) do research on the causes of unemployment in Pakistan from year 1976 to 2012. They found that population has a positive relationship with unemployment in Pakistan. A significant short-run and long-run relationship effects on both unemployment and population was determined as well. According to Asif

(2013), he studies the macroeconomic factors of the unemployment for three countries, which are China, India and Pakistan. The data are collected from 1980 to 2009. The result shows that there is a significant impact of population on unemployment rate for those three countries.

Mahmood, Akhtar, Amin, and Idrees (2011) examine the determinants affecting the unemployment in Peshawar Division of Pakistan in the education sector. A sample of 442 residents of Peshawar Division, who having a graduation degree (first degree) or qualified with any professional or technical job regardless they are employed or unemployed was collected. The result reveals that the growth rate of population has a positive relationship towards the unemployment rate among the educated segment.

Based on Bakare (2011), he studies the causes of urban unemployment in Nigeria with a period of thirty years which is from 1978 to 2008. There is a positive relationship bound around unemployment rate and population. The reason for high unemployment rate in Nigeria is the demand of jobs is exceeds the supply of jobs. This is due to high population growth will lead to a rapid growth of the labour force.

However, Aqil et al. (2014) argue that growth rate of population has inverse and significant impact on unemployment rate in Pakistan. It indicates that the higher the population growth rate, the lower the unemployment rate. Loku and Deda (2013) research on the relationship exists in related to population growth and unemployment in Kosovo economy and an inverse relationship exists between them.

2.2.5 Independent Variable – The Foreign Direct Investments

Foreign Direct Investment (FDI) known as an action to conduct an investment by a company or individual from the home country to another country. A study carried out by Matthew and Johnson (2014) and Shaari, Hussain, and Ab. Halim (2012) investigate a negative relationship between FDI and Unemployment. It shows

that if there is an increment in FDI, rate of unemployment will decrease by that. Stamatiou and Dritsakis (2014) examine the impacts of FDI on the unemployment in Greece. Based on their findings, there is a negative relationship between FDI towards unemployment rate significantly. This study also argues on the positive impacts on FDI towards unemployment rate by other researchers. Some researcher claims that labour market involve only the skilled workforce.

Mayom (2015) analyses a research in Sub-Saharan Africa. The result of employment ratio achieved based on the expected results which is positive and significant relationship of inflows of FDI and employment rate. An increase in FDI will generally lead to higher employment rate. Pinn et al. (2011) investigate the intense competition may increase unemployment rate through disinvestment and shutting down of domestic firms. This can be explained by the foreign investment project in Malaysia which takes FDI as the form of capital-intensive. Besides, acquiring existing businesses of a country may increase unemployment rate as demand of labour is lower.

Balcerzak and Zurek (2011) examine the finding by using the VAR analysis to conduct the testing. According to the results conducted, FDI inflows have a negative relationship toward unemployment. However, the reduction level may occur in short term. After certain period of time, unemployment level will return back to the original level. There is a significant effect of FDI on the unemployment rate in India. Job opportunities created by FDI generally for unemployed youth who are skilled and trained will eventually lead to a decline in unemployment rate (Kannaiah & Selvam, 2014). According to Kurtovic, Siljivic, and Milanovic (2015), results show a negative relationship bound around FDI and unemployment whereby increment in FDI causes the unemployment rate to decrease in most countries of the Western Balkans.

In spite of negative relationship of FDI and unemployment rate, there are studies showing positive relationship between these two variables as well. A study conducted by Gaspareniene and Remeikiene (2015) shows a very weak relationship between FDI and unemployment rate. On top of that, the creation of work places and

development of industrial processes determined by FDI may cause the likelihood of increasing in income from FDI which will decrease the unemployment rate in the form of weak relationship.

Rizvi and Nishat (2009) examine the finding by collecting the evidences from Pakistan, India and China. Based on the findings, there are no impacts of FDI towards employment opportunities in all three countries. This may be caused by the time lag as FDI may impact employment in taking into consideration of economic growth. Another important study was done by Jaouadi (2014) who mentioned that the nature of foreign investment explained the positive relationship between FDI and unemployment.

Moreover, Trimurti, Sukarsa, Budhi, and Yasa (2015) discuss about the relationship between unemployment and FDI. In accordance to the practical results, there is a positive relationship whereby increase in FDI will affect an increase in unemployment rate. This result probably affected by the motive of government in Indonesia who invited foreign investors to make investment in Indonesia majoring in Java and Bali since it able to provide good quality of labor, infrastructure, regional economic performance and business security which benefits to country's economy.

A positive relationship in long run among export, economic growth and inflows of FDI towards unemployment rate shown in the study that conducted by Bayar (2014). An increase in economic growth and export eventually decreases unemployment. Meanwhile, increment in inflows of FDI would lead to higher unemployment for longer period. Bayar (2014) encourages more expansion of existing businesses may improve job opportunities which lead to reduce unemployment rate.

Hisarciklilar, Gultekin-Karakas, and Asici (n.d.) applied the dynamic panel data analysis to conduct the finding. Data obtained from year 2000 – 2007. It shows a positive relationship between FDI inflow and unemployment rate. This result can be explained where the mode of entry brings impact on the final result. Merger and Acquisition plays a major role that carries no job opportunity and even increase the

unemployment level. This would lead to minimizing the labor force in a country. Besides, the positive relationship can cause by the relocation among the low, medium and high tech industries in manufacturing as well.

2.3 Conclusion

In short, empirical frameworks from past researchers have been known to be differed from the theoretical frameworks. It is always inconsistent with the researches obtained. There are researchers found significant relationship of inflation, GDP growth, population and foreign direct investment in related to unemployment rate, vice versa. Some of the studies have proven the causality relationship as well. Different kinds of tests have been used in past studies. Meanwhile, in order to obtain a well-understanding between the relationship of each independent variables towards dependent variable, autoregressive-distributed lag (ARDL) bounds testing approach will be employed and further explanation on this method will be described in the following chapter with empirical evidences as supportive sources.

CHAPTER 3

METHODOLOGY

3.0 Introduction

The methodological framework employed to examine the test will be discussed in this chapter. This study adopts autoregressive-distributed lag model (ARDL) to figure out the relationship of unemployment rate in China in conjunction with gross domestic product growth, foreign direct investment, inflation as well as population by approaching long-run effect.

The sequence of this chapter is as follows. Section 1 describes the data employ in the test. Section 2 discusses various types of tests applied to generate the result. Lastly, Section 3 summaries this chapter.

3.1 The Data

In accordance with the study objective of examining the relationship of unemployment (UN) in China with four variables which are growth domestic product (GDP) growth, inflation (INF), foreign direct investment (FDI) and population (POP). Data collected in study are secondary data. Those data generally are obtained from World Development Indicators. The collection of data period is covered from 1982 to 2014 in collaboration with the observation of 33 sample size in total. All the data collect in based on annual basis.

Variable wise, the unemployment is measured by the total percentage of total labor force with the national estimate. GDP growth is measured by the percentage in annual basis. Inflation (INF) is measured in term of GDP deflator in percentage basis and foreign direct investment (FDI) measure in term of net inflow in China based on the percentage in GDP. Lastly, population growth measure in terms of percentage with annual basis.

3.2 Data Analysis

3.2.1 Unit Root Test

Unit root test is used to review the stationarity of time series variables and investigate is there any unit root to be existed. If the variable is (weakly) stationary at level, it can said to be $I(0)$. If not, then it may be stationary after considering a certain degree of differentiation. For example, when a variable is stationary after first-differencing, the variable is considered as $I(1)$ or integrated at first order and if the variable is $I(2)$, it is stationary after second-differencing.

Time series with unit roots do not provide a simple and absolute understanding generally. It often creates problems of statistical interpretation for the empirical economist. In accordance to Yule (1926), nonsense correlation can be defined as the correlation between two unrelated $I(1)$ series either contribute to plus or minus one. On top of that, a regression of one $I(1)$ series on another $I(1)$ series will generate an R^2 that closer to one (Granger & Newbold, 1974).

There are two ways to model the unit root processes which are difference stationary and trend stationary models. The decision to select which model to use is extremely important for researchers as they provide different predictions. On the other hand, it may result in spurious regression which can lead to inaccurate inferences in the time series analysis if the model is not chosen correctly.

Augmented Dickey-Fuller (1981) unit root test is applied to determine and crosscheck the stationarity of employed variables. The model estimation can be proceed once the stationarity of all variables are found and there is no I(2) variable in the list.

3.2.1.1 Augmented Dickey Fuller (ADF) Test

The ADF test takes into consideration time series y_t is I(1) against the alternative that it is I(0) by the assumption of y_t is an ARMA process of both autoregressive and moving average terms. In order to examine unit root using the ADF test, the following model can be estimated to support the study:

$$y_t = \beta_0 + \beta_1 y_{t-1} + \beta_2 t + \sum_{i=1}^n \alpha_i \Delta y_{t-1} + u_t \quad (\text{EQ. 3.1})$$

where the n lagged first differences approximate the ARMA dynamics in related to time series, β_0 is a constant, and t is a trend. If the series has a unit root, $\beta_1 = 0$ and $\sum_{i=1}^n \alpha_i \Delta y_{t-1} = 1$. The ADF test is a test of the hypothesis that $\beta_1 = 0$ given n lagged first differences. The residual term in the term model (1) is approximately white noise such as mean zero, a finite variance, and is not serially correlated when selecting n . Besides, it is important when comes to choosing of a lag length. Too little lags will cause autocorrelation and size distortion. However, too many lags included in estimated model would challenge the power and validity of the test.

3.2.2 ARDL Bounds Tests for Cointegration

Pesaran, Shin, and Smith (2001) developed autoregressive distributed lag (ARDL) cointegration approach, in other word, bounds test for the investigation of long-run relationships and dynamic connections among the variables of interest. The included variables in this paper are unemployment rate, GDP growth, FDI, inflation rate and population. This study eventually focuses on ARDL bounds testing approach

in studying the long run relationship between the variables. Traditional cointegration methods such as Engle and Granger (1987), and Johansen and Juselius (1990) cointegration methods are not being used in this paper due to its various advantages provided.

Firstly, ARDL bounds test approach is considered to be the parameter of both short and long-run in respectively. This test provides a better result for small sample size as well which is relatively more efficient to be said so (Omoniyi & Olawale, 2015). When comes to the application, ARDL does not need to get all variables in order sequence. It can also be applied when the under-lying variables are integrated of order one, order zero or fractionally integrated. Meanwhile, it is applicable either regressors in the model are purely I(0), purely I(1) or mutually cointegrated. At last, this approach provides unbiased estimates of the long-run model (Alimi, 2015). The Wald F-statistic in ARDL bounds test approach is used to test the existence of long-run relationship in unrestricted equilibrium correction model (UECM).

The equation of UECM can be constructed as:

$$\Delta UN_t = \beta_0 + \beta_1 UN_{t-1} + \beta_2 INF_{t-1} + \beta_3 GDP_{t-1} + \beta_4 POP_{t-1} + \beta_5 FDI_{t-1} + \sum_{p=1}^{n_1} \theta_1 \Delta UN_{t-p} + \sum_{p=0}^{n_2} \theta_2 \Delta INF_{t-p} + \sum_{p=0}^{n_3} \theta_3 \Delta GDP_{t-p} + \sum_{p=0}^{n_4} \theta_4 \Delta POP_{t-p} + \sum_{p=0}^{n_5} \theta_5 \Delta FDI_{t-p} + \varepsilon_t$$

(EQ. 3.2)

The null and alternative hypotheses are as follows:

$H_0: \beta_{UN} = \beta_{INF} = \beta_{GDP} = \beta_{POP} = \beta_{FDI} = 0$ (no long run relationship)

H_1 : At least one $\beta_i \neq 0$, where $i = UN, INF, GDP, POP$ and FDI (a long run relationship exists)

Narayan (2005) states F-statistic can be used as a tool in comparison if sample sizes lie between 30 and 80 observations. We can compare F-statistic with the

approximate critical. Generally, assumption says all variables in the model are I(0) and the other set assumes they are all I(1). If the computed F-statistic is higher than the upper bound of critical values, then the H_0 of no long run relationship between the variables is rejected. If the F-statistic lies within the bounds then the test is said to be inconclusive. Nevertheless, there is no co-integration between the variables if F-statistic falls below the lower bound of critical values. When a long-run relation exists, the long run model can be regressed as:

$$UN_{t-1} = \delta_0 + \delta_1 INF_t + \delta_2 GDP_t + \delta_3 POP_t + \delta_4 FDI_t + \mu_t \quad (\text{EQ. 3.3})$$

3.2.3 Diagnostic Checking

3.2.3.1 Jarque-Bera Test

Normality of data can be tested by Jarque-Bera test. It is one of the consistent assumptions for many statistical tests, for instance t test or F test. Test procedure that based on normal distribution is the reason why normality assumption must be fulfilled before carrying out those statistics tests. If the assumption is violated, it may produce inaccurate inferences and hence produce misleading results.

The skewness and kurtosis measurements are applied in Jarque-Bera test to investigate is the data matches a normal distribution. Skewness describes the degree of asymmetry of a distribution while the kurtosis measures whether the data are light-tailed or heavy-tailed in contrast to a normal distribution. For a distribution to be normal, the skewness coefficient of 0 and the kurtosis coefficient of 3 must be fulfilled. Jarque-Bera statistics go with chi-square distribution with two degrees of freedom for large sample.

Consider testing the null hypothesis:

H_0 : The error term is normally distributed

H_1 : The error term is not normally distributed

The formula for the Jarque-Bera test statistic (JB Test Statistic) is:

$$JB = n [(Skewness)^2 / 6 + (Kurtosis - 3)^2 / 24] , \text{ where } n \text{ is the sample size.}$$

The critical values can be found from the chi-square distribution's table as:

Table 3.1: Chi-square Distribution Table

Significance Level (α)	Critical Value
0.10	4.61
0.05	5.99
0.01	9.21

If JB test statistic $> \chi^2_{(\alpha,2)}$, then the decision is made to reject the null hypothesis and it can be concluded that the data do not follow normal distributed.

3.2.3.2 Lagrange Multiplier Test (LM Test)

According to the research conducted by Arellano (2002), there are several problem in terms of econometrics are applicable by the principle of LM testing. It is consider as a part of diagnostic checking by proving that whether there is autocorrelation between the error terms. LM testing able to apply without the consideration whether there are lagged dependent variable and it examined the higher order ARMA error. Besides, the impact on the first order condition for a maximum of the likelihood of imposing the hypothesis can be tested by Lagrange multiple (LM)

test. While according to the research done by Breusch and Pagan (1980), they mentioned that LM test perform effectively and efficiently when there are restricted models that need to be estimated as while as a sample size.

On the other hand, the researcher mention the advantage of performing LM test whereby least square residual are required, easily to be compute and some of specific cases content small sample distribution. Besides, it shows additional advantage where LM test content standard distributional properties when the parameter which has been tested lie on the boundary of the parameter space under the null hypothesis (Greene & McKenzie, 2012).

3.2.3.3 Ramsey's RESET Test

Regression Specification Error Test which proposed by Ramsey (1969) which assist in the testing of omitted variable which some of the important variable are not including in the model. Besides, the specification error of incorrect functional form and correlation between X and error term also able to be tested by using Ramsey's RESET Test (Sapra, 2005).

3.2.3.4 CUSUM and CUSUMSQ Test

According to the Harish and Mallikarjunappa (n.d.), they mentioned that cumulative sum of recursive residuals (CUSUM) is a famous technique to exploit the stability of the series and it able to perform the sequential analysis to examine the sequential changes in the beta of the variables. CUSUM test used to determine the systematic movement since the coefficient values shows that there is a possible instability in the structure. Besides, CUSUM of square (CUSUMSQ) test discover the random movement

The CUSUM and CUSUMSQ conduct in the same procedure by using the cumulative sum of recursive residual. Beside the recursive residual took from the first

set of n observation. The CUSUM statistic will be plot with two scenarios which the statistic plotted within the 5% significance level or out of the 5% significance level. This can be explained where the estimated coefficient is stable or unstable respective toward the position of statistic plotted. The dissimilarity between CUSUM and CUSUMSQ is the recursive residuals used. Square recursive residual will be employed when performing CUSUMSQ (Farhani, 2012).

A stable relationship will created between the dependant and independent variable. However, the error-correction term together with the short run dynamic is formed by the stability of the long- run coefficient. While inadequate modelling of short run dynamic with the changes from long run relationship will lead to the instability issue occurred. This is the reason to apply CUSUM and CUSUMSQ test in order to encompass the short run dynamic to corporate with the long run parameter (Irpan, Saad, Nor, Noor, & Ibrahim, 2016).

3.3 Conclusion

This chapter discussed the data sources and methodology used to test the result. The ARDL cointegration approach has been applied to examine the long-run relation between unemployment and its macroeconomic factors in China. The following chapter will generate and analyze the empirical results.

CHAPTER 4

DATA ANALYSIS

4.0 Introduction

This chapter apply autoregressive distributed lag (ARDL) and analyze the empirical result of the factors affecting unemployment rate in China. There are six sub-sections in this chapter. Section 1 shows the results of variables stationary by using unit root test. Section 2 estimates long run relation between variables by using bounds test. Section 3 discusses the estimated long run ARDL model of unemployment and its determinants in China. Section 4 reports the results of diagnostic checking which included Jarque-Bera normality test, Breusch-Godfrey serial correlation LM test, Ramsey RESET test as well as CUSUM and CUSUM-squared test. Section 5 summarized this chapter.

4.1 Unit Root Test

In order to identify the stationarity and order of integration of the variables, we conduct the Augmented Dickey-Fuller (ADF) unit root test as shown in Table 4.1. We carry out the tests in the level form and first difference of the series. We assumed the variables in level with a constant and linear trend, whereas assumed only a constant in first difference. Moreover, we have employed the lag length of ADF test using an Akaike Information Criterion (AIC) with a maximum lag length of 2.

Table 4.1: Augmented Dickey-Fuller Unit Root Test

	ADF Statistics	
	Level	First Differences
	Trend and Intercept	Intercept
UN	-4.3790 (0) ***	-7.2594 (0) ***
INF	-3.4737 (1)	-5.4354 (1) ***
GDP	-4.2090 (1) ***	-6.6176 (1) ***
POP	-2.6483 (1)	-3.6153 (1) ***
FDI	-1.9823 (1)	-4.3846 (1) ***

Notes: *** Indicate significance at 5% level.

Parentheses presented the optimum lag length based on Akaike Information Criterion (AIC).

Hypothesis:

H₀: UN/ INF/ GDP/ POP/ FDI is not stationary and has a unit root.

H₁: UN/ INF/ GDP/ POP/ FDI is stationary and does not contain a unit root.

Significance Level: $\alpha = 5\%$ or 0.05

Decision Rule: Reject H₀ if p-value is less than α . Otherwise, do not reject H₀.

The results in Table 4.1 show that UN and GDP are stationary at level at 5% significance level. The other variables which are INF, POP and FDI are non-stationary and contain a unit root at level, however they are stationary in first difference at 5% significance level. In conclusion, the stationarity of the variables are found in ADF tests, besides there is no I(2) variables in the test. Therefore, we could proceed to the long-run model estimation by using ARDL cointegration technique.

4.2 ARDL Bound Cointegration Test Model

Table 4.2: F-Statistic Bound Test

Wald F-statistics = 4.7184 **		k = 4, n = 32
Critical Value: Narayan (2005)		
Level of Significance	Lower Bound	Upper Bound
1%	4.768	6.670
5%	3.354	4.774
10%	2.752	3.994

Notes: ** Indicate significance at 10% level.

The lag length selected for each variable is (1, 0, 0, 0, 0) following the sequence of UN, INF, GDP, POP and FDI.

Critical values obtained from Narayan (2005) assuming unrestricted intercept and no trend (Case III).

In order to find out the long-run relationship among the variables, we carried out the Wald F-statistics bounds testing approach on the Equation 3.2. The lag lengths that selected to estimate ARDL model are based on what had been purposed by minimum AIC. We assumed the variables with a constant and no linear trend. The lower and upper bound critical values are referred to Narayan (2005) which designed for small sample size between 30 and 80 observations, instead of the critical values of Pesaran et al. (2001) which designed for large sample size, this is because we have a smaller sample size (33 observations) in this study.

Hypothesis:

$$H_0: \beta_{UN} = \beta_{INF} = \beta_{GDP} = \beta_{POP} = \beta_{FDI} = 0$$

$$H_1: \beta_{UN} \neq \beta_{INF} \neq \beta_{GDP} \neq \beta_{POP} \neq \beta_{FDI} \neq 0$$

Decision Rule: Reject H_0 if test statistic is greater than upper critical value, otherwise do not reject H_0 .

According to the result in Table 4.2, the calculated F-statistic (4.7184) is higher than the upper bound test critical value at 10% significance level (3.994). This shows that the null hypothesis of no cointegration is rejected at 10% significance

level, thus we concluded that there is a long-run relationship among the variables. Based on this result, we can evaluate the long-run effect of each variable on changes of unemployment rate.

4.3 The Long-Run Relation of Unemployment Rate and Its Determinants in China

In related to results in Table 4.3, it implies that the GDP and POP are significant to interpret the unemployment rate in the long run at 5% level of significance, while the INF and FDI are not significant to interpret the unemployment rate at 5% levels of significance.

Table 4.3: Long-Run Relation for UN and Its Determinants

Dependent variable: UN			
Independent variables	Coefficient	Standard Error	P-value
INF	0.0095	0.0217	0.6664
GDP	-0.0782 ***	0.0269	0.0073
POP	-1.9054 ***	0.2682	0.0000
FDI	0.0457	0.0422	0.2887
Constant	5.5783	0.3846	0.0000

Notes: *** Indicate significance at 5% level.

The value of -0.0782 implies that when the gross domestic product growth in China increase by 1 percentage point, on average, the estimated unemployment rate will decrease by 0.0782 percentage point in the long-run, holding other variables constant. This finding is consistent with Okun’s Law which explains that there is an inverse relationship between GDP growth rate and unemployment. Lal et al. (2010) also investigated that GDP growth rate is a main source to reduce unemployment rate. Furthermore, the value of -1.9054 shows that holding other factors constant, when the population growth rate in China increase by 1 percentage point, on average, the

estimated unemployment rate will be decreased by 1.9054 percentage point. According to Loku and Deda (2013) and Aqil et al. (2014), their empirical results explore that population is negative and significant towards unemployment.

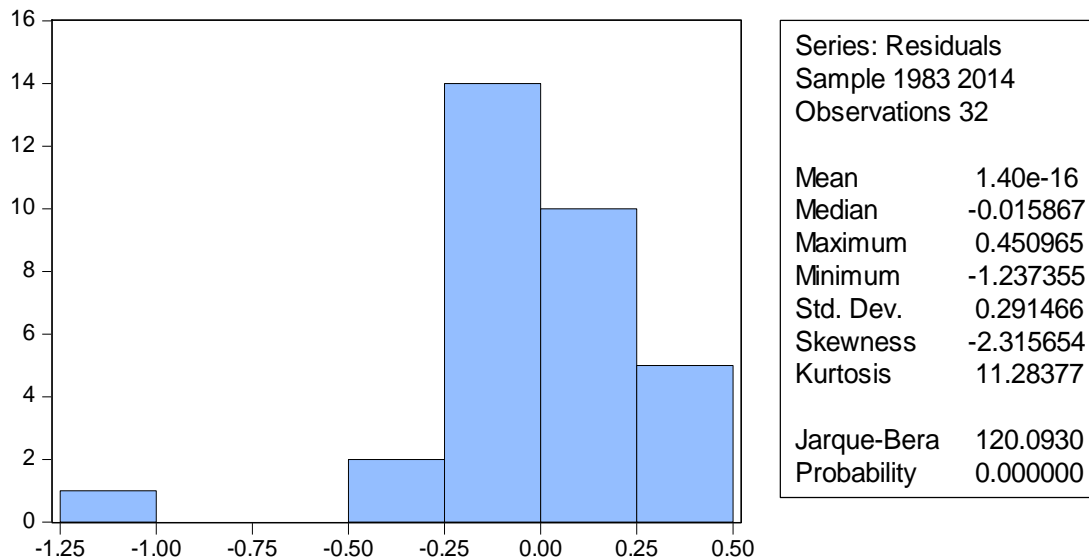
The results of INF and FDI are insignificant to the unemployment rate in China in the long-run. Based on Philips Curve, there is no effect on unemployment in the long run as it assumes natural unemployment rate in long term. Based on the study of the Republic of Macedonia by Djambaska and Lozoska (2015), FDI does not have statistically significant effect on the reduction in unemployment.

The value of error-correction term which is -0.7225 (Appendix 3) implies that the long-run relation model is a valid error-correction mechanism for any disequilibrium occurs in the short-run.

4.4 Results of Diagnostic Checking

4.4.1 Normality Test

Figure 4.1: Jarque-Bera Normality Test



According to Mantalos (2010), testing for normality should be at least as important a step, or perhaps more, than the assumption for normality. The most widely method, at least in econometrics, that has been suggested and used for testing whether the distribution underlying a sample is normal is Jarque-Bera Normality Test.

Hypothesis:

H₀: Error term is normally distributed.

H₁: Error term is not normally distributed.

Significance Level: $\alpha = 5\%$ or 0.05

Decision Rule: Reject H₀ if p-value is less than α . Otherwise, do not reject H₀.

The results in Figure 4.1 show that p-value (0.0000) is smaller than 5% level of significance. This implied that the null hypothesis of error term is normally distributed is rejected at 5% significance level.

Generally, a normality distribution test should have a mean zero, yet we found our error term is not normally distributed based on our empirical testing. Based on Omoniyi and Olawale (2015), it is acceptable that the error term is not normally distributed if homoscedasticity exists. In order to further support of research, we perform heteroscedasticity testing. Below are the generated results:

Table 4.4: White Test for Heteroscedasticity

Heteroskedasticity Test: White			
F-statistic	0.577608	Prob. F(5,26)	0.7167
Obs*R-squared	3.199156	Prob. Chi-Square(5)	0.6693
Scaled explained SS	10.85936	Prob. Chi-Square(5)	0.0542

Hypothesis:

H₀: There is no heteroscedasticity problem.

H₁: There is a heteroscedasticity problem.

Significance Level: $\alpha = 5\%$ or 0.05

Decision Rule: Reject H_0 if the p-value is less than α . Otherwise, do not reject H_0 .

We have sufficient evidence to conclude that there is homoscedasticity existing in the econometric model to support our research.

The skewness of -2.3157 indicates a negatively skewed distribution and the distribution has a longer left-tailed. Besides that, there is a positive kurtosis as the kurtosis value of 11.2838 is exceeds the normal kurtosis coefficient of 3. A positive kurtosis implies that the distribution has fatter tails and a sharper peak.

4.4.2 Autocorrelation

Table 4.5: Breusch-Godfrey Serial Correlation LM Test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.133553	Prob. F(2,24)	0.8756
Obs*R-squared	0.352222	Prob. Chi-Square(2)	0.8385

The assumption that under multiple linear regression models is there is no autocorrelation between the error terms (Huitema & Laraway, 2006). The possible factors that lead to autocorrelation are the omission of variables and misspecification.

Hypothesis:

H_0 : There is no autocorrelation problem.

H_1 : There is an autocorrelation problem.

Significance Level: $\alpha = 5\%$ or 0.05

Decision Rules: Reject H_0 if p-value of the Chi-squared is less than α , which mean that there is an autocorrelation problem. Otherwise, do not reject H_0 .

Since the p-value of Chi-square is 0.8385 which means that greater than significance level of 0.05, we do not reject the null hypothesis. Thus, we have enough evidence to conclude that there is no autocorrelation problem.

4.4.3 Specification Error

Table 4.6: Ramsey RESET Test

Ramsey RESET Test
Equation: ARDL1
Specification: UN UN(-1) GDP INF FDI POP C
Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	0.075112	25	0.9407
F-statistic	0.005642	(1, 25)	0.9407

According to Alema and Odongo (2016), specification error is an omnibus term which covers any departure from the assumptions of the maintained model. We use Ramey’s reset test to detect the specification error.

Hypothesis:

H₀: The model is correctly specified.

H₁: The model is incorrectly specified.

Significance Level: $\alpha = 5\%$ or 0.05

Decision Rule: Reject H₀ if p-value is less than α . Otherwise, do not reject H₀.

Based on the result in Table 4.6, the p-value of 0.9407 is greater than the 5% significance level. This implied that the null hypothesis of the model is correctly specified is accepted at 5% significance level.

4.4.4 CUSUM and CUSUMSQ

Figure 4.2: CUSUM (5%)

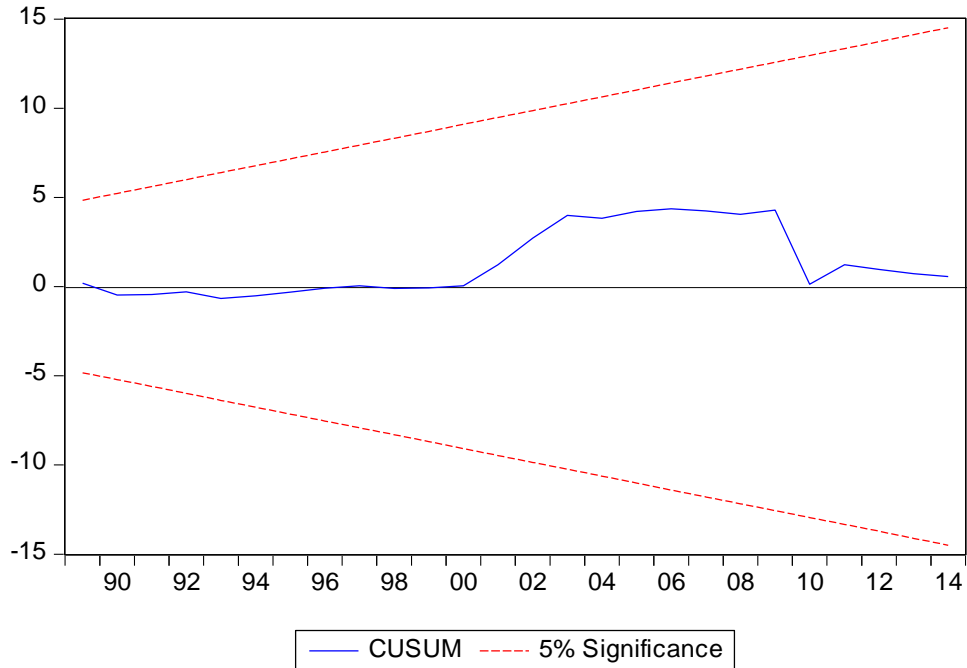
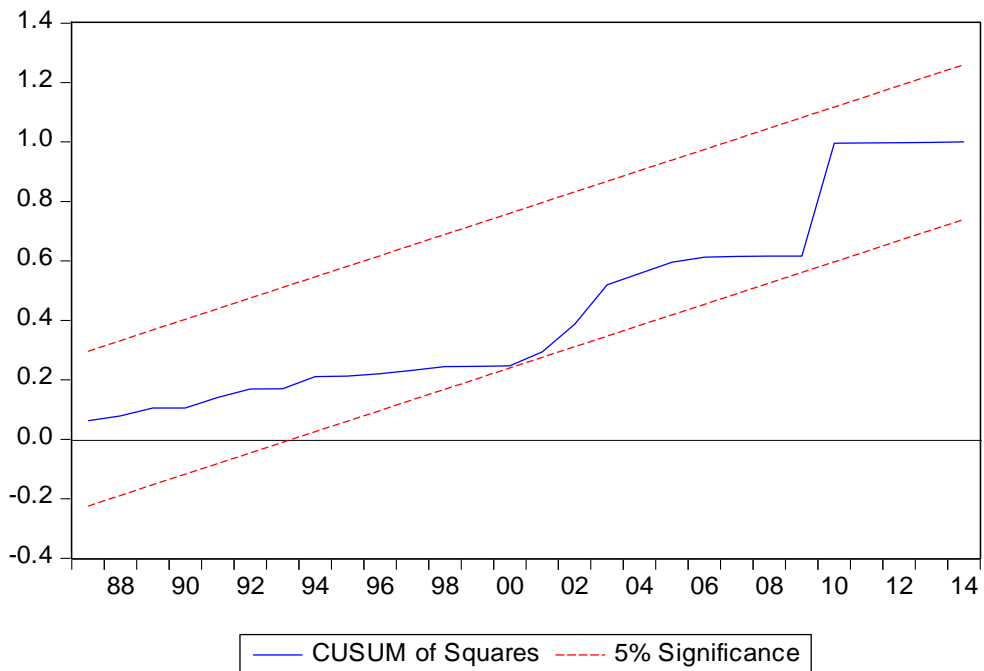


Figure 4.3: CUSUM-Square (5%)



Based on the Figure 4.2 and 4.3, the results of cumulative sum of recursive residuals (CUSUM) and CUSUM of square (CUSUMSQ) showed that there are no parameter and error variance instability in the ARDL model since the plot of the CUSUM and CUSUMSQ statistic fall within the critical bounds of the 5% confidence interval of parameter stability.

4.5 Conclusion

This chapter introduces, explains and discusses the empirical findings of the long-run relation among unemployment rate and its macroeconomic factors in China, under the framework of ARDL model. According to the results, GDP and POP are significant to the unemployment which means the long-run relation exists. However, INF and FDI show an insignificant result. Since there is no parameter and error variance instability in ARDL model and the model passed most adequate test, we can conclude that it is satisfied for ARDL observation. The next chapter will summarize our main findings, provide policy implications as well as limitations and recommendations.

CHAPTER 5

DISCUSSIONS, CONCLUSION, IMPLICATIONS

5.0 Introduction

Main purpose of this research is to investigate determinants which bring impacts towards unemployment rate generally long-run effects in China. Particularly, we discuss on the macroeconomics factors and figure out the significant effects of all chosen variables such as inflation, GDP growth, population and foreign direct investments in related to unemployment. In achieving the research objectives, a methodology framework of autoregressive distributed-lag (ARDL) has been undertaking to investigate on year period from 1982 – 2014. Based on the generated results in pervious chapter, a summary on the major findings with appropriate limitations, recommendation and implications would be discussed in this chapter.

5.1 Summary of Major Findings

This research is mainly discussed the macroeconomic factors that affect the unemployment rate in China over the period from 1982 to 2014. Based on previous research, the common factors which influence greatly towards unemployment rate are inflation (INF), gross domestic product growth (GDP), population (POP) and foreign direct investment (FDI). Other than confirming the significance among each variable on unemployment rate, another main finding from us is to determine the long-run effect between each variables toward unemployment rate though. After we done our research, we has explored several major findings.

At first, we have gone through Augmented Dickey Fuller (ADF) under unit root test to investigate the stationarity and integration order of the variables. The result shows that UN and GDP are stationary at level, $I(0)$, whereas INF, POP and FDI are stationary at first-difference, $I(1)$. To explain the long-run relationship among each variable towards unemployment, we have conducted the ARDL approach. According to the result of Wald F-statistics bounds testing approach, we can conclude that the long-run relationship exists among all the variables. Moreover, we found that the GDP and POP are significant to interpret the unemployment rate in long-run whereas insignificant long-run relation between unemployment rate with INF and FDI in respective.

Further support our generated results whether adequate to used ARDL approach, we then performed some other relevant test as Table 5.1.

Table 5.1: Summary of Diagnostic Checking

Diagnostic Tests	Statistics Value	P-value
Jarque-Bera Normality Test	120.0930	0.0000 ***
Breusch-Godfrey Serial Correlation LM Test	0.3522	0.8385
Ramsey RESET Test	0.0056	0.9407
Error-Correction Term	-0.7225	0.0026 ***
CUSUM	Within 5% bounds	-
CUSUM-Square	Within 5% bounds	-

Notes: *** Indicate reject null hypothesis at 5% significance level.

The ARDL model is based on the lag order of (1, 0, 0, 0, 0, 0).

In accordance to the empirical results, some of the findings for each variable can be proven by some empirical reviews from past researchers or theoretical framework. In such, Inflation has an insignificant relationship with unemployment rate. Umair and Ullah (2013) support to this statement as well. As per theoretical framework, no effect on unemployment in the long run as it assumes natural unemployment rate in long term which proven our finding though.

For GDP growth, it has a negative and significant relationship with unemployment rate. This finding is proven by most of the previous studies such as Abdul-Khaliq et al. (2014); Haririan et al. (2009); Malley and Molana (2007) and Mosikari (2013). On top of that, it is aligned with the Okun's law as well.

In terms of population, our empirical finding shows negative and significant relationship toward unemployment rate. It is reverse meaning from theoretical framework of positive relationship. However, our finding of significant negative relationship may be justified by the previous studies from Aqil et al. (2014) and Loku and Deda (2013). Same goes to foreign direct investment has a positive yet insignificant relationship towards unemployment rate. Even though this result is inversed to theoretical framework, yet, there is previous study having the same results as well such as Rizvi and Nishat (2009).

Theoretical framework can sometimes not applicable to reality as there are many much effects affecting on the variable. Anyhow, reason to cause this may be probably due to the data constraints or excluding relevant factors in our estimated model which may cause the data to be false sometimes which will be further discussed in following limitation session.

5.2 Limitations

Several limitations are found throughout the research of this study. The first limitation will be data constraints. Due to some missing data in World Development Indicators, it limits our data periods which lead to have a small sample size. Based on Das and Rahmatullah Imon (2016), small sample size may lead to an error term to be not normally distributed. The available data period for us to investigate in this study is constrained within year 1982 to 2014.

In addition, this study focuses on the unemployment relationship among the macroeconomic variables in China. Thus, the information and result in this study may

not suitable for other countries' researchers. Besides, due to the rapid population growth in China, it became the second largest economy in global market thus its policy implication and challenges may be different with other developing countries.

Moreover, this study investigates the relationship between four variables which included GDP growth, foreign direct investment, inflation and population. However, there are other variables that affect the unemployment rate in China which did not considered in this study. The other macroeconomics variables may be export, interest rate, money supply, income and exchange rate (Asif, 2013; Bennett, 2011; Dogan, 2012).

5.3 Recommendations

For the sake of future research, a large number of sample sizes should be employed in order to increase the accuracy of the result obtained. According to Gujarati and Porter (2009), they stated that when number of sample size increases, error terms tend to be normally distributed, hence, the estimated result will be closer to the actual result. In addition, the larger samples primarily cause a more accurate estimate of population means (Hertwig, Zangerl, Biedert, & Margraf, 2008). Based on the Noordzij et al. (2010), when the sample size is too small, an important existing effect may not be able to detect. Hence, we suggest future researchers to use monthly or quarterly data in order to increase the sample sizes since there are limited data with annual basis provided in World Development Indicators.

Besides, future researchers can focus on studying the unemployment of the other nations other than China. For example, they can divide the nations into less developed countries, developing countries as well as developed countries to observe the respective unemployment based on these segmentation. In other words, future researchers can employ panel data to carry out the analysis. They can study the

impacts of inequality in the economy which lead to the difference in the income per capita, and finally affect the unemployment rate in the country.

On the other hand, they can also include other macroeconomic factors such as interest rate, money supply, income, exchange rate and export (Asif, 2013; Bennett, 2011; Dogan, 2012). Future researchers can try to study the relationship between these variables and unemployment rate for them to carry out a more in depth study into why these relationships exist.

5.4 Policy Implications

From the empirical result obtained from previous chapter, we indicated that the population affects the unemployment rate in China significantly. The larger the population will lead to a lower unemployment rate in China.

In accordance to the Minister of Human Resource and Social Security of China, there were around 7.49 million of students graduated from China's college in year 2015. This statistic eventually increased by 220,000 of students as compared to year 2014. Since there are large amount of potential fresh graduates searching for job opportunities at all time, it then creates a highly competitive market ("Chinese graduates face tough," 2015). Policy makers should take into consideration by encouraging business firms to have collaboration with University or Colleges in recruiting potential fresh graduates. With the collaboration may bring several benefits toward fresh graduates, economic even to their own family. It helps to reduce the unemployment rate of a country and improve the economic development ("Chinese graduates face tough," 2015). As mentioned by Landefeld, Seskin, and Fraumeni (2008), size of the economy can be measured by the income approach known as GDP growth. Thus, reducing in unemployment rate may be improved by the raise in GDP growth in China.

An increment in population helps to improve the employment rate. There are few ways to promote growth in population that policy makers should take into consideration. According to Muliana (2013), if a couple who have a child or lesser is entitled to enjoy a 75% of subsidies on the Assisted Conception Treatment which including in-vitro fertilisation (IVF) in Singapore. However, a Singaporean who married to permanent residents or foreigners will entitle 55% or 35% of subsidies respectively. This subsidy has benefited over 3800 couples since implementation and subsequently increases the population of a country in term of fertility rate.

Besides, longevity may be one of the factors which affect the population as well. Based on the study of Horiuchi (2011) stated that advancement of technology in term of progress of medical technology and accessible in medical service affect the longevity. According to the World Health Organization (WHO) shows there are 300,000 premature deaths per year in China due to outdoor air pollution. Policy maker would consider implementing any medical services treatments to patients who having diseases (Kan, 2009). This may help enhancing longevity which improves population growth in China.

5.5 Conclusion

Throughout the outcomes generated from chapter 4 as compared to the literature review and theoretical review, we have concluded and made a summary to it. Factors such as population and GDP growth have significant and long-run effect relationship with unemployment rate whereas inflation and foreign direct investment do not have significant towards unemployment rate. These outcomes can be predicted by some of the limitations such as data constraint and excluding relevant variables. Thus, we suggested some policy implications and recommendations for references to future researchers. Future researchers may use monthly or quarterly data to increase the sample size. As our research focuses solely in China, future researchers may use panel data analysis as methodology for further judgment on the validity of research

towards various countries. On top of that, future researchers may include more variables to avoid relevant variables to be taken into accounts the factors which possible to influence unemployment rate. As for limitations and recommendations, we make suggestion to policy makers to encourage university for the collaboration with business firm to hire fresh graduate as well as implement medical or fertility subsidiary to residents.

REFERENCES

- Abdulla, A. K. (2012). The relationship between economic growth and unemployment in Iraq. *Iraqi Journal for Economic Sciences*, 32, 193-203.
- Abdul-Khaliq, S., Soufan, T., & Shihab, R. A. (2014). The relationship between unemployment and economic growth rate in Arab country. *Journal of Economics and Sustainable Development*, 5(9), 56-59.
- Al Amarat, M. H. (2016). The impact of direct foreign investment on unemployment in Jordan. *Modern Economy*, 7(6), 737-741.
- Alema, R., & Odongo, T. (2016). Exchange rate volatility and exports of Uganda's traditional crops. *American Journal of Economics*, 6(1), 41-49.
- Alimi, R. S. (2014). ARDL bounds testing approach to cointegration: A re-examination of augmented fisher hypothesis in an open economy. *Asian Journal of Economic Modelling*, 2(2), 103-114.
- Alisa, M. (2015). The relationship between inflation and unemployment: A theoretical discussion about the Philips curve. *Journal of International Business and Economics*, 3(2), 89-97.
- Al-Zeaud, H. A. (2014). The trade-off between unemployment and inflation evidence from causality test for Jordan. *International Journal of Humanities and Social Science*, 4(4), 103-111.
- Amassoma, D., & Nwosa, P. I. (2013). The impact of unemployment rate on productivity growth in Nigeria: An error correction modeling approach. *International Journal of Economics and Management Sciences*, 2(8), 1-13.

- Aqil, M., Qureshi, M. A., Ahmed, R. R., & Qadeer, S. (2014). Determinants of unemployment in Pakistan. *International Journal of Physical and Social Sciences*, 4(4), 676-682.
- Arellano, M. (2002). Lagrange multiplier test.
- Arslan, M., & Zaman, R. (2014). Unemployment and its determinants: A study of Pakistan economy (1999-2010). *Journal of Economics and Sustainable Development*, 5(13), 20-24.
- Asif, K. (2013). Factors effecting unemployment: A cross country analysis. *International Journal of Academic Research in Business and Social Sciences*, 3(1), 219-230.
- Bakare, A. S. (2011). The determinants of urban unemployment crisis in Nigeria: An econometric analysis. *Journal of Emerging Trends in Economics and Management Sciences*, 2(3), 184-192.
- Balcerzak, A. P., & Zurek, M. (2011). Foreign direct investment and unemployment: VAR analysis for Poland in the years 1995-2009. *European Research Studies*, 14(1), 3-14.
- Ball, L. M., Leigh, D., & Loungani, P. (2013). Okun's law: Fit at fifty? *National Bureau of Economic Research*.
- Bartolucci, F., Choudhry, M. T., Marelli, E., & Signorelli, M. (2015, April). *Financial crises and unemployment in developed and developing countries*. Paper presented at the 16th Conference on Economic and Social Development, Moscow.
- Bayar, Y. (2014). Effects of economic growth, export and foreign direct investment inflows on unemployment in Turkey. *Investment Management and Finance Innovations*, 11(2), 20-27.
- Bennett, J. (2011). *Unemployment dynamics- The role of unemployment protection legislation*. Paper presented at International Labour Process Conference.

- Berentsen, A., Menzio, G., & Wright, R. (2008). Inflation and unemployment in the long run.
- Breusch, T. S., & Pagan, A. R. (1980). The Lagrange multiplier test and its applications to model specification in econometrics. *The Review of Economic Studies*, 47(1), 239-253.
- Cai, F., & Chan, K. W. (2009). The global economic crisis and unemployment in China. *Eurasian Geography and Economics*, 50(5), 513-531.
- Chinese graduates face tough job-hunting season. (2015, July 9). *China Daily*. Retrieved from <http://www.chinadaily.com.cn/>
- Das, K. R., & Rahmatullah Imon, A. H. (2016). A brief review of tests for normality. *American Journal of Theoretical and Applied Statistics*, 5(1), 5-12.
- Dickey, D. A., & Fuller, W. A. (1981). Likelihood ratio statistics for autoregressive time series with a unit root. *Econometrica: Journal of the Econometric Society*, 49(4), 1057-1072.
- Djambaska, E., & Lozoska, A. (2015). Foreign direct investment and unemployment: Evidence from the Republic of Macedonia. *International Journal of Economics, Commerce and Management*, 3(12), 73-85.
- Dogan, T. T. (2012). Macroeconomic variables and unemployment: The case of Turkey. *International Journal of Economics and Financial Issues*, 2(1), 71-78.
- Dritsaki, C., & Dritsaki, M. (2012). Inflation, unemployment and the NAIRU in Greece. *Procedia Economics and Finance*, 1, 118-127.
- Dunsch, S. (2016). Okun's law and youth unemployment in Germany and Poland. *International Journal of Management and Economics*, 49(1), 34-57.
- Eldeeb, O. (2015). *Foreign direct investments and its impact on unemployment- Case study of Libya* (Doctoral dissertation, Czech University of Life Sciences

Prague, Prague, Czech Republic). Retrieved from <https://www.pef.czu.cz/dl/45899>

Engle, R. F., & Granger, C. W. (1987). Co-integration and error correction: Representation, estimation, and testing. *Econometrica: Journal of the Econometric Society*, 55(2), 251-276.

Farhani, S. (2012). Tests of parameters instability: Theoretical study and empirical analysis on two types of models (ARMA model and market model). *International Journal of Economics and Financial Issues*, 2(3), 246-266.

Feng, S., Hu, Y., & Moffitt, R. (2014). Unemployment and labor force participation in China: Long run trends and short run dynamics.

Fernald, J. G., Hsu, E., & Spiegel, M. M. (2014). Has China's economy become more "standard"? *FRBSF Economic Letter*.

Furuoka, F., & Munir, Q. (2014). Unemployment and inflation in Malaysia: Evidence from error correction model. *Malaysian Journal of Business and Economics*, 1(1), 35-45.

Gaspareniene, L., & Remeikiene, R. (2015). The impact of FDI on Lithuanian economics. *WSEAS Transactions on Business and Economics*, 12, 48-54.

Gorg, H., & Greenaway, D. (2004). Much ado about nothing? Do domestic firms really benefit from foreign direct investment? *The World Bank Research Observer*, 19(2), 171-197.

Granger, C. W., & Newbold, P. (1974). Spurious regressions in econometrics. *Journal of Econometrics*, 2(2), 111-120.

Greene, W. H., & McKenzie, C. (2012). LM tests for random effects.

Gujarati, D. N., & Porter, D. C. (2009). *Basic econometrics* (5th ed.).

- Haririan, M., Huseyin Bilgin, M., & Karabulut, G. (2009). The Relationship between GDP and unemployment: Evidence from MENA countries. *Zagreb International Review of Economics and Business*, 13(1), 17-28.
- Harish, S. N., & Mallikarjunappa, T. (n.d.). An examination of the beta stability in the Indian capital market.
- Haug, A. A., & King, I. (2014). In the long run, US unemployment follows inflation like a faithful dog. *Journal of Macroeconomics*, 41, 42-52.
- Hertwig, R., Zangerl, M. A., Biedert, E., & Margraf, J. (2008). The public's probabilistic numeracy: How tasks, education and exposure to games of chance shape it. *Journal of Behavioral Decision Making*, 21(4), 457-470.
- Hisarciklilar, M., Gultekin-Karakas, D., & Asici, A. A. (n.d.). Can FDI be a panacea for unemployment?: The Turkish case.
- Holz, C. A. (2014). The quality of China's GDP statistics. *China Economic Review*, 30, 309-338.
- Horiuchi, S. (2011). Major causes of the rapid longevity extension in postwar Japan. *The Japanese Journal of Population*, 9(1), 162-171.
- Huitema, B. E., & Laraway, S. (2006). Autocorrelation. *Encyclopedia of Measurement and Statistics*.
- Imoisi, I. A., Olatunji, O. M., & Ubi-Abai, I. P. (2014). Population and its impact on level of unemployment in least developed countries: An appraisal of the Nigerian economy. *Euro-Asian Journal of Economics and Finance*, 2(1), 28-42.
- Irpan, H. M., Saad, R. M., Nor, A. H., Noor, A. H., & Ibrahim, N. (2016). Impact of foreign direct investment on the unemployment rate in Malaysia. *Journal of Physics: Conference Series*, 710(1).

- Jaouadi, S. (2014). Could foreign direct investment increase unemployment: Case of KSA. *The International Journal's Research Journal of Economics and Business Studies*, 3(9), 51-56.
- Johansen, S., & Juselius, K. (1990). Maximum likelihood estimation and inference on cointegration—with applications to the demand for money. *Oxford Bulletin of Economics and statistics*, 52(2), 169-210.
- Kan, H. (2009). Environment and health in China: Challenges and opportunities. *Environmental Health Perspectives*, 117(12), A530-A531.
- Kannaiah, D., & Selvam, V. (2014). Impact of FDI in retailing: An empirical analysis on perception of unemployed youth on employment opportunities in India. *International Journal of Economics and Finance*, 6(11), 9-20.
- Karanassou, M., Sala, H., & Snower, D. J. (2007). The evolution of inflation and unemployment: Explaining the roaring nineties.
- Karanassou, M., & Sala, H. (2010). The US inflation–unemployment trade-off revisited: New evidence for policy-making. *Journal of Policy Modeling*, 32(6), 758-777.
- Kreishan, F. M. (2011). Economic growth and Unemployment: An empirical analysis. *Journal of Social Sciences*, 7(2), 228-231.
- Kurtovic, S., Siljkovic, B., & Milanovic, M. (2015). Long-term impact of foreign direct investment on reduction of unemployment: Panel data analysis of the Western Balkans countries. *Journal of Applied Economics and Business Research*, 5(2), 112-129.
- Lal, I., Muhammad, S. D., Jalil, M. A., & Hussain, A. (2010). Test of Okun's Law in some Asian countries co-integration approach. *European Journal of Scientific Research*, 40(1), 73-80.

- Landefeld, S. J., Seskin, E. P., & Fraumeni, B. M. (2008). Taking the pulse of the economy: Measuring GDP. *Journal of Economic Perspectives*, 22(2), 193-216.
- Li, C. S., & Liu, Z. J. (2012). Study on the relationship among Chinese unemployment rate, economic growth and inflation. *Advances in Applied Economics and Finance*, 1(1), 1-6.
- Loku, A., & Deda, G. (2013). Unemployment in relation of growth population. *International Journal of Research in Social Sciences*, 2(2), 31-38.
- Mahmood, Z., Akhtar, N., Amin, M., & Idrees, M. (2011). Causes of unemployment among the educated segments in Peshawar Division, Pakistan: A statistical study. *Sarhad J. Agric*, 27(1), 139-142.
- Malley, J., & Molana, H. (2007). The relationship between output and unemployment with efficiency wages. *German Economic Review*, 8(4), 561-577.
- Malthus, T. R. (1798). *An essay on the principle of population*. London: J. Johnson.
- Mantalos, P. (2010). Robust critical values for the Jarque-bera test for normality. *Jönköping International Business School*.
- Maqbool, M. S., Mahmood, T., Sattar, A., & Bhalli, M. N. (2013). Determinants of unemployment: Empirical evidences from Pakistan. *Pakistan Economic and Social Review*, 51(2), 191-207.
- Matthew, O. H., & Johnson, A. A. (2014). Impact of foreign direct investment on employment generation in Nigeria: A statistical investigation. *IOSR Journal of Business and Management*, 16(3), 44-56.
- Mayom, D. A. (2015). *The impact of foreign direct investment on labor market measures: Evidence from Sub-Saharan Africa* (Master's thesis).

- Mohd Noor, Z., Mohamed Nor, N., & Abdul Ghani, J. (2007). The relationship between output and unemployment in Malaysia: does Okun's Law exist? *International Journal of Economics and Management*, 1(3), 337-344.
- Mosikari, T. J. (2013). The effect of unemployment rate on gross domestic product: Case of South Africa. *Mediterranean Journal of Social Sciences*, 4(6), 429-434.
- Muliana, C. (2013). Parent aid: Benefits and subsidies for parents in Singapore. Retrieved from <https://singaporemotherhood.com/articles/2013/04/parent-aid-benefits-and-subsidies-for-parents-in-singapore/>
- Narayan, P. K. (2005). The saving and investment nexus for China: Evidence from cointegration tests. *Applied Economics*, 37(17), 1979-1990.
- Neely, C. J. (2010). Okun's law: Output and unemployment. *Economic Synopses*.
- Noordzij, M., Tripepi, G., Dekker, F. W., Zoccali, C., Tanck, M. W., & Jager, K. J. (2010). Sample size calculations: Basic principles and common pitfalls. *Nephrology Dialysis Transplantation*, 25(5), 1388-1393.
- Obi, B. O. (2007). *Fiscal policy and poverty alleviation: Some policy options for Nigeria*. Nairobi: African Economic Research Consortium.
- Omoniyi, L. G., & Olawale, A. N. (2015). An application of ARDL bounds testing procedure to the estimation of level relationship between exchange rate, crude oil price and inflation rate in Nigeria. *International Journal of Statistics and Applications*, 5(2), 81-90.
- Orumie, U. C. (2016). The effect of unemployment rate and population growth rate on gross domestic product in Nigeria. *International Journal of Applied Science and Mathematics*, 3(1).
- Parker, J. (2010). Models of unemployment. In *Econ 314 Coursebook*. Retrieved from <http://www.reed.edu/economics/parker/s10/314/coursebook.html>

- Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of applied econometrics*, 16(3), 289-326.
- Pinn, S. L. S., Ching, K. S., Kogid, M., Mulok, D., Mansur, K., & Loganathan, N. (2011). Empirical analysis of employment and foreign direct investment in Malaysia: An ARDL bounds testing approach to cointegration. *Advances in Management & Applied Economics*, 11(3), 77-91.
- Raurich, X., & Sorolla, V. (2014). Growth, unemployment and wage inertia. *UB Economics Working Paper 2014/309*.
- Rigas, J., Theodosiou, G., Rigas, N., & Blanas, G. (2011). The validity of the Okun's law: An empirical investigation for the Greek economy. *Journal of European Economy*, 10(1), 16-38.
- Rizvi, S. Z., & Nishat, M. (2009). The impact of foreign direct investment on employment opportunities: Panel data analysis: Empirical evidence from Pakistan, India and China. *The Pakistan Development Review*, 841-851.
- Safdari, H., Hosseiny, A., Farahani, S. V., & Jafari, G. R. (2016). A picture for the coupling of unemployment and inflation. *Physica A: Statistical Mechanics and Its Applications*, 444, 744-750.
- Sapra, S. (2005). A regression error specification test (RESET) for generalized linear models. *Economics Bulletin*, 3(1), 1-6.
- Shaari, M. S., Hussain, N. E., & Ab. Halim, M. S. (2012). The impact of foreign direct investment on the unemployment rate and economic growth in Malaysia. *Journal of Applied Sciences Research*, 8(9), 4900-4906.
- Sorolla Amat, V. (2000). Growth, unemployment and the wage setting process.
- Stamatiou, P., & Dritsakis, N. (2014). The impact of foreign direct investment on the unemployment rate and economic growth in Greece: A time series analysis. *International Work-Conference on Time Series Analysis*, 1, 97-108.

- Strat, V. A., Davidescu, A., & Paul, A. M. (2015). FDI and the unemployment- A causality analysis for the latest EU members. *Procedia Economics and Finance*, 23, 635-643.
- Trimurti, C. P., Sukarsa, M., Budhi, M. K. S., & Yasa, I. G. W. M. (2015). Determinants and the impact foreign investment to economic growth and unemployment in Java-Bali region. *IOSR Journal of Economics and Finance*, 6(5), 69-74.
- Todorova, T. (2012). The economic dynamics of inflation and unemployment. *Theoretical Economics Letters*, 2(2), 133-140.
- Umair, M., & Ullah, R. (2013). Impact of GDP and inflation on unemployment rate: A study of Pakistan economy in 2000-2010. *International Review of Management and Business Research*, 2(2), 388-400.
- Vermeulen, C. (2015). Inflation, growth and employment in South Africa: Trends and trade-offs. *Economic Research Southern Africa*.
- Yelwa, M., David, O. O., & Awe, E. O. (2015). Analysis of the relationship between inflation, unemployment and economic growth in Nigeria: 1987-2012. *Applied Economics and Finance*, 2(3), 102-109.
- Yule, G. U. (1926). Why do we sometimes get nonsense-correlations between time-series? A study in sampling and the nature of time-series. *Journal of the Royal Statistical Society*, 89(1), 1-63.
- Zivanomoyo, J., & Mukoka, S. (2015). An empirical analysis of the impact of unemployment on economic growth in Zimbabwe. *Archives of Business Research*, 3(6), 38-49.

APPENDICES

Appendix 1: Augmented Dickey-Fuller Test

Level form: Intercept with trend

Null Hypothesis: UN has a unit root
 Exogenous: Constant, Linear Trend
 Lag Length: 0 (Automatic - based on AIC, maxlag=2)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.378963	0.0078
Test critical values: 1% level	-4.273277	
5% level	-3.557759	
10% level	-3.212361	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: INF has a unit root
 Exogenous: Constant, Linear Trend
 Lag Length: 1 (Automatic - based on AIC, maxlag=2)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-3.473679	0.0601
Test critical values: 1% level	-4.284580	
5% level	-3.562882	
10% level	-3.215267	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: GDP has a unit root
 Exogenous: Constant, Linear Trend
 Lag Length: 1 (Automatic - based on AIC, maxlag=2)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.209049	0.0119
Test critical values: 1% level	-4.284580	
5% level	-3.562882	
10% level	-3.215267	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: POP has a unit root
 Exogenous: Constant, Linear Trend
 Lag Length: 1 (Automatic - based on AIC, maxlag=2)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-2.648271	0.2633
Test critical values: 1% level	-4.284580	
5% level	-3.562882	
10% level	-3.215267	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: FDI has a unit root
 Exogenous: Constant, Linear Trend
 Lag Length: 1 (Automatic - based on AIC, maxlag=2)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-1.982327	0.5878
Test critical values: 1% level	-4.284580	
5% level	-3.562882	
10% level	-3.215267	

*MacKinnon (1996) one-sided p-values.

First difference: Intercept

Null Hypothesis: D(UN) has a unit root
 Exogenous: Constant
 Lag Length: 0 (Automatic - based on AIC, maxlag=2)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-7.259355	0.0000
Test critical values: 1% level	-3.661661	
5% level	-2.960411	
10% level	-2.619160	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(INF) has a unit root
 Exogenous: Constant
 Lag Length: 1 (Automatic - based on AIC, maxlag=2)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-5.435383	0.0001
Test critical values: 1% level	-3.670170	
5% level	-2.963972	
10% level	-2.621007	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(GDP) has a unit root
 Exogenous: Constant
 Lag Length: 1 (Automatic - based on AIC, maxlag=2)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-6.617560	0.0000
Test critical values: 1% level	-3.670170	
5% level	-2.963972	
10% level	-2.621007	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(POP) has a unit root
 Exogenous: Constant
 Lag Length: 1 (Automatic - based on AIC, maxlag=2)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-3.615254	0.0114
Test critical values: 1% level	-3.670170	
5% level	-2.963972	
10% level	-2.621007	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(FDI) has a unit root
 Exogenous: Constant
 Lag Length: 1 (Automatic - based on AIC, maxlag=2)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.384361	0.0017
Test critical values: 1% level	-3.670170	
5% level	-2.963972	
10% level	-2.621007	

*MacKinnon (1996) one-sided p-values.

Appendix 2: ARDL Bounds Test

ARDL Bounds Test

Date: 02/23/17 Time: 21:22

Sample: 1983 2014

Included observations: 32

Null Hypothesis: No long-run relationships exist

Test Statistic	Value	k
F-statistic	4.718413	4

Critical Value Bounds

Significance	I0 Bound	I1 Bound
10%	2.45	3.52
5%	2.86	4.01
2.5%	3.25	4.49
1%	3.74	5.06

Appendix 3: ARDL Cointegrating and Long Run Form

ARDL Cointegrating And Long Run Form

Dependent Variable: UN

Selected Model: ARDL(1, 0, 0, 0, 0)

Date: 02/23/17 Time: 21:22

Sample: 1982 2014

Included observations: 32

Cointegrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GDP)	-0.056466	0.013977	-4.039984	0.0004
D(INF)	0.006831	0.014219	0.480447	0.6349
D(FDI)	0.032995	0.029829	1.106147	0.2788
D(POP)	-1.376650	0.282836	-4.867312	0.0000
CointEq(-1)	-0.722486	0.216957	-3.330081	0.0026

$$\text{Cointeq} = \text{UN} - (-0.0782 \cdot \text{GDP} + 0.0095 \cdot \text{INF} + 0.0457 \cdot \text{FDI} - 1.9054 \cdot \text{POP} + 5.5783)$$

Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP	-0.078156	0.026866	-2.909043	0.0073
INF	0.009456	0.021687	0.435997	0.6664
FDI	0.045669	0.042162	1.083177	0.2887
POP	-1.905436	0.268169	-7.105364	0.0000
C	5.578305	0.384635	14.502866	0.0000