GLOBALIZATION IMPACT ON CHINA ECONOMIC GROWTH

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DECLARATION

We hereby declare that:

(1) This undergraduate FYP 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 FYP 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 FYP.

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LIST OF ABBREVIATIONS

ADF	Augmented Dickey-Fuller
AIC	Akaike's Information Criterion
APEC	Asian Pacific Economic Cooperation
ARCH	Autoregressive Conditional Heteroscedasticity
BLUE	Best Linear Unbiased Estimators
CNLRM	Classical Normal Linear Regression Model
DF	Dickey-Fuller
DV	Dependent Variable
DW	Durbin Watson
ECM	Error Correction Model
EU	European Union
EXCH	Exchange Rate
FDI	Foreign Direct Investment
FGLS	Feasible Generalized Least Squares
FRED	Federal Reserve Economic Data
GAM	Generalized Additive Model
GAMM	Generalized Additive Mixed Model
GDP	Gross Domestic Product
GLM	Generalized Linear Model
GLMM	Generalized Linear Mixed Model

GLS	Generalized Least Squares
HUMAN	Human Capital
IS-LM	Investment-Savings; Liquidity-Money
IV	Independent Variables
JB	Jarque-Bera
LM	Lagrange Multiplier
LOG	Logarithms
NX	Net Export
OLS	Ordinary Least Square
PP	Phillips Perron
PPP	Purchasing Power Parity
RESET	Regression Equation Specification Error Test
RMB	Renminbi
SIC	Schwarz's Information Criterion
TFP	Total Factor Productivity
U.S.	United States
VAR	Vector Autoregression
VECM	Vector Error Correction Model
VIF	Variance Inflation Factor
WTO	World Trade Organization

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PREFACE

Involving in globalization activities nowadays is crucial for a country as it promotes economic growth. There are many macroeconomic factors that could affect the economic performance. It depends on a country's culture, geographical location, political situation and other factors. Since 1978, China started to participate in the international trade and grew rapidly within 50 years. As China's economic is becoming stronger among the countries in a short period, the factors that affect the economic growth of China are worth to explore. The reasons that make China grows rapidly inspired us to investigate which factors impact the most on the growth of China economic.

This research project will define which macroeconomic factors affect China's economic. The explanatory variables included in this study are exchange rate, foreign direct investment, human capital, net export and also technology advancement. As the prior two variables are clear to be known as important factors to impact a country's economic, while technology advancement is yet to be defined whether they are significant to affect the economic. As China is focusing in their technology development in these few years and showed the successful of development, it is interesting to identify the impact of technology advancement on economic growth.

Throughout this research, the readers could gain the knowledge on how the globalization factors affect the economics of China. This research could also benefit all readers by providing the procedures to conduct different types of test and identify which model are more suitable to be conducted. The limitations that we found while conducting this research are also useful to further scholars to seek for a better direction to do these types of research.

ABSTRACT

This paper studied the globalization factors that influencing the economic growth of China. The factors included in this paper are exchange rate, foreign direct investment, human capital, net export and technology advancement while the gross domestic product of China will be the variable to be explained by those factors. Number of observations in this research will be 33 which obtained annually from the year of 1982 to 2014. Ordinary Least Square (OLS) Test will be used to test the significance of the independent variables influencing the gross domestic product of China. According to the outcomes found in this research, net export is insignificant affecting the GDP of China while other independent variables are found to be significant affecting the GDP of China. The actual result of net export was shown to be incompatible to the expected outcome. Since exchange rate, foreign direct investment, human capital and technology advancement is significantly influencing the economic growth, developing countries could strengthen these few factors while participating in globalization in order to elevate their economic level.

CHAPTER 1: RESEARCH OVERVIEW

1.0 Introduction

In this study, we contribute an understanding of the background which creates an inducement for us to conduct research and analysis based on the globalization's impact on China's economic growth. After proposing the research background, this topic will be covering the challenges of research, research objective and questions as well as the significance of the research.

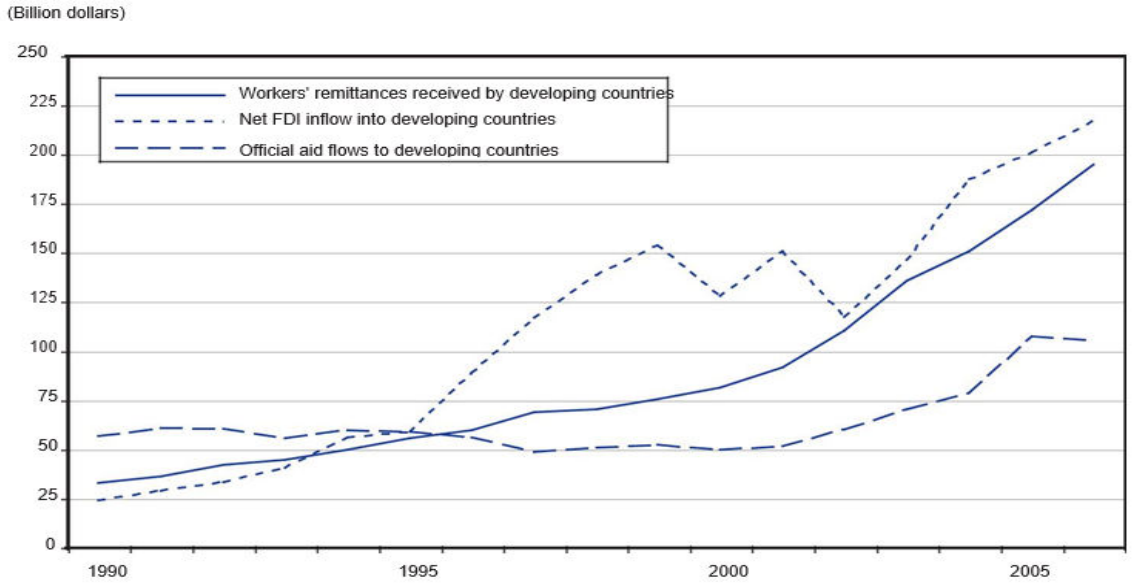
1.1 Background of Study

1.1.1 Introduction of Globalization

Globalization is the process of a country integrating its economies and societies with other countries around the world (Irani, 2011). Globalization impacts a country's structure with the influence of westernization. As Globalization affect several sectors of a country such as technology, communication, transportation and society development, it facilitates a country development. Globalization also helps to facilitate economic growth by promoting liberal policies which known as "free market" in the world economy. With a new platform to trade, a country is given more opportunity to trade with others in the world, which entails exchanging resources that are not available in the country. Globalization is mainly caused by technology advancement, improvement of technology in a

country provides an opportunity which a country can increase efficiency in various aspect including the production of goods, transportation, as well as communication. Globalization was introduced during the convergence caused by the open economy forces of trade and mass migration in the early period of 19th century, in which a strong flow of labor and capital across nations was observed as well. (Williamson, 1996) Besides, trading of commodities between nations became vigorous due to the decrease in transportation cost. This opened up a new page of trading as international trade between nations, which became a common thing around the world.

Figure 1.1: World Development Indicators



Source: World Bank (2007). *World Investment Report*.

As shown in the graph, globalization increases the net flow of foreign direct investment significantly throughout the 19th century. The developing countries also experience increasing worker's remittances through globalization which help to provide aids for the country's development. As a globalized economy integrates and connects the economy around the world, developed countries also show a strong influence by providing more aids to developing countries for development purpose throughout the 19th century.

1.1.2 Initiatives & Reasons taken to involve in globalization

Nowadays, globalization can be more common due to some of the inspectors believe that the process of globalization may affect the changes in inflation. Globalization can emerge as an indispensable component in an example that influence the past events which low inflation is also involved in it. (Greenspan, 2005). There will be a disdain toward the inflation of the traditional business model if there is exchange involve that ignore the globalization (Economist, 2005). From that point, that is possible to take action into globalization because globalization cause low inflation and also have respect from traditional trade in the marke1t.

According to Taylor (2008), under the management of Banque de France, fiscal policy has been one of the important policy in globalization for many years as the majestic Galerie Dorée. It affect when the year was in 1808 and the countries that represent in the world during that time was Europe, Africa, America and also Asia. He alerts that under European site are more formidable compare with other countries like America. Although there is some disparity among each of the countries, he also relief that usually globalization are unproven even comes until today.

1.1.3 Benefits of Globalization

The terms of improving in the approach of ability and mechanization impact on future prospect of life have become one of the benefits of globalization. The improvement in global alertness toward the value of health plays an important role which for those government and non-government management be in charge of the section they should belong to (Derek Yach, 2005).

With globalization, there is a better growth rate in the world trade for foreign direct investment (FDI) and it may advance in transmit of technology, industrial restructuring and developing of global firms. Globalization also motivates the development of the technology that may help the economic growth rate by being more efficient with the process of technology. Some of the large firms will make the changes in the cost and price of the product after involving in globalization by analyzing the economies nowadays in order to balance the economic growth, but it may affect those small firms have a contrast between each other in a country (Justin Kuepper, 2018).

1.2 Problem Statement

In the light of previous studies, there are many factors of globalization affecting the economic growth rate of China. As China is growing important to the world economy, it is important to discover the elements that determine the growth rate in China. This study aims to comprehend the factors that influence the growth rate of China.

Since China announced economic reforms in December 1978 by Deng Xiao Ping, China was becoming the fastest growing country in the world. As China is becoming the biggest exporters and imports raw commodities from other countries. Net export is a considerable variable affecting the growth rate. Most of the researchers have concluded that the export affects growth rate positively. But some researchers showed that both export and growth rate would also be affected by each other. On the other words, not only the growth of export will impact the growth rate, but a better economic growth rate in a country will also increase the trade between the countries (Hashim & Masih, 2014). However, Hashim and Masih also pointed out that past reviews have ignored the importance of import, most of them were just focusing on the impact of exporting. As China is growing

to become the biggest consumer market, imports shouldn't be excluded from this research. The involvement of imports with exports are yet to be defined in the following topics.

Empirical studies proved that Foreign Direct Investment (FDI) is a major variable that could impact the growth rate of a country. A high investment from foreign countries will directly increase the growth rate of the invested country. However, some of the previous researchers found out that not only FDI influences the growth rate, FDI will also be affected by the situation of growth rate. On the other words, when the growth rate in a certain country is performing well, foreign investors will more likely to invest in the country, cause the FDI to increases. Most of the researchers have proved the positive relationship between FDI and growth rate. But Carp (2012) came out with another result. He stated that a country's growth rate will also have a negative impact on the FDI due to political factors. The causality between these two variables is also yet to be verified.

Another finding on the relationship between the human capital and growth rate conducted by some scholars have shown that the literacy level of the national will crucially affect the growth rate of the country. It depends on the workers' capability to adapt to new technologies import from other countries that implemented in the production. However, there are insufficient studies found to prove that how China's economic growth rate affected by literacy level of the national. Further research needs to be conducted to prove the relationship between the two variables.

The results according to past studies do not have sufficient evidence to conclude the relationship among the explanatory variables and economic growth rate in China, as the result varies for each country. Thereby, further studies need to be practiced to evaluate the relationship between the selected economic variables and China GDP. This research is attempted to fill those gap in the literature.

1.3 Research Objectives

1.3.1 General Objectives

This study plans to investigate different macroeconomic factors affecting the economic growth in China. Furthermore, this research also prepares to evaluate which factors had contributed the most effect on the economic growth rate of China. However, the most important of this research is to examine the influences and relationships between the selected explanatory variables and economic growth rate of China.

1.3.2 Specific Objectives

1) To investigate the relationship between exchange rate and economic growth of China.

2) To investigate the relationship between foreign direct investments (FDI) and economic growth of China.

3) To investigate the relationship between human capital and economic growth of China.

4) To investigate the relationship between trade volume and economic growth of China.

5) To investigate the relationship between technology advancement and economic growth of China.

1.4 Research Questions

1) Is the relationship between exchange rate and economic growth of China significant?

2) Is the relationship between foreign direct investment and economic growth of China significant?

3) Is the relationship between human capital and economic growth of China significant?

4) Is the relationship between net export and economic growth of China significant?

5) Is the relationship between technology advancement and economic growth of China significant?

1.5 Research Hypotheses

H_0: The relationship between exchange rate and China gross domestic product is not significant.

H_1: The relationship between exchange rate and China gross domestic product is significant.

H_0: The relationship between foreign direct investment (FDI) and China gross domestic product is not significant.

H_1: The relationship between foreign direct investment (FDI) and China gross domestic product is significant.

H_0: The relationship between human capital and China gross domestic product is not significant.

H_1: The relationship between human capital and China gross domestic product is significant.

H_0: The relationship between net export and China gross domestic product is not significant.

H_1: The relationship between net export and China gross domestic product is significant.

H_0: The relationship between technology advancement and China gross domestic product is not significant.

H_1: The relationship between technology advancement and China gross domestic product is significant.

1.6 Significance of Study

This research paper tends to analyze the relationship between the explanatory variables, which is exchange rate, foreign direct investment, human capital, net export, technology advancement and the dependent variable, which is gross domestic product. We are going to collect the data from 1982 to 2014 to investigate the changes in independent variables that will affect the changes in dependent variable and whether there is a positive or negative relationship. The type of data that we collected is time series data. According to Jianyong Yue (2012), the prevailing view nowadays which Chinese companies in China have got a larger benefit from globalizing and become bigger and stronger. This is because the intelligence of the top leadership in China has made a larger decision which is an accession to the World Trade Organization (WTO) in 2001. It has

been known as a big gamble for the Chinese enterprises because before participating in WTO, they were particularly weak in every comparison with global firms (Nolan 2001; 2004). With this study, it will be able to help all parties like government, policy maker, investor, company top management and so on to clear about the importance of globalization.

On the other hands, other research done by Dr. Anil Kumar (2015) had mentioned that the globalization is a double-edged weapon. Based on this research, globalization had helped India to meet its emergent need of foreign exchange from 1990 to 1991 when India faced its economy worst position. However, it also causes some permanent damage to the Indian economic system. Therefore, this study will provide clear insight to how the economic growth will react to the macroeconomic factors or independent variable in order to let policy maker and government of developing countries clearly understand the effect of globalization to increase their economic growth.

Last but not least, we found many studies and researches that have been used to investigate the ways that the macroeconomic factors had influenced economic growth. However, the results that we obtain are inconsistent. Several researchers found that the explanatory variables and the explained variables will have a positive relationship. However, several researchers found that the explanatory variables are having a negative relationship with the dependent variable. Few researchers even found that the relationship between some of the macroeconomic factors and economic growth is not significant. Therefore, this research paper would be able to clearly provide the view of gross domestic product of China by studying the relationship and the changes between explanatory variables and explained variables.

1.7 Chapter Layout

1.7.1 Chapter 1

Chapter 1 is a concise picture of the introduction and background of this study. This chapter included a problem statement that we are interested in and try to resolve it. Besides that, objective, hypothesis and significance of the study are also included in this chapter.

1.7.2 Chapter 2

Chapter 2 is to observe the literature review on previous studies which are related to our research about the explained variables (Gross Domestic Production of China) and few macroeconomic factors as explanatory variables (exchange rate, foreign direct investment (FDI), human capital, net export and technology advancement). The review of previous studies consists of the period of sample, significant relationship between the variables, methodologies, implications, and findings.

1.7.3 Chapter 3

The purpose of chapter 3 is to display the collections of data and research methodologies. This chapter also illustrates the structure of our research designs, the type of regression model and the sources of data.

1.7.4 Chapter 4

Chapter 4 provides empirical findings with result analysis and discussions about decision making and conclusion for each of the diagnostic testing and try to provide the remedial for problem-solving.

1.7.5 Chapter 5

Chapter 5 will conclude every highlight in this research by outlining the discussions, implications and conclusion in this research. Major findings, limitations and suggestions for future researchers will also be summarized in this chapter to finalize our study.

1.8 Conclusion

The research background and history of China, economic growth, globalization have been reviewed according to the problem statement. Furthermore, the objectives, significances of study and research hypotheses were also stated out above.

CHAPTER 2: LITERATURE REVIEW

2.0 Introduction

This chapter provides several reviews on past literatures done by other researchers to evaluate the impacts of the explanatory variables to the economic growth rate. This chapter offers us a better understanding about the relevancy between the variables for further study which will be conducted in the following chapters. The theories corresponding to our research will also be discussed in this chapter.

2.1 Review of the Literature

2.1.1 Exchange Rate

Exchange rate plays one of the important roles as it affects the economic growth rate, it shows that the currency of a country that can be exchanged with another country. Study of Habib, Mileva and Stracca (2017) indicate that negative relationship was found between real exchange rate and economic growth per capita. Empirical result shows that when currency's value decrease, export of goods in a particular nation will increase. According to the study of Razzaque, Bidisha, and Khondker (2017) also saying that decreasing value of real exchange rate improves output and economic growth significantly. However, it is only effective when accompanied by good monetary and fiscal policies.

As the nominal exchange rate seldom reflects the real exchange rate in reality. Exchange rate usually categorized as overvalued or undervalued. There is a result shows that it may face losses in economic growth between export and import-competing sectors in a country when it involved with the overvaluation of the exchange rate. The overvaluation will cause trouble which the real exchange rate will be much tougher than before to sell it to another foreign market because real exchange rate can be considered as relative prices. This may also lead to a compromise to the progress of tradable sectors which always generate the product to the foreign market (Razin and Collins, 1997). There is another theoretical research shows that exchange rate undervaluation leads to the growth of economic which is export-led growth. In this hypothesis, it proves that the exchange rate undervaluation stimulates in tradable sectors and it may lead to the growth of economic nowadays (Rodrik, 2008).

Based on the research of Rodrik (2008), there is an exposition proving that significant relationship for the undervaluation of exchange rate when there are sources reallocated for those tradable sectors. When the exchange rate becomes more flexible, it will lead toward the economic growth positively by launch those unemployed productive resources that do not affect the long run for the economic growth rate. From the caption above, it also shows that both undervalued exchange rate and economic growth rate are significantly related (Porcile and Lima, 2010; Gouvea and Lima, 2013).

Normally, there is a model which is IS-LM model used to measure the exchange rate disarrangement and economic growth for those developed countries. By using the model of IS-LM stated out the result that there is no relationship between exchange rate disarrangement and economic growth. The economic growth will increase slowly when there is a large gap of overvaluation in exchange rate disarrangement. However, some of the authors define out that their exchange rate disarrangement have a positive relationship with economic growth (Razin & Collins, 1997).

According to the research of Bereau et al. (2009), the data used to examine the relationship between exchange rate disarrangement and economic growth panel data from the developed countries during the time of period 1980 to 2007. The method for this research is the exchange rate methodology which applies to forecast the real exchange rate disarrangement. The final results show that there is a significant relationship when the currency is undervalued but a negative relationship when the currency is overvalued.

2.1.2 Foreign Direct Investment (FDI)

Foreign Direct Investment (FDI) had played as one of the major determinants in the economic growth for developing countries and also developed countries. FDI is an investment that invests by an individual investor or firm in one country into another country's business interests. There are many studies regard FDI and economic growth had done by many researchers. According to the past study done by Har, Teo and Yee (2008), they had mentioned that FDI is one of the important sources of economic growth in Malaysia. They are using time series data and conduct the Ordinary Least Square (OLS) regressions to test the relationship between FDI and economic growth in Malaysia. Based on the result from their study, the foreign direct investment inflows had a significant impact on Malaysia's economic growth and also there has a positive relationship between them.

Besides that, the researches about the causality between FDI and economic growth had done by Zhang (2001) and Choe (2003). Based on the study done by Zhang (2001), cointegration and Granger causality tests are used on data for 11 economies of developing countries which is in East Asia

and Latin America. As the result, it had mentioned that FDI is able to enhance economic growth. However, it also said that the conditions of host country which are education level, trade regime and macroeconomic stability are important when the government or policymaker enhances economic growth via FDI. Furthermore, Choe (2003) also found that FDI would cause the economic growth of the host country. This study is using panel data which is 80 countries over the period within 1997 until 1995 and conducts a panel VAR model to study the relationship of FDI on economic growth. Therefore, an increase in FDI inflows would enhance the host country's economic growth.

Besides, many studies had stated that FDI would affect economic growth positively. However, the higher the Gross Domestic Production (GDP) rate of the host country also would increase the FDI. For example, Simionescu (2016) not only found that the FDI and economic growth has a positive relationship but also found that the higher GDP rates would increase the FDI inflows of European Union (EU) countries. This is because the higher the GDP rates mean that the host countries had strong economic growth and would attract more foreign investors to invest in the host country.

According to the theory, the FDI has a significant positive impact on economic growth. However, the relationship between FDI and GDP rates is inconsistency between theoretical and practical. Based on the study done by Carp (2012), it had mentioned that the FDI would generate both positive and negative impact on economic growth. There should depend on the condition of the host country, policy, trade strategy and so on. Moreover, Li and Liu (2005) also found that the interaction between FDI on human capital would lead to a strong positive impact on developing countries' economic growth. However, the interaction of FDI on the technology gap would lead to a significant negative effect on economic growth.

2.1.3 Human Capital

Ali, Egbetokun, Memon (2018) stated although positive relationship is found between human capital and nation's economic growth as labor who are in possession of high skill, creativity, innovative is crucial in order for a better economy, productivity, and efficiency. As degree of literacy is one of the major determinant in economic growth, people who possess higher education level able to significantly influence economic output than those people who do not. (Arabi, Abdalla, 2013) People with higher education are more adaptive to new technology and able to operate a new machine and technology efficiently. As technology advance and improve from times to times due to globalization however people require a certain level of knowledge in order to make use of the technology. Therefore, people with higher literacy level are crucial in order for a country's economy to advance. According to a study of Samimi, Jenatabadi (2014), the benefit of globalization and financial development are amplified in countries with higher human capital level than countries with lower human capital. As their study also proved that the implementation of technologies obtain from developed countries through globalization require skilled labors. Whether technology can be successfully implemented in the country or not? It's determined by the education and skill level of its people in the country. Therefore, it is important to increase the overall literacy level of people in the country so that people can adapt to the globalized economy structure.

Based on the study of Baro, R. J. (2001), even though economic growth is positively related to the literacy level of people, however, there is an only significant relationship between adult male and economy growth but insignificant between adult female and economy growth. Even both gender possess the same literacy level, but female labor is not utilize in the labor market, it's possibly due to gender discrimination occurs in the nation. Gender discrimination is a common issue in developing the country as people are not as open-minded as a developed country. As women in the

nation possess lesser rights than men thus even women with high skill and capability are not being utilized efficiently.

However, the result of a study from Solarin and Eric (2015) proved a different result. Empirical results show that globalization causing a negative impact on human capital in Nigeria in long run, this is the result of high mobility of workers to move between countries. As globalization reduce the barrier of emigration which causing people with the higher skill to leave the nation and work abroad. This scenario usually occurs due to several reasons such as foreign country provide a better working environment to the worker, a worker getting the better privilege and higher income to life sustainment, or they believe in which working in abroad will grant them a better standard of living as well as higher living quality.

Study of Bani, Y (2017) stated that globalization will further the gap of literacy inequality as the effect of globalization are vary depending on the level of development in the region thus causing the different distribution of education level of people around the country. As a country still in development state, the country unable to overall improve its people's literacy level around the country. People in countryside are lesser benefit from globalization that those people who live and capital. As the difference in literacy level of people eventually distant the gap of income level thus worsen the income inequality in a country if proper policy is not imposed.

2.1.4 Net Export

The relationship between economic growth and net export has been researched by many studies and most of the studies found that there is an

only a small contribution to the economic growth by the export. According to Justin (n.d.), these studies have been ignoring the indirect impact of export, imports, investment, consumption and even the government expenditure only the direct impact of export has been examined. Besides, the effect of imports and exports in economic growth has not been differentiated by the traditional method which used to estimate the foreign trade's contribution toward GDP growth. Due to the lack of concern to the other economic variables, the contribution of foreign trade has been underestimated. The study of Justin (n.d.) has improved the estimation and emphasis on the indirect impact of export to economic growth by accounting the consumption and investment. Thus, the result show export has a bigger impact on economic growth, every 10% increase in export, the economic growth increase 1% on average.

According to the study of Khaled, Abdulbaset & Vladimir (2010), by taking the data of economic growth and export from 1980-2007 in vector error correction model (VECM), the result shows that export and GDP have a long-run bidirectional causality and they are related to the past deviations from the empirical long-run relationship. Moreover, the study has concluded the export growth has a positive impact on the economic growth in the long term and short term as export and GDP have a tendency to revert back quickly to equilibrium.

Besides, Mukherji R. & Pandey D. (2014) has concluded Growth Led Exports which mean the growth increase because of the export increase. Taking the annual data of export and GDP in India from 1969-2012 and using the VAR analysis, Granger causality test and Impulse Response Functions one by one. The VAR analysis result show there is a positive relationship and a year lag between the export's growth and GDP's growth. On the other hand, the Granger causality test has determined the relationship between GDP and export, the result shows there is growth led exports rather than exports led growth. Lastly, the impulse response

functions show the response of export has much higher through a change in GDP, consequently, the theory of growth led exports has been concluded in India.

Moreover, based on the study of Chemeda (2001), it analyzes the relationship between GDP and export by using the Cobb-Douglas function model. The unit root test, error correction model (ECM) and co-integration test are possible to differentiate the effect of export to economic growth in the long term as well as short term. The results show the effect of export impact positively to economic growth in the Ethiopian economy in long term but there is only small short term effect.

Last but not least, Hashim and Masih (2014) had discovered export and economic growth does have a bidirectional causal relationship in the case of Malaysia. Which is mean that not only the changes in export will impact the host country's economic growth, but also changing in economic growth will affect the export of host country. This study is using the time series data and conducts Granger causality test to analyze the relationship between trade volume and economic growth in Malaysia. Besides that, the finding of Mah (2005) had the same conclusion with Hashim and Masih (2014) with using the case of China. However, they also said that major researchers just focus on export impact economic growth and ignore the importance of import.

2.1.5 Technology Advancement

Technology advancement is also one of the major determinants for changing in economic growth rate. Technology advancement can be determined by using total factor productivity. Study of Jean and Thomson

(2006) found that Niger's income per capita decrease with an average of 0.3 percentage a year during the observation period, the cause of this disappointing economic performance is due to the negative growth rate of TFP, therefore a positive relationship was found in technology advancement on economic growth rate, holding another factor constant.

At the same time, the central finding of economics during the last fifty years has proved that technological advancement is critically significant to long term economic growth. (Jeffrey & John, 2002) In order to foster economic growth, technological advancement is the key to create a successful innovation system that requires focus, attention and institutional creativity. Technological advancement facilitates economic growth from various aspect such as increase production efficiency, speed up transportation meanwhile reducing transportation cost, enhance product quality thereby contribute to the welfare of the world.

Mieko and John (1982) suggested that technology advancement and technical efficiency share the same methodology which in a normal scenario, an increase in total factor productivity leading to the increase in economic growth. However, based on the finding of Mieko & John of the pattern of technology advancement change between two major economic plan periods, they found out that technology advancement does not always have a positive relationship with economic growth. This is possibly due to another factor which causing the effect of technology advancement on economic growth to be invalid, such as corruption.

2.2 Review of Relevant Theoretical Models

2.2.1 Endogenous Growth Model (New Growth Theory)

New growth theory is a kind of economic theory that emphasizing the internal factors which enhances economic growth. The reason that we chose this model as one of our underlying theories, is because it helps to analyze the technological progress and study their effects on economic growth which pointed out by Aghion and Howitt (1998) that it is the gap of neoclassical theory. Cortright (2001) stated that through the new growth theory, it pointed out that investment in creating new knowledge is a key role to sustain growth. Technological progress is an endogenous effect which improves through learning by doing, investment in education and other forms of human capital. Meanwhile, increases foreign direct investment in a nation helps to improve technology. As technology advancement requires a massive amount of capital to conduct research and development. Therefore, according to this theory, we assuming human capital, foreign direct investment and technology advancement might impact a nation's economic growth.

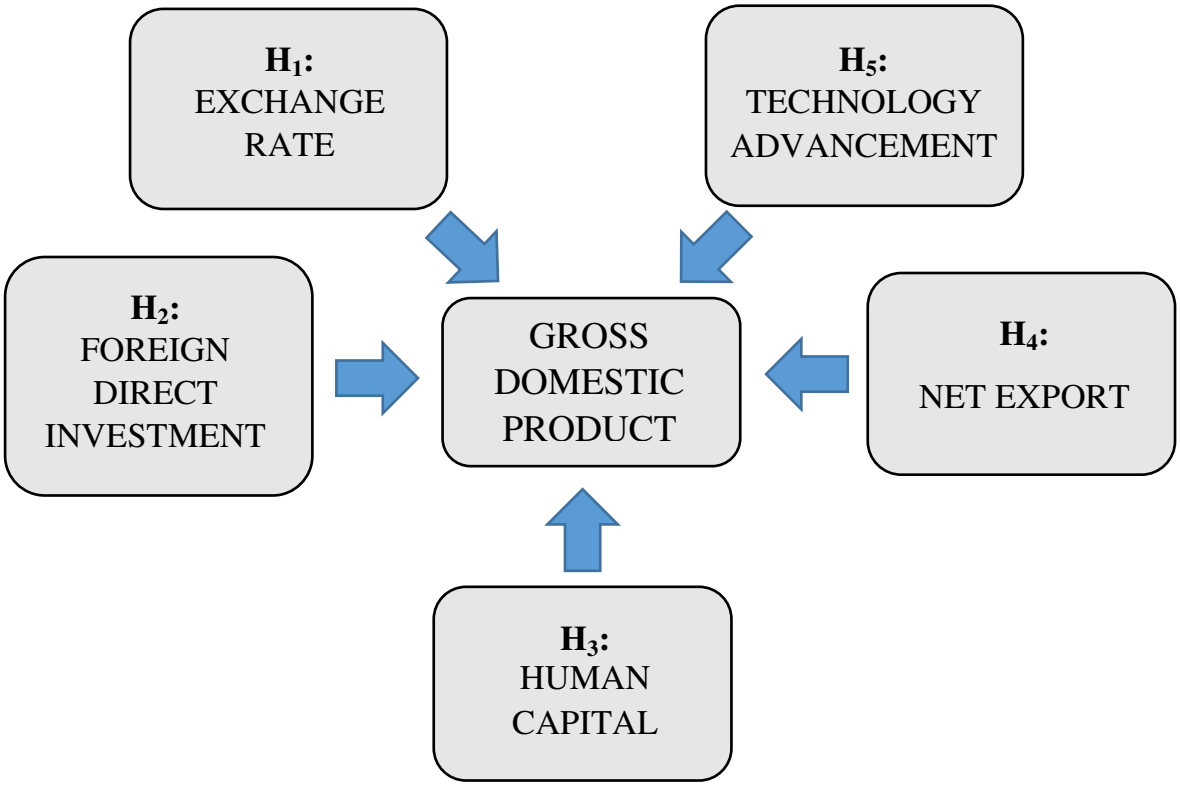
2.2.2 Purchasing Power Parity (PPP)

Purchasing power parity is another economic theory which provides measurement on different price level across the countries. It is an alternative by using the market exchange rate to compare the currencies among the countries. PPP is considered as a better measurement as it has taken the exchange rate into account and assumes every individual's

purchasing power is equal. Its concept is to assume that a bunch of goods should have the same cost between each country. As the currency depreciated, foreign nations with stronger currency would increase the imports from the domestic nation which stimulates the net export to increase. As the result, increasing of net export helps to facilitate the economic growth in a particular country. According to Lafrance and Schembri (2002), they stated that absolute purchasing power parity is the most casual and formidable form of PPP based on the law of one price. So, we can conclude that the exchange rate and net export are major determinants to impact the economic growth in a nation.

2.3 Proposed Framework

Figure 2.1: Factors of Globalization Affecting Economic Growth



The framework was proposed based on the empirical study from Habib et al. (2017) and Razzaque et al. (2017) which exchange rate as an independent variable that will impact the economic growth significantly in monetary and fiscal policies. Based on the past studies conducted by Har et al. (2008); Zhang (2001); Choe (2003), they had mentioned that positive relation was found between FDI and economic growth. Thus, the increase of FDI inflows would enhance economic growth for the host country. Another study Arabi et al. (2018) used human capital as an independent variable to identify the impact of economic growth from globalization. Samimi et al. (2014) also suggested that human capital is an important variable that helps impact economic growth through globalization. Mukherji & Pandey (2014) proved that growth led export which means increasing export will affect economic increase indicating that export affects economic growth positively. Last but not least, the study of Jean & Thomson (2006) found out that there decreasing in technology advancement cause economic growth in a nation to decrease, vice versa. This finding was supported by Jeffrey & John (2002) which proved that positive significant relationship was found between technological advancement and economic growth rate.

2.4 Hypotheses Development

2.4.1 Exchange Rate and Gross Domestic Product

Habib et al. (2017) stated that a negative relationship between real exchange rate and an economic growth rate that may affect the currency rate for a current country to another country. This empirical review was supported by Razzaque et al. (2017). According to Razzaque et al. (2017), the economic growth rate and the productivity will be affected when the value of real exchange rate depreciates.

H_1: *The relationship between real exchange rate and gross domestic product is significant.*

2.4.2 Foreign Direct Investment and Gross Domestic Product

Foreign Direct Investment (FDI) is one of the major determinants which affecting economic growth in a country. Based on the past study done by Har et al. (2008), they found out that the net inflow of foreign direct investment affects Malaysia's economic growth positively. Besides, Zhang (2001) and Choe (2003) had mentioned that FDI affects economic growth positively. Therefore, an increase in FDI inflows would facilitate economic growth in the host country. Moreover, not only FDI will influence economic growth, the country's economic growth will affect the FDI inflows. Simionescu (2016) had found that higher GDP rates would increase the FDI inflows of European Union countries. Thus, the host country had a higher GDP rate will attract more foreign investors. However, Carp (2012) had said that the FDI would generate both positive and negative effect on the economic growth and it should depend on the condition of the host country. Last but not least, Li and Liu (2005) also found that the interaction of FDI with human capital would lead to a strong positive impact on economic growth for those developing countries. However, the interaction of FDI with the technology gap would lead to a significant negative effect on economic growth.

H_2: *The relationship between foreign direct investment and gross domestic product is significant.*

2.4.3 Human Capital and Gross Domestic Product

Ali et al. (2018) provide sufficient empirical evidence to prove that strong positive relationship was found between human capital and economic growth rate as skilled labor help to increase productivity, and facilitate economic growth rate. A study from Arabi et al. (2013) stated that increasing human capital helps to amplify the effect of globalization to the nation, as technology advancement require skilled labor to operate to bring out its benefit to the country. Technology improved from time to time as the nation globalized and import new technology from a foreign nation, labor without sufficient knowledge and skill are unable to make use of the particular technology. This was supported by research result from Samimi et al. (2014) saying that a country with a higher capital level has higher economic growth rate than a country with lower capital level.

H_3: *The relationship between human capital and gross domestic product is significant.*

2.4.4 Net export and Gross Domestic Product

Justin Y. L. (n.d.) state that by accounting some other economic variables which are affected by export and conclude the export found to be cause positive impact on economic growth indirectly. By using the improved estimation, the empirical result shows the export has a positive and larger indirect impact on economic growth. Meanwhile, the study of Khaled R. M. E. & Abdulbaset M. H. & Vladimir G. (2010) provides sufficient empirical evidence to shows the export and GDP have bidirectional causality in long run and conclude that export has a positive effect on long term economic growth as well as short term. Besides, the empirical results of Mukherji R. & Pandey D. (2014) have shown the positive relationship

and a year lag between export and economic growth, growth led export rather than export-led growth has been proved in the empirical result. Furthermore, Chameda F. E. (2001) shows the effect of export has to an impact towards the economic growth positively in both short term and long term, but there is an only small effect in the short run. Last but not least, Hashim and Masih (2014) had observed a bidirectional causal relationship between export and Malaysia's economic growth. This statement also strengthens by the study of Mah (2005) with using the case of China.

H_4: *The relationship between export and gross domestic product is significant.*

2.4.5 Technology Advancement and Gross Domestic Product

Jean et al (2006) stated that growth of income per capita decrease along with the decrease in total factor productivity indicating that decrease in technology advancement proved to have a significant negative effect to the economic growth in a nation. This was also supported by a study of Jeffrey et al (2002) which shows that technology advancement does foster economic growth in a nation which innovation is proved to be a key to facilitate economic growth of a nation through various aspect.

H_5: *The relationship between technology advancement and gross domestic product is significant.*

2.5 Conclusion

As a conclusion in this chapter, past literatures have helped to identify the expected relationship between the variables. Hypotheses have been constructed based on the perception of the relationship of various independent variables towards economic growth. The methods used to conduct the hypotheses will be further discussed in the following chapter.

CHAPTER 3: METHODOLOGY

3.0 Introduction

This will show the data sources of our variables. All of these data are the data of China. The data are used to examine the relationship between our explained variable, gross domestic product (GDP), and the explanatory variables which are exchange rate, foreign direct investment (FDI), human capital, net export and technology advancement. We are using Multilinear Regression and Ordinary Least Square (OLS) method. Our study has used the annual data of these variables in China, the time period is from 1982-2014. All of the variables are from secondary sources. Quantitative research method has been used to analyze the collected data.

3.1 Research Design

According to our research, we are going to choose causal research as our main research design. This research paper is to determine which variables are the cause and which are the effect. This research design also includes the determination of the relationship between the causal variable and the effect predicted. Further experiment will be conducted to prove or to disprove the relationship between the cause and effect.

3.2 Sampling Design

3.2.1 Target Population

This research study had selected the economic growth of China as our target population. This objectives of this research paper are to analyze the relationship between economic growth and the globalization factors in China. In addition, these globalization factors that will impact the economic growth in China will carry out and test in the multiple regression model.

3.2.2 Sampling Frame

In this research study, Gross Domestic Production (GDP) will use to measure the economic growth of China. Besides, the globalization factors that will affect the economic growth in China are exchange rate, foreign direct investment, human capital and net export. These globalization factors as the independent variable are used to explain how large the influence toward the economic growth in China.

3.2.3 Sample Size

The year 1982 until the year 2014 with an annual basis is the data collected for this research. There are a total of 33 observations and would be

considered a large sample size. Based on the econometric theory, the number of observation "n" is equal or more than 30 is considered as a large sample size. The number of observations should be large enough when running the tests in order to make the results more accurate and reliable. With using the large sample size, it will tend to get a significant effect among the dependent variable and independent variable. Furthermore, the large the sample size would easy to detect the differences or changes of the dependent variable. Thus, 33 numbers of observations are chosen for this research study.

3.3 Data Collection Methods

In this research, we are going to use secondary data as our sources to run the test according to the relationship between the variables. The range of the observations is from 1982 to 2014 which involves 33 years to be observed and will be calculated annually.

Table 3.1: Descriptions of Data

Variables	Descriptions	Sources
Gross Domestic Product (GDP)	Billion in US currency	World bank
Exchange Rate	Local currency per one US dollar	World bank
Foreign Direct Investment (FDI)	FDI Net inflow in US Currency	World bank
Human capital	Index of Human Capital per person for China	FRED Economic Data
Net Export	Billion in US currency	World bank
Technology Advancement	Total Factor Productivity (TFP)	FRED Economic Data

Table 3.1 shows the descriptions and the data sources of explained variable and explanatory variables. The explained variable is a gross domestic product (GDP), the explanatory variables consist of exchange rate, foreign direct investment (FDI), human capital, net export and technology advancement.

Gross domestic product (GDP) is known as economic growth, the data is in billion and the unit measure is U.S. dollar. The exchange rate is the valuable currency of China (RMB) per single U.S. dollar ($). The data of foreign direct investment (FDI) with a proxy of net inflow and the unit measurement is in U.S. currency ($). The net export is known as the foreign trade of China, the data is in billion and the unit measurement is U.S. dollar ($). World Bank and FRED economic data are the sources where we collected our data.

3.4 Data Analysis

3.4.1 Multiple Linear Regression

Uyanık and Güler (2013) have stated that one of the statistic technique or method to analyze the relationship between the explained variable and the explanatory variables is regression analysis. The application of simple linear regression model is only applied to analyze the relationship among the dependent variable and a single independent variable. However, the regression models which only have one explained variable and two explanatory variables and above are known as multiple linear regression models. Thus, we had chosen multiple linear regression models to reflect the globalization factors which would affect the economic growth rate at the same time for our research study.

According to Brant (2007), there are several key assumptions that need to be fulfilled. First, there is no exact collinearity between the explanatory variables in a model. Perfect colinearity may happen if any two of the independent variables are linearly dependent and both of them exist in the same multiple linear regression model. However, there is no way to measure or distinguish the separate influence of the two independent variables on respond variable. In this situation, the end result will become inaccurate. Next, specification bias does not exist in the model. It means that the model is correctly specified, no important variable is missing from the model.

In addition, the multiple linear regression models may or may not linear in the variables but must be linear in the parameters. Next, independent variables must be stochastic and independent of the error terms. It can be explained that the error terms and independent variables are not correlated in a model. If the error terms and independent variables are correlated, it is unable to examine the effect on the dependent variable. The other assumptions are zero mean value of disturbance and homoscedasticity. Homoscedasticity indicates the equal spread of variance of the error terms. Moreover, there is no autocorrelation between the disturbances. If the disturbances are correlated, it may not be able to investigate the individual effect of explanatory variables on the explained variable. Besides that, the number of parameters should not be more than the number of observations. Which means that the number of explanatory variables must be lesser than the number of observations. The last assumption is the nature of explanatory variables. A given sample of the explanatory variables must not be all the same.

The model of our research paper is as follow:

GDP=f [Exchange Rate (EXCH), Foreign Direct Investment (FDI), Human Capital (HUMAN), Net Export (NX), Total Factor Productivity (TFP)]

Econometric Function:

$Y_t=B_0+\beta_1 X_t+\beta_2 X_t+\beta_3 X_t+\varepsilon_t$

$GDP_t=\beta_0+\beta_1 EXCH_t+\beta_2 FDI_t+\beta_3 HUMAN_t+\beta_4 NX_t+\beta_5 TFP_t+\varepsilon_t$

Where,

GDP_t = China Gross Domestic Productions (US$)

$EXCH_t$ = Ratio of China currency per single US dollar

FDI_t = China Foreign Direct Investment, net inflow (US$)

$HUMAN_t$ = Index of Human Capital per person for China

NX_t = China Net Export (US$)

TFP_t = Total Factor Productivity

ε_t = Error term

3.4.2 Properties of Ordinary Least Square Estimators

In econometrics, an ordinary least square (OLS) is applied to evaluate the parameters in a linear regression model. This is because the ordinary least square (OLS) technique is used and the purpose is to know the validity of OLS estimates. There are several assumptions are made while running linear regression models:

1. "Linear in parameters" must be determined in Linear Regression Model
2. Randomly sampled observations.
3. Zero conditional means.
4. Free from multicollinearity (or perfect collinearity).

5. Homoscedasticity and autocorrelation are not existed.
6. Error terms are normally distributed.

To achieve Best Linear Unbiased Estimators (BLUE), there is one theory which named Gauss-Markov theorem is indicating that the OLS estimators $\widehat{\beta_0}$ and $\widehat{\beta_1}$ must satisfy the 3 properties below:

1. Linear

This linear characteristic is more focus on the estimator compared to the original equation which is being estimated. Therefore, the main thing was the multiple linear regressions must "linear in parameters". The linear characteristic emphasizes that OLS estimators are only linear in the responding variable but not necessarily in the explanatory variables.

2. Unbiasedness

The estimated regression equation will be found to be associated with error terms. This leads to the responding variable become random. If an estimator uses the random respond variable, then a random number of estimators' results. Before describing what the unbiasedness is, mentioning the unbiasedness characteristic is crucial because unbiasedness is a characteristic of the estimator but not for any sample. Hence, unbiasedness is the most desirable characteristic of any estimator. Thus, the estimator should be an unbiased estimator. Ultimately, the unbiasedness characteristic of OLS in Econometrics is the basic minimum requirement to be fulfilled by any estimator.

3. Minimum Variance

To achieve Best Linear Unbiased Estimators (BLUE), the estimator must have minimum variance. In this manner, if all the estimators chose are

unbiased, the least variance may be obtained in the estimator. The individual data points are closer to the mean if the estimator having the least variance. Accordingly, more accurate and precise outcomes over different estimators will tend to have higher variance. To put it plainly, unbiased estimator and least variance estimator is the best estimator.

T-statistic Test

T-statistic able to help us to examine the degree of significance between each of the explanatory variables against the explained variables, as well as explain its validity in the regression model. T-statistic are important as we will make our decision on whether to reject or accept the null hypothesis by referring to the T-statistic of the particular independent variables. The step of conducting the test is shown below:

H_0 = The independent variables are insignificantly associated with the dependent variable.

H_1 =The independent variables are significant associated with the dependent variable.

Decision rule:

- Reject H_0 if the test statistic if the test result is smaller than the lower critical value or more than the upper critical value. Otherwise, do not reject H_0.
- Reject H_0 if the p-value is less than the level of significance (0.01, 0.05, 0.10), otherwise, do not reject.

F-statistic Test

Fisher (1924) proposed F-statistic test which able to examine the overall significance of the regression model, proving the validity of the regression model. The result from the F-statistic test might vary when we apply different significance level. The step of conducting the test is shown below:

H_0: $\beta_1 = \beta_2 = \beta_3 = \beta_4 = 0$

H_1: All slope coefficients are not simultaneously zero

Decision rule:

- Reject H_0 if the test statistic if the test result is smaller than the lower critical value or more than the upper critical value. Otherwise, do not reject H_0.

- Reject H_0 if the p-value is less than the significance level (0.01, 0.05, 0.10), otherwise, do not reject. (P-value approach)

3.5 Diagnostic Testing

3.5.1 Jarque-Bera Normality Test

According to Das and Rahmatullah Imon (2016), they had mentioned that there are one of the assumptions that need to fulfill in the classical normal linear regression model (CNLRM). The assumption which mentioned above indicates that the disturbance terms must be normally distributed. Furthermore, Mohd Razali and Yap (2011) also said that the popular methods that use to test the normality problem in a regression model by the major researchers are Shapiro-Wilk, Kolmogorov-Smirnov and Jarque-Bera. Shapiro-Wilk test is the best methods to test normality compare with Kolmogorov-Smirnov and Jarque-Bera. This is because its power and result are more accurate. However, the Jarque-Bera test is more suitable for this research study to test the normality problem. This is because the calculation and the procedure to carry out the Shapiro-Wilk test is complex compared with the Jarque-Bera test. Moreover, the Jarque-Bera test would give an appropriate result for any level of measurement which is 0.1, 0.05 and 0.01.

In addition, the Jarque-Bera test also is a method or test for normality data. With using the kurtosis and skewness from the sample data, it would conduct the goodness of fit test. In order to avoid making the wrong decision or reject a true hypothesis, we should analyze the normality of data before doing any statistical analysis. On the order hand, the Jarque-Bera test is applicable to the ordinary least square (OLS) residuals to examine whether the error terms have accomplished the normal assumptions. The formula of the test is as follow:

$$JB = \frac{n}{6}(S^2 \ + \frac{1}{4}k - 3)^2$$

For example, Mohd Rosli (2013) had conducted the normality test and failed to reject the null hypothesis. This indicates that the error terms are normally distributed in the regression model. Therefore, it can make a conclusion that the error term is distributed normally in the model since the p-value is larger than the level of significance.

The hypothesis study is as follow:

H_0 : The error terms are normally distributed.

H_1 : The error terms are not normally distributed.

The level of significance: 0.01, 0.05, 0.1

Decision Rule: Reject H_0 if the p-value is samller than the level of significance, $\propto$ = 0.01, 0.05, 0.1. Otherwise, do not reject.

3.5.2 Multicollinearity

Multicollinearity occurs when the situation that one of the explanatory variables is extremely correlated with other explanatory variables. In order

to detect the multicollinearity between the paired independent variables, Gujarati & Porter (2009) mentioned that using the R-Squared from the result of E-views to detect the multicollinearity problem.

Furthermore, Frisch (1934) also defined that the Multicollinearity occurs in a particular regression model when the relationship between one of the explanatory variables and other explanatory variables is linear. In a normal regression model, the independent variables cannot predict or impact each other. Therefore, Multicollinearity would affect the regression result and lead to the rejection of the true hypothesis and wrong decision making (Stephanie, 2015).

According to Paul (n.d.), there are some of the main sources of Multicollinearity occur:

1. The data collection method employed.
2. Constraints on the model or in the population.
3. Model specification.
4. An over defined model.

There are a few ways for detection of Multicollinearity problem in a regression model:

1. High R-square and few significant T-ratios.
2. High pairwise correlation among Regression
3. Variance Inflation Factor (VIF), $VIF=1/(1-R^2)$

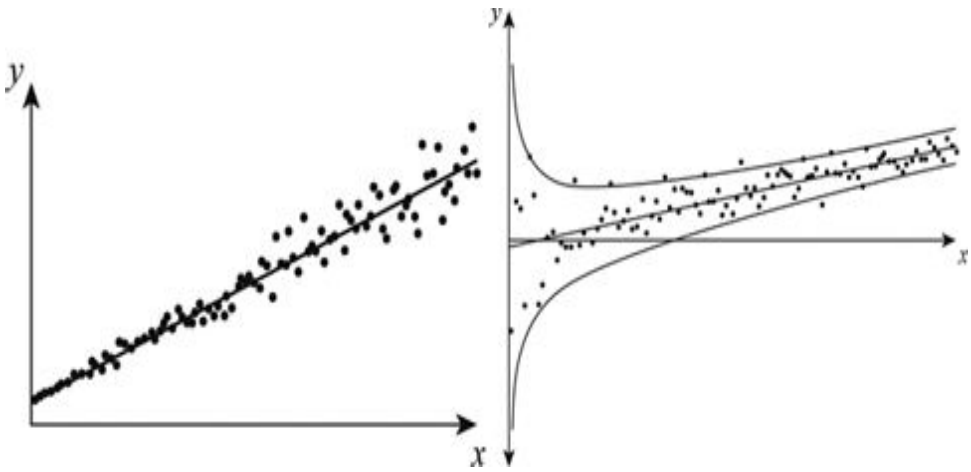
There are a few Remedial Measures for Multicollinearity problem in a regression model:

1. Increase The Sample Size.
2. Using the Extraneous Estimate.
3. Dropping Variables.
4. Combining Cross-Sectional and Time Series Data.
5. Model Specification.

3.5.3 Heteroscedasticity

Normally, heteroscedasticity takes place when the observations have differed with the variance of the error terms which can be explained as inconstancy of one variable is not parallel equal across the range with another variable that has been forecasted. The only method to identify whether it is heteroscedasticity or not is by erecting a scatterplot. It can prove that there is heteroscedasticity if the scatterplot shows a cone-like a pattern. Meanwhile, the variability of the predicted variable become widens or narrows if there is an increase in the independent variable. The graphs below show an overview of the Heteroscedasticity:

Figure 3.1: Comparison between Homoscedasticity and Heteroscedasticity



Sources: Chegg Study (2003-2017). Individual using the Internet.

According to Mohd Rosli S. H. (2013), there will consider doing not have any heteroscedasticity problem when the p-value from the research had reached a significant level that lesser than 10%. Besides, huge volatility in the measurement of error can lead to heteroscedasticity or consider as outliers (Williams, 2015).

The null and alternative hypotheses for heteroscedasticity as shown in below:

H_0: The residuals are homoscedastic

H_1: The residuals are heteroscedastic

There are some of the consequences cause by heteroscedasticity. One of the common consequence is the ordinary least square (OLS) will show an estimator with little variance. Besides, the significance test run for heteroscedasticity will become either too low or too high and bias in standard errors.

Many tests can be used to detect whether there is Heteroscedasticity. There is two tests that has been used commonly which are Breusch Pagan Test and F Test. Breusch Pagan Test was published by Trevor Breusch and Adrian Pagan in the year of 1979. This test will be used when there is an error term that are normally distributed. It tests out the result to show whether the variance of the error term will be dependent on the value for those independent variables. Breusch Pagan Test can be called as X^2 test. There are few ways to carry out the test by using the fitted values of the model, independent variables of the model and perform multiple tests, and p-value adjustment.

H_0: The variance is constant

H_1: The variance is not constant

F Test applies in heteroscedasticity when the error terms are independent and identically distributed. Fitted values, independent variables of the model and specify the variables are the methods to perform the test.

H_0: Variance is homogeneous

H_1: Variance is not homogeneous

3.5.4 Autocorrelation

Autocorrelation related to the connection in time series which is regarding the value in past and futures. Sometimes, autocorrelation also named as "serial correlation" which explain as the correlation that linked with the number of the series sort in time. Autocorrelation occurs mostly because of the dependencies within the data. The existence of an autocorrelation may be a strong motivation for that investigator who interested in relational

inference and learning sequence. Below show the measurement for lagged k autocorrelation:

$$r_k = \frac{\sum_{t=k+1}^{n} (y_t - \bar{y})(y_{t-k} - \bar{y})}{\sum_{t=1}^{n} (y_t - \bar{y})^2}$$

r_i = autocorrelation at lag i

k = the time lag

n = number of observations in the time series

According to the research of Box and Jenkins (1976), autocorrelation function can be applied to two main objectives which detect that non-randomness in data and to investigate the suitable time series model if the data used are not random. The relationship between autocorrelation and error terms in any of the research exists. During the testing of hypothesis, the result will be invalid only when there is an autocorrelation problem in the regression model. Many tests can be chosen which are Durbin Watson (DW) test, Breush Godfrey LM test and Durbin's H test. DW test can be chosen when there is cross-sectional data; Durbin's h test can only use to find out the autocorrelation problem; Godfrey LM test same as Durbin's h test but it can apply in time series data (Gujarati and Porter, 2009).

H_0 : The autocorrelation problem is not in the model.

H_1 : The autocorrelation problem is in the model.

3.5.5 Granger Causality

Granger causality usually occurs in time series data which an independent variable past's data granger cause and impact its following year's data within the same regression model. In another word, the past values of independent variables able to provide us information that helps to predict its following year's independent variable's value, indicating that the relationship between the variables in a time series are having causality. The occurrence of causation in independent variables will cause OLS model to be inaccurate and inefficient. Granger proposed Granger Causality Test in purpose to identify the presence of Granger causality in a regression model. Steps are shown below.

H_0: X does not Granger cause Y

H_1: X does Granger cause Y

Decision Rules: Reject H_0 when the test statistic is larger than the critical value, otherwise do not reject H_0.

Test Statistic (Wald F Test): $F = \frac{(SSE_{reduced} - SSE_{full})/(k_{reduced} - k_{full})}{SSE_{full}/(n - k_{full} - 1)}$

Critical Value: $F_{\alpha,(K_{full} - K_{reduced}),(n - K_{full} - 1)}$

3.5.6 Model Specification Error (Ramsey's RESET Test)

Model specification error refers to the misspecification in a regression model. There are several reasons why the error exists. Firstly, when a relevant explanatory variable that is important in order to determine the explained model is omitted from the model, the model specification error arises. Including an unnecessary or irrelevant independent variable will also cause the regression model to be misspecified. When model

specification error arises in an OLS regression model, the error will cause the regression model to be inefficient and biased. In order to identify the error in a regression model, we can use Ramsey's RESET Test which designed and proposed by Ramsey in 1969. The steps are shown below.

H_0: Model specification is correct

H_1: Model specification is incorrect

Decision Rules: Reject H_0 when the test statistic value is greater than the critical value, otherwise do not reject H_0.

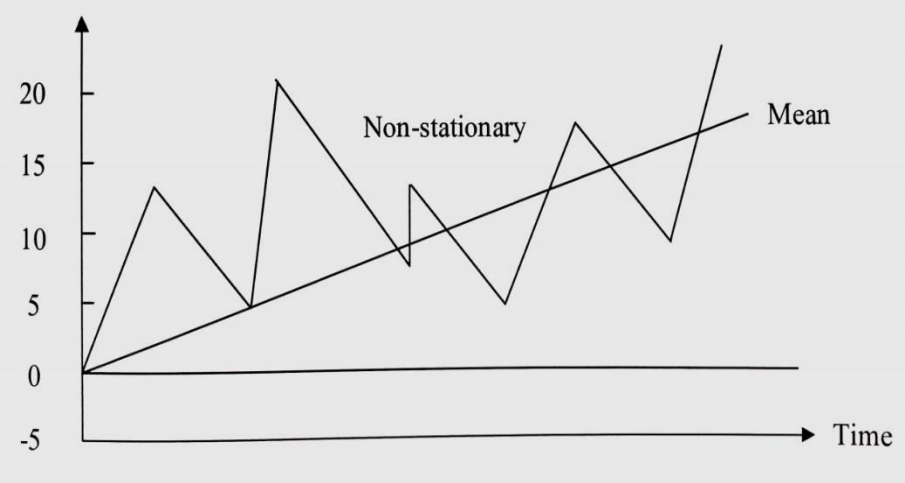
Critical Value: $F_{\alpha,2,n-3}$

Test Statistic: $F = \frac{(R^2_{unrestricted} - R^2_{restricted})/(k_{unrestricted} - k_{restricted})}{(1 - R^2_{unrestricted})/(n - k_{unrestricted})}$

3.5.7 Unit Root Test

Gujarati and Porter (2009) have pointed out that the necessary to check if the time series possess involved any unit root problem or called as stationarity or non- stationarity. Unit root test has the characteristics to figure out the stationarity in a time series. The stationarity in a time series can explain that even there is a change in time also would not affect the form of distribution. However, unit roots are one of the causes that affects non- stationarity. The reason to test out the non- stationarity is because the behavior and properties will be strongly affected by stationarity series. Besides that, if both of the two variables in the test are trending over the period, one of the regression will have a high R^2 compare with others although two of the variables are totally different. In this case, we called as spurious regression. The figure below shows the differences between stationary and non- stationarity:

Figure 3.2: Comparison between Stationary and Non-stationary



Sources: Individual using the internet.

There are many tests can be used as the measurement for the unit root test. The tests involved 1. Dickey-Fuller tests (DF test and ADF test), 2. Phillips-Perron test (PP test), 3. Schmidt–Phillips Test, 4. Phillips–Perron (PP) Test and also Zivot-Andrew test. Basically, there is only two tests that been used commonly which are Dickey-Fuller Test and also the Phillips-Perron (PP) Test.

3.1.1.1 Dickey-Fuller Test

Based on the research of Dickey, Fuller (1979), Dickey-Fuller Test can be considered as one of the best tests that uses widely. Another word can be called a Dickey Pantula test. Augmented Dickey-Fuller (ADF) test will be a better choice when there is an issue of serial correlation. This is because the ADF test can cover more amount and difficult models. ADF test is used to estimate the time series is stationarity or non-stationarity. Schwarz's Information Criterion (SIC) is one of the best suggestion selection for the ADF

test to run. Residuals (μ_t) that are independent and identically distributed is the most important term underlying the Dickey-Fuller Test (Gujarati and Porter, 2009).

H_0: There is a unit root or the time series is nonstationary.

H_1: There is no unit root or the time series is stationary.

Decision rule: Reject H_0 when p-value is smaller than the significant level, α. Otherwise, do not reject H_0.

3.5.7.2 Philips Perron (PP) Test

Gujarati et al. (2009) stated that the asymptotic distribution of PP test and Augmented Dickey-Fuller (ADF) test statistic are similar. In another word, result from the PP test is usually similar to the result from the ADF test. However, PP test designed to integrate an automatic correction to the DF procedure which allows auto-correlated residuals in a regression model as PP test uses a nonparametric statistical technique to identify the serial autocorrelation in the error terms without consideration any lagged difference term in the regression model.

H_0: There is a unit root or the time series is nonstationary.

H_1: There is no unit root or the time series is stationary.

Decision rule: Reject H_0 when the p-value is smaller than the significant level, α. Otherwise, do not reject H_0.

3.6 Conclusion

To conclude with this chapter, it consists of the different type of method that had been using for the research in order to figure out the data. The test which is suitable in the research is Multiple Linear Regressions, Ordinary Least Square Estimators, and Diagnostic Testing. The outcome and the analysis will be carried out and disclosure on the following chapter.

CHAPTER 4: DATA ANALYSIS

4.0 Introduction

This chapter is going to examine the relationship between dependent variable and independent variables, which are China economic growth (GDP) as the dependent variable and the independent variables are exchange rate (EXCH), foreign direct Investment (FDI), human capital (HUMAN), net export (NX), technology advancement (TFP). The empirical results are explained by E-view 10, and the data are collected from online sources. The tests are including Ordinary Least Square Method (OLS), Jarque-Bera test (JB test), T-statistic test, F-statistic test, Ramsey RESET test, Autoregressive Conditional Heteroscedasticity test and autocorrelation test.

4.1 Interpretations

4.1.1 Ordinary Least Square Model

$$\text{LOG (GDP)} = 5.883296 - 1.008643\text{LOG (EXCH)}_t + 0.244521\text{LOG (FDI)}_t + 5.930006\text{LOG (HUMAN)}_t + 0.029630\text{LOG (NX)}_t + 1.314813\text{LOG (TFP)}_t + \varepsilon_t$$

Where,

GDP_t = China Gross Domestic Productions (US$)

$EXCH_t$ = Ratio of China currency per single US dollar

FDI_t = China Foreign Direct Investment, net inflow (US$)

$HUMAN_t$ = Index of Human Capital per person for China

NX_t = China Net Export (US$)

TFP_t = Total Factor Productivity

ε_t = Error Term

4.1.2 Interpretation of Parameters

$\widehat{\beta}_0 = 5.883296$

When the value of all independent variables is 0, on average, China gross domestic productions will increase by 5.83%, ceteris paribus.

$\widehat{\beta}_1 = -1.008643$

When the exchange rate increased by 1%, on average, China gross domestic productions will be decreased by 1.01%, ceteris paribus.

$\widehat{\beta}_2 = 0.244521$

Every increasing 1% in FDI, on average, China gross domestic productions will rise by 0.24%, ceteris paribus.

$\widehat{\beta}_3$ = 5.930006

When the index of human capital increased by 1%, on average, China gross domestic productions will increase by 5.93%, ceteris paribus.

$\widehat{\beta}_4$ = 0.029630

When the China net export increased by 1%, on average, China gross domestic productions will increase by 0.03%, ceteris paribus.

$\widehat{\beta}_5$ = 1.314813

When the total factor productivity increased by 1%, on average, China gross domestic productions will increase by 1.31%, ceteris paribus.

4.1.3 Goodness of Fit

R^2 = 0.991359

Independent variables such as exchange rate, foreign direct investment, human capital, net export and total factor productivity can only explain the variation in China gross domestic production by 99.14%.

Adjusted R^2 = 0.989759

After taking the degree of freedom into account, Independent variables such as exchange rate, foreign direct investment, human capital, net export and total factor productivity can only explain the variation in China gross domestic production by 98.98%.

4.2 Hypothesis Testing

This hypothesis testing is to study how the independent variables affect the dependent variable. Using t-statistic to identify the individual significant effect of independent variables to the dependent variable. And the F-statistic is used to examine the validity of the regression model.

Table 4.1: Summary of Ordinary Least Square Results

Variables	T-statistic	P-value	F-statistic (p-value)
Exchange rate(EXCH)	-6.226990	0.0000	0.000000
FDI	2.960154	0.0063	
Human capital(HUMAN)	5.835424	0.0000	
Net export(NX)	1.252004	0.2213	
Total factor productivity(TFP)	2.606065	0.0010	

4.2.1 F-statistic

Hypothesis:

H_0: $\beta_1 = \beta_2 = \beta_3 = \beta_4 = 0$

H_1: Not all slope coefficients are simultaneously zero

Significance level

$\alpha = 0.10$

Decision Rule

When the p-value is below $\alpha=0.10$, reject H_0.

F-statistic (p-value) = 0.0000

Decision Making

The p-value (0.0000) is below $\alpha=0.10$, reject H_0.

Conclusion

The result is sufficient evidence to prove that the model is significantly affecting the GDP of China at a significance level of 10%.

4.2.2 T-statistic

Hypothesis

H_0= No significant relationship whereby β=0

H_1= Significant relationship whereby β≠0

Significance level

α = 0.10

Decision Rule

When the p-value is below α=0.10, reject H_0.

4.2.2.1 Exchange Rate (EXCH)

$H_0: \beta_1 = 0$

$H_1: \beta_1 \neq 0$

Decision Rule

When the p-value is below α=0.10, reject H_0.

Decision Making

The p-value (0.0000) is below α = 0.10, reject H_0

Conclusion

The result is sufficient evidence to prove that the exchange rate is significantly affecting the GDP of China at a significance level of 10%.

4.2.2.2 FDI Net Inflow

$H_0: \beta_1 = 0$

$H_1: \beta_1 \neq 0$

Decision Rule

When the p-value is below α=0.10, reject H_0.

Decision Making

The p-value (0.0063) is below α = 0.10, reject H_0

Conclusion

The result is sufficient evidence to prove that FDI (net inflow) is significantly affecting the GDP of China at a significance level of 10%.

4.2.2.3 Human Capital

$H_0: \beta_1 = 0$

$H_1: \beta_1 \neq 0$

Decision Rule

When the p-value is below α=0.10, reject H_0.

Decision Making

The p-value (0.0000) is below α = 0.10, reject H_0

Conclusion

The result is sufficient evidence to prove that human capital is significantly affecting the GDP of China at a significance level of 10%.

4.2.2.4 Net Export

$H_0: \beta_1 = 0$

$H_1: \beta_1 \neq 0$

When the p-value is below α=0.10, reject H_0.

Decision Making

The p-value (0.2213) is above α = 0.10, reject H_0

Conclusion

The result is sufficient evidence to prove that net export is insignificantly affecting the GDP of China at a significance level of 10%.

4.2.2.5 Technology Advancement

$H_0: \beta_1 = 0$

$H_1: \beta_1 \neq 0$

Decision Rule

When the p-value is below α=0.10, reject H_0.

Decision Making

The p-value (0.0010) is below α = 0.10, reject H_0

Conclusion

The result is sufficient evidence to prove that technology advancement is significantly affecting the GDP of China at a significance level of 10%.

4.3 Diagnostic Checking

4.3.1 Jarque-Bera Normality Test (JB Test)

Table 4.2: Summary of Jarque-Bera Normality Test Results

N	33
Skewness	0.997161
Kurtosis	4.343451
Jarque-Bera	7.950498
Probability	0.018775

Significance level = 0.10

Hypothesis

H_0: The error terms are normally distributed.

H_1: The error terms are not normally distributed.

Significance level

$\alpha = 0.10$

Decision Rule

When the p-value is below $\alpha=0.10$, reject H_0.

Decision Making

The p-value (0.018775) is below $\alpha = 0.10$, reject H_0

Conclusion

The result is sufficient evidence to prove that the model is not normally distributed

4.3.2 Multicollinearity Test

Table 4.3: Summary of Multicollinearity Test Results

	FDI	NX	EXCH	HUMAN	TFP
FDI	1.0000	0.7257	0.8125	0.9725	0.9047
NX		1.0000	0.4663	0.8023	0.7964
EXCH			1.0000	0.7419	0.5253
HUMAN				1.0000	0.9264
TFP					1.0000

The correlation matrix is to indicate whether an independent variable affects other independent variables in the regression model. The value range of correlation matrix is from -1 to +1 which -1 refers to negative perfect multicollinearity while +1 refers to positive perfect multicollinearity. Based on the table of the correlation matrix of independent variables we obtained through E-views. We can observe that there is a strong correlation between independent variables which exchange rate and FDI; human capital and FDI; human capital and net export; total factors productivity and foreign direct investment; and total factor productivity and human capital are suffering from serious multicollinearity issues.

4.3.3 Model Specification Error Test

Table 4.4: Summary of Ramsey RESET Test Results

	Value	df	Probability
T-statistic	6.218039	26	0.0000
F-statistic	38.66401	(1,26)	0.0000
Likelihood ratio	30.06657	1	0.0000

Model specification error occurs due to the misspecification in the regression model. We performed the Ramsey RESET test and captured its result from E-views. The Ramsey RESET Test's step is shown below.

H_0: Model specification is correct

H_1: Model specification is incorrect

Decision Rules

When p-value is below $\alpha = 0.10$, reject H_0

p-value: 0.0000

Decision making

As p-value is smaller than α, we reject H_0. Hereby, we can conclude that the model specification in our regression model is incorrect.

4.3.4 Heteroscedasticity Test

Table 4.5: Summary of Heteroscedasticity Test Results

No. of lag	Probability	AIC	SIC
LAG=1	0.0567	-4.892366	-4.800758
LAG=2	0.1689	-4.796809	-4.658036
LAG=3	0.2569	-4.724174	-4.537347
LAG=4	0.4213	-4.625677	-4.389937

Presence of heteroscedasticity in a regression model indicating that the variance of error terms are unequal. We carried out Autoregressive Conditional Heteroscedasticity (ARCH) Test up until lag length equals to four to identify the presence of heteroscedasticity in the regression model. The table above shows the result of ARCH Test. The step of ARCH Test is shown below.

H_0: The variance of the error term in the regression model is constant.

H_1: The variance of the error term in the regression model is not constant.

Decision Rules: Reject H_0 when the p-value is smaller than α, 0.10.

$P\text{-value}_{\text{lag length=1}}$: 0.0567

$P\text{-value}_{\text{lag length=2}}$: 0.1689

$P\text{-value}_{\text{lag length=3}}$: 0.2569

$P\text{-value}_{\text{lag length=4}}$: 0.4213

The table above shows the p-value of the test under four different lag length. We can conclude that there is heteroscedasticity problem when lag length equals to one meanwhile there is no sign of heteroscedasticity in the regression model from lag length equals to two until lag length equals to four.

4.3.5 Autocorrelation Test

Table 4.6: Summary of Autocorrelation Test Results

	Probability	AIC	SIC
LAG=1	0.0002	-1.778520	-1.461079
LAG=2	0.0002	-1.841499	-1.478709
LAG=3	0.0008	-1.780965	-1.372827
LAG=4	0.0023	-1.732028	-1.278541

Autocorrelation is a common problem in a regression model with time series data. To capture the presence of autocorrelation in the regression model, we required to perform Breush-Godfrey Serial Correlation LM Test with four different lag length, the result of the test from E-views are collect and present in the table above.

H_0: There is no autocorrelation problem.

H_1: There is an autocorrelation problem.

Decision Rules: When p-value is below $\alpha = 0.10$, reject H_0

p $value_{lag\ length=1}$: 0.0002

p $value_{lag\ length=2}$: 0.0002

p $value_{lag\ length=3}$: 0.0008

p $value_{lag\ length=4}$: 0.0023

According to table 4.7, by comparing the p-value of the test under four different lag length. We can conclude that there is autocorrelation problem for all different lag length.

4.3.6 Granger Causality Test

Granger causality test is used to examine the causal relationship between the variables. The test results are as follow:

Table 4.7: Summary of Granger Causality Test Results

Variable X	Variable Y	Significance level, α	P-value	Decision	Conclusion
GDP	EXCH	0.05	0.0586	Do not reject H_0	Granger cause does not exist
GDP	FDI	0.05	0.8266	Do not reject H_0	Granger cause does not exist
GDP	HUMAN	0.05	0.1115	Do not reject H_0	Granger cause does not exist
GDP	NX	0.05	0.0026	Reject H_0	GDP granger cause NX
GDP	TFP	0.05	0.0078	Reject H_0	GDP granger cause TFP

The Granger causality test found that the exchange rate, FDI net inflow and the human capital are not Granger cause by economic growth. However, the economic growth is having a granger cause to net export and total factor productivity.

4.3.7 Unit Root Test

Table 4.8: Summary of Unit Root Test Results

Trend and intercept						
	LEVEL		1st difference		2nd difference	
Variables	t-statistic	p-value	t-statistic	p-value	t-statistic	p-value
GDP	-1.750809	0.7046	-5.280555	0.0009	-7.419487	0.0000
EXCH	-1.739864	0.7097	-6.641220	0.0000	-7.442292	0.0000
FDI	-2.122279	0.5139	-4.167022	0.0132	-3.325989	0.0851
HUMAN	-5.117515	0.0021	-1.675759	0.7379	-5.207511	0.0011
NX	-4.957795	0.0019	-7.760876	0.0000	-4.636902	0.0059
TFP	-1.427087	0.8332	-3.630102	0.0434	-7.952125	0.0000

Unit root problem can be known as the non-stationary of time series data. To identify the presence of unit root, we performed Augmented Dickey-Fuller Unit Root Test in level, 1st difference and 2nd difference. The result of the test is tabulated and shown above.

H_0: There is a unit root or non-stationary.

H_1: There is no unit root or stationary.

Decision rule: When p-value is below α=0.10, reject H_0.

Table 4.9: Summary of Decisions on Unit Root Test Results

Decision (Reject H_0 if p value < α)						
	LEVEL		1st difference		2nd difference	
Variables	p-value	Decision	p-value	Decision	p-value	Decisions
GDP	0.7046	Do not reject	0.0009	Reject	0.0000	Reject
EXCH	0.7097	Do not reject	0.0000	Reject	0.0000	Reject
FDI	0.5139	Do not reject	0.0132	Reject	0.0851	Reject
HUMAN	0.0021	Reject	0.7379	Do not reject	0.0011	Reject
NX	0.0019	Reject	0.0000	Reject	0.0059	Reject
TFP	0.8332	Do not reject	0.0434	Reject	0.0000	Reject

Based on the test above, we can conclude that data of human capital and net export are non-stationary using ADF Unit Root Test in level. The result of ADF Unit Root Test in 1st difference shows that data of all independent variables except human capital are non-stationary while the result of Augmented Dickey-Fuller Unit Root Test in 2nd difference shows that all data in the regression model are non-stationary.

4.4 Summary of Results

Table 4.10: Summary of Hypotheses Results

Empirical Test	Result
Overall F-statistic	The model is significant to explain the economic growth
T-statistic	EXCH – significant FDI – significant HUMAN – significant NX – insignificant TFP – significant
Jarque-Bera Normality test	The model is not normally distributed
Multicollinearity	HUMAN and FDI, HUMAN and NX, EXCH and FDI, TFP and FDI, TFP and HUMAN are having a strong positive multicollinearity
Ramsey RESET test (Model specification test)	The model specification is incorrect
Heteroscedasticity test (ARCH test)	There is no heteroscedasticity problem in this model
Autocorrelation test (Breusch-Godfrey Serial Correlation LM test)	There is autocorrelation problem in this model
Granger causality test	GDP has ganger cause on NX and TFP

Unit Root Test (Augmented Dickey-Fuller Test)	
Trend and intercept	
Level	All variables are stationary and do not have unit root except human capital and net export
First Difference	All variables are stationary and do not have unit root except human capital
Second Difference	All variables are non-stationary

4.5 Conclusion

We have examined the relationship between the globalization factors and economic growth in this chapter. Furthermore, there are five diagnostic testing carried out in this chapter such as normality test, multicollinearity, model specification test, heteroscedasticity test and autocorrelation test. Moreover, the significant relationship between the effects of globalization (independent variable) and the economic growth of China (GDP) are determined by the F-statistic and T-statistic hypothesis. Lastly, the unit root test is carried out to test the variables are stationary or non-stationary.

CHAPTER 5: DISCUSSION, CONCLUSION AND IMPLICATIONS

5.0 Introduction

The main purpose of this research is to figure out that the globalization's impact on China's economic growth based on 33 observations from the independent variables that we choose for this research. The independent variables included exchange rate, foreign direct investment, human capital, net export and also technology advancement. In the last chapter, we will conduct our findings from the chapter above and recommend some of the opinions towards policy implication. Furthermore, we will also list out the delimitations during research and give some suggestion in order to overcome those delimitations.

5.1 Discussion on Major Findings

This research study was conducted to indicate the relationship between the economic growth represented by Gross Domestic Product (GDP) of China and its macroeconomic factors. The independent variables are the macroeconomic factors which include human capital, exchange rate, foreign direct investment (FDI), net export and technology advancement of China; while the dependent variable is GDP of China.

Some of the relevant tests have been conducted as per the table below. Our research study has conducted some tests in order to examine the relationship among the dependent variable and independent variables.

Table 5.1: Summary of Diagnostic Checking

Dependent Variable	**Independent Variable**	**Significance Level**	**Expected Sign**	**Results**
GDP	EXCH	0.1	Significant	Significant Negative
GDP	FDI	0.1	Significant	Significant Positive
GDP	HUMAN	0.1	Significant	Significant Positive
GDP	NX	0.1	Significant	Insignificant
GDP	TFP	0.1	Significant	Significant Positive

From this empirical result, it has shown that all the macroeconomic factors are a significant relationship with the economic growth of China except the net export.

5.1.1 Exchange Rate and GDP of China

According to the output estimation obtained from multiple linear regressions, the exchange rate shows that a negative significant relationship with the GDP of China. It has meant that when the exchange rate of China increases, the GDP of China will decrease. Our result outcome also supported by Habib, Mileva and Stracca (2017) and mentioned that there is a negative relationship between exchange rate and economic growth per capita. This is because when currency's value decreases, export of goods in a particular nation will increase. Furthermore, the decrease in value of exchange rate can improve output and also economic growth significantly. Therefore, the value of the exchange rate

or value of currency decrease will due to the GDP of China increase because of the export of goods increase.

5.1.2 Foreign Direct Investment and GDP of China

Based on the Multiple Linear Regression Analysis, we had found that there is a positive relationship between foreign direct investment (FDI) and the GDP of China. According to our research study, the FDI increase will increase the economic growth of China. FDI is an investment that invests by an individual investor or firm in one country into another country's business interests. Based on our research outcome, it also the same conclusion of the past study done by Har, Teo and Yee (2008) and mentioned that FDI is one of the important sources of economic growth for developing countries and also developed countries. This is because the foreign direct investment inflows had a significantly positive impact on economic growth. However, the higher the GDP rate of the host country also would increase the FDI inflows. We also found from our research outcome that there is a causality relationship between FDI and economic growth. The higher GDP rates of the host country would increase their FDI inflows because the higher the GDP rates mean that the host countries had strong economic growth and would attract more foreign investors to invest in the host country. Thus, FDI inflows increase would enhance the economic growth of China.

5.1.3 Human Capital and GDP of China

According to the result that we found from Multiple Linear Regression Analysis, human capital and GDP of China have a positive significant relationship. As degree of literacy is one of the major determinant in economic growth, people who possess higher education level able to significantly influence economic output than those people who do not. This is because people with higher education are more adaptive to new technology and able to operate a new machine and technology efficiently. In addition, the past study of Ali, Egbetokun, Memon (2018) had same conclusion with our outcome and stated that there is a positive relationship between human capital and economic growth rate as labor who are in possession of high skill, creativity, innovative are crucial in order for better economy, productivity, and efficiency. Therefore, it is important to increase the overall literacy level of people in China so that people can adapt to the globalized economy structure and enhance the GDP of China.

5.1.4 Net Export and GDP of China

According to Multiple Linear Regression Analysis, net export of China appears to have an insignificant relationship with GDP of China. Net export has no impact on the GDP of China but the exchange rate of Yuan or the currency value of China apparently does impact on GDP of China as the findings of this study indicated. This is because the exchange rate or currency value will affect the export and import of that country and then affect the GDP (Habib et. al, 2017). Therefore, the study concludes that not the net export effect the GDP of China. However, the main reason for affecting the GDP of China is the exchange rate.

5.1.5 Technology Advancement and GDP of China

Based on the results from the multiple linear regression, it showed that Technology advancement (TPF) has a positive significant relationship with GDP of China. It was represented that technology advancement would affect the economic growth of China. According to the past study of Jean and Thomson (2006), it has proved our result outcome that income per capita decrease would due to the negative growth rate of TFP. In addition, in order to foster economic growth, technology advancement is the key to create a successful innovation system that requires focus, attention and institutional creativity (Jeffrey & John, 2002). Technology advancement facilitates economic growth from various aspect such as increase production efficiency, speed up transportation meanwhile reducing transportation cost, enhance product quality thereby contribute to the welfare of the world. Therefore, technology advancement will affect significantly the economic growth of China.

5.2 Policy Implications

In this research, we had investigated the relationship between independent variables included the exchange rate, foreign direct investment (FDI), human capital, net export and technology advancement which influence towards Gross Domestic Production (GDP) of China. As a matter of fact, the growth of China had implemented by the substitution of the independent variable significantly.

Based on the result of Ordinary Least Square regression model and Diagnostic test that our group had made in the previous chapter, Gross Domestic Product (GDP) has impacted significantly towards human capital. To have a better picture of how the economic growth rate in China does during globalization affected that

determinant mention above, China's economic play as an important role in human capital. During the year 1999 and above, human capital in China had speed up structurally comes with the improvement of education level. This shows that the effect the human capital development, the better the China economic growth rate in the result.

Besides that, our findings on research show that foreign direct investment has a significant relationship with gross of Domestic Production (GDP) in China. In the year 1990, China came out with a based financial background with 19 billion before implement foreign direct investment and goes up to 300 billion during the year 1999 after implementing FDI. By bringing out FDI, China had successfully become the guidance towards all of the developing country. Not only that, but China had also become the second strongest among all of the Asia Pacific Economic Cooperation (APEC) nation. This due to FDI in China involves a bigger Greenfield investment, while comparing with the United States, China had more utilize by extending those in existence firm than establish a new firm. FDI in China has been extended towards Asia except for Japan. One of the best examples, Hong Kong shows that it is the biggest source of FDI due to Hong Kong is a mostly self-governing "special autonomous area" for China itself.

Moreover, technology advancement also shows a significant relationship impact the economic growth rate of China. Over the past three eras, China facing the different matter of debate. Most of the matter dispute that China had impact efficiency with technology advancement. It has been distributed into three different structure of governance. For national governance, it should modernize those organization and summarize out innovation in order to perform a guidebook for policymakers. For provincial supervisor, technology advancement may be the best standpoint to observe where the infrastructure may be the best option to utilize it. For that official who stay in local, they may always keep in touch with entrepreneur so that the resources may be fully utilized in production.

Last but not least, the testing result shows that exchange rate is negative significantly related to China economy growth rate. China had faced three different major problems which involved a global trading problem, the undulation of the stock market, and the level of foreign exchange. However, there are some possibilities in order to overcome or control the problem that stated in China exchange rate. Loosen the fixed rate might be one of the solutions. In the long-term situation, China always comes with a sternly controlled over the currency policy that may face a problem which limits the growth of economy. To solve the problem, the government of China may widen the band of trading. Forming of union and entering a free trade agreement with other nation help to facilitate and foster the economy growth in China. Besides government invention, China exchange rate can also be affected by global demand and supply forces. During the year 1980s to 1990s, China applied an open economy strategy for foreign investment, it helps the government can easily put or short the currency via interbank market as well as controlling the nation's foreign reserve to control the currency rate at an optimum level.

5.3 Limitations of the Study

5.3.1 Insufficient Sample Size Data

Based on the research, the sample that we use consists of 33 sample size from five different independent variables which is from the year 1998 to the year 2014. The reason that we did not choose a large amount of sample size is due to the sample size available of each of the independent variable obtain from data sources is not adequate. This is due to China had just published "Open Door Policy" in the early 20th century which is in the

year 1979. This is one of the reasons that we could not adequate the sample size from a different independent variable.

5.3.2 Limitations of Linear Regression Model

When we considering linear relationships between the independent variables and the dependent variable, linear regression method technically is not the best model specification because there are no such optimal situations in reality (Dowling and Reinke, 2008). In ecology, the theory sometime will difference with practical and the data is seldom modeled adequately by the regression model, which have to fulfil a whole series of assumptions, including normality, homoscedasticity, fixed X (explanatory variables), independence, and no model specification bias. The model arises problem and needs to reject when all the assumption is violated (Schneider, Hommel & Blettner, 2010). Besides, the linear regression method also will build a problem when taking into consideration of modeling a non-linear relationships variable

5.4 Recommendations for Future Research

For the limitation of data sample size, we recommend that all of the independent variables may always keep updated frequently so that for those future researches can be able to involve a larger amount of data sample size for each of independent variables. This is because smaller data sample size may hard for us to carry out the research. Based on the research, it will be better if the sample size is more than 33 in order to avoid the lack of research and test running while doing the research.

This also may help another researcher when they face the same problem so they may have an easier way to conduct their study.

On the other hand, I would recommend that future researcher may use another model rather than a linear regression model. There are several solutions that may resolve the limitation. For the problem of heteroscedasticity, we may use either allocate other variances in the linear regression model or applied different distribution and model structure such as Gamma distributions in GLM. Besides, we also can use models that more flexibility than regression which is smoothing methods or a model for the error structure to fixed dependence problem. Furthermore, data and random effects also need to consider. With using these techniques, generalized linear mixed model (GLMM) and generalized additive mixed model (GAMM) that generalized by mixed modeling approach and combined with GLM and GAM. Besides that, Generalized Least Squares (GLS) Model and Feasible Generalized Least Squares (FGLS) Model are also alternatives which could help to overcome the econometric problems.

5.5 Conclusion

This chapter provides a major finding regarding the comparison and relationship between the dependent variables and the independent variable. Based on the major findings, we conclude that there is a significant positive relationship between the dependent variables which is economic growth rate in China and those independent variables which are foreign direct investment, human capital, and also technology advancement. This shows that the problem statement has been proved through the outcome of our research. Besides that, there is a significant negative relationship between the exchange rate and economic growth rate in China. Meanwhile, there is no significant relationship between net export and economic growth rate in China. Furthermore, the outcome that we found also approved with our research theoretical model which are Endogenous Growth

Model and also purchasing power parity. Endogenous Growth Model provides the new technology (technology advancement) which would enhance economic growth effectively. As purchasing power parity suggested that depreciation in exchange rate help to facilitate a nation's economic growth. The significance of the independent variable, the exchange rate proved that purchasing power parity theory can be applied in China's economic growth.

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APPENDICES

Appendix 4.1: Hypothesis Testing

Appendix 4.1.1: Ordinary Least Square (OLS) Outcome

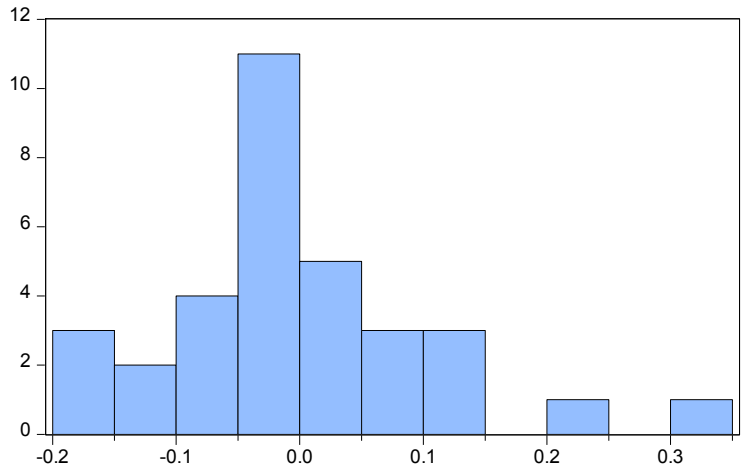
Dependent Variable: LCHINA_GDP_MILLION_USD_
Method: Least Squares
Date: 03/03/19 Time: 19:10
Sample: 1982 2014
Included observations: 33

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LEXCHANGE_RATE	-1.008643	0.161979	-6.226990	0.0000
LFDI_NETFLOW	0.244521	0.082604	2.960154	0.0063
LNET_EXPORT	0.029630	0.023666	1.252004	0.2213
LHUMAN_CAPITAL	5.930006	1.016208	5.835424	0.0000
LTFP__RATIO_	1.314813	0.504520	2.606065	0.0147
C	5.883296	1.595375	3.687721	0.0010

R-squared	0.991359	Mean dependent var	14.00787
Adjusted R-squared	0.989759	S.D. dependent var	1.161813
S.E. of regression	0.117572	Akaike info criterion	-1.280559
Sum squared resid	0.373228	Schwarz criterion	-1.008467
Log likelihood	27.12922	Hannan-Quinn criter.	-1.189008
F-statistic	619.5443	Durbin-Watson stat	0.711756
Prob(F-statistic)	0.000000		

Appendix 4.2: Diagnostic Checking

Appendix 4.2.1: Jarque-Bera Test (Normality Test)



Series: Residuals
Sample 1982 2014
Observations 33

Mean	-3.97e-15
Median	-0.018839
Maximum	0.329581
Minimum	-0.164342
Std. Dev.	0.107997
Skewness	0.997161
Kurtosis	4.343451
Jarque-Bera	7.950498
Probability	0.018775

Appendix 4.2.2: Multicollinearity Test Outcome

Correlation coefficients, using the observations 1982 - 2014
5% critical value (two-tailed) = 0.3440 for n = 33

l_FDINetflow	l_Netexport	l_Exchangerate	l_humancapital	l_TFPratio	
1.0000	0.7257	0.8125	0.9725	0.9047	l_FDINetflow
	1.0000	0.4663	0.8023	0.7964	l_Netexport
		1.0000	0.7419	0.5253	l_Exchangerate
			1.0000	0.9264	l_humancapital
				1.0000	l_TFPratio

Appendix 4.2.3: Model Specification Error Test (Ramsey RESET)

Ramsey RESET Test
Equation: EQ01
Specification: LCHINA_GDP_MILLION_USD_ LEXCHANGE_RATE LFDI_NETFLOW LHUMAN_CAPITAL LTFP__RATIO_ LNET_EXPORT C
Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	6.218039	26	0.0000
F-statistic	38.66401	(1, 26)	0.0000
Likelihood ratio	30.06657	1	0.0000

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	0.223161	1	0.223161
Restricted SSR	0.373228	27	0.013823
Unrestricted SSR	0.150067	26	0.005772

LR test summary:

	Value
Restricted LogL	27.12922
Unrestricted LogL	42.16251

Unrestricted Test Equation:
Dependent Variable: LCHINA_GDP_MILLION_USD_
Method: Least Squares
Date: 03/03/19 Time: 19:25
Sample: 1982 2014
Included observations: 33

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LEXCHANGE_RATE	3.234205	0.690326	4.685041	0.0001
LFDI_NETFLOW	-0.733107	0.166038	-4.415297	0.0002
LHUMAN_CAPITAL	-16.45520	3.659440	-4.496646	0.0001
LTFP_RATIO	-4.487082	0.988388	-4.539800	0.0001
LNET_EXPORT	-0.090464	0.024635	-3.672143	0.0011
C	9.592009	1.191001	8.053734	0.0000
FITTED^2	0.138096	0.022209	6.218039	0.0000

R-squared	0.996526	Mean dependent var	14.00787
Adjusted R-squared	0.995724	S.D. dependent var	1.161813
S.E. of regression	0.075972	Akaike info criterion	-2.131061
Sum squared resid	0.150067	Schwarz criterion	-1.813620
Log likelihood	42.16251	Hannan-Quinn criter.	-2.024252
F-statistic	1242.932	Durbin-Watson stat	1.267206
Prob(F-statistic)	0.000000		

Appendix 4.2.4: Autoregressive Conditional Heteroscedasticity (ARCH) Test

Appendix 4.2.4.1: ARCH Test – 32 Observations

Heteroskedasticity Test: ARCH

F-statistic	3.927797	Prob. F(1,30)	0.0567
Obs*R-squared	3.704617	Prob. Chi-Square(1)	0.0543

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 03/03/19 Time: 19:14
Sample (adjusted): 1983 2014
Included observations: 32 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.007765	0.004080	1.903168	0.0667
RESID^2(-1)	0.339277	0.171191	1.981867	0.0567

R-squared	0.115769	Mean dependent var	0.011589
Adjusted R-squared	0.086295	S.D. dependent var	0.021275
S.E. of regression	0.020336	Akaike info criterion	-4.892366
Sum squared resid	0.012407	Schwarz criterion	-4.800758
Log likelihood	80.27786	Hannan-Quinn criter.	-4.862001
F-statistic	3.927797	Durbin-Watson stat	1.961647
Prob(F-statistic)	0.056721		

Appendix 4.2.4.2: ARCH Test – 31 Observations

Heteroskedasticity Test: ARCH

F-statistic	1.896283	Prob. F(2,28)	0.1689
Obs*R-squared	3.698020	Prob. Chi-Square(2)	0.1574

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 03/03/19 Time: 19:15
Sample (adjusted): 1984 2014
Included observations: 31 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.007809	0.004519	1.728028	0.0950
RESID^2(-1)	0.356576	0.188600	1.890643	0.0691
RESID^2(-2)	-0.038760	0.188273	-0.205873	0.8384

R-squared	0.119291	Mean dependent var	0.011486
Adjusted R-squared	0.056383	S.D. dependent var	0.021618
S.E. of regression	0.021000	Akaike info criterion	-4.796809
Sum squared resid	0.012348	Schwarz criterion	-4.658036
Log likelihood	77.35054	Hannan-Quinn criter.	-4.751573
F-statistic	1.896283	Durbin-Watson stat	1.987164
Prob(F-statistic)	0.168910		

Appendix 4.2.4.3: ARCH Test – 30 Observations

Heteroskedasticity Test: ARCH

F-statistic	1.429180	Prob. F(3,26)	0.2569
Obs*R-squared	4.246836	Prob. Chi-Square(3)	0.2360

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 03/03/19 Time: 19:15
Sample (adjusted): 1985 2014
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.009336	0.004896	1.906696	0.0677
RESID^2(-1)	0.356789	0.192976	1.848882	0.0759
RESID^2(-2)	0.003598	0.205047	0.017547	0.9861
RESID^2(-3)	-0.145594	0.192829	-0.755039	0.4570

R-squared	0.141561	Mean dependent var	0.011825
Adjusted R-squared	0.042511	S.D. dependent var	0.021904
S.E. of regression	0.021433	Akaike info criterion	-4.724174
Sum squared resid	0.011944	Schwarz criterion	-4.537347
Log likelihood	74.86260	Hannan-Quinn criter.	-4.664406
F-statistic	1.429180	Durbin-Watson stat	2.032661
Prob(F-statistic)	0.256881		

Appendix 4.2.4.4: ARCH Test – 29 Observations

Heteroskedasticity Test: ARCH

F-statistic	1.011247	Prob. F(4,24)	0.4213
Obs*R-squared	4.182730	Prob. Chi-Square(4)	0.3818

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 03/03/19 Time: 19:16
Sample (adjusted): 1986 2014
Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.010435	0.005466	1.909125	0.0683
RESID^2(-1)	0.336624	0.202782	1.660031	0.1099
RESID^2(-2)	0.012462	0.212822	0.058555	0.9538
RESID^2(-3)	-0.127724	0.212813	-0.600168	0.5540
RESID^2(-4)	-0.073744	0.201925	-0.365203	0.7182

R-squared	0.144232	Mean dependent var	0.012233
Adjusted R-squared	0.001604	S.D. dependent var	0.022175
S.E. of regression	0.022158	Akaike info criterion	-4.625677
Sum squared resid	0.011783	Schwarz criterion	-4.389937
Log likelihood	72.07232	Hannan-Quinn criter.	-4.551846
F-statistic	1.011247	Durbin-Watson stat	2.022283
Prob(F-statistic)	0.421269		

Appendix 4.2.5: Breusch-Godfrey Serial Correlation LM Test (Autocorrelation)

Appendix 4.2.5.1: Breusch-Godfrey Serial Correlation LM Test – 1 lag

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 1 lag

F-statistic	19.45229	Prob. F(1,26)	0.0002
Obs*R-squared	14.12306	Prob. Chi-Square(1)	0.0002

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 03/03/19 Time: 19:11
Sample: 1982 2014
Included observations: 33
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LEXCHANGE_RATE	0.069509	0.125834	0.552385	0.5854
LFDI_NETFLOW	-0.027526	0.063971	-0.430284	0.6705
LNET_EXPORT	-0.008274	0.018337	-0.451229	0.6556
LHUMAN_CAPITAL	-0.219630	0.784807	-0.279852	0.7818
LTFP__RATIO_	0.372669	0.397925	0.936531	0.3576
C	0.840389	1.244284	0.675400	0.5054
RESID(-1)	0.685751	0.155482	4.410475	0.0002

R-squared	0.427972	Mean dependent var	-3.97E-15
Adjusted R-squared	0.295965	S.D. dependent var	0.107997
S.E. of regression	0.090617	Akaike info criterion	-1.778520
Sum squared resid	0.213497	Schwarz criterion	-1.461079
Log likelihood	36.34557	Hannan-Quinn criter.	-1.671710
F-statistic	3.242049	Durbin-Watson stat	1.575356
Prob(F-statistic)	0.016312		

Appendix 4.2.5.2: Breusch-Godfrey Serial Correlation LM Test – 2 lags

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 2 lags

F-statistic	12.22663	Prob. F(2,25)	0.0002
Obs*R-squared	16.31758	Prob. Chi-Square(2)	0.0003

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 03/03/19 Time: 19:12
Sample: 1982 2014
Included observations: 33
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LEXCHANGE_RATE	-0.027414	0.131945	-0.207770	0.8371
LFDI_NETFLOW	0.016380	0.065935	0.248435	0.8058
LNET_EXPORT	-0.009860	0.017601	-0.560196	0.5803
LHUMAN_CAPITAL	-0.160670	0.753092	-0.213347	0.8328
LTFP__RATIO_	0.057713	0.419162	0.137687	0.8916
C	-0.172333	1.317135	-0.130839	0.8969
RESID(-1)	0.903714	0.191481	4.719608	0.0001
RESID(-2)	-0.384200	0.211860	-1.813467	0.0818

R-squared	0.494472	Mean dependent var	-3.97E-15
Adjusted R-squared	0.352924	S.D. dependent var	0.107997
S.E. of regression	0.086874	Akaike info criterion	-1.841499
Sum squared resid	0.188677	Schwarz criterion	-1.478709
Log likelihood	38.38473	Hannan-Quinn criter.	-1.719431
F-statistic	3.493322	Durbin-Watson stat	1.975185
Prob(F-statistic)	0.009479		

Appendix 4.2.5.3: Breusch-Godfrey Serial Correlation LM Test – 3 lags

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 3 lags

F-statistic	7.826192	Prob. F(3,24)	0.0008
Obs*R-squared	16.31879	Prob. Chi-Square(3)	0.0010

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 03/03/19 Time: 19:12
Sample: 1982 2014
Included observations: 33
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LEXCHANGE_RATE	-0.025584	0.141607	-0.180671	0.8581
LFDI_NETFLOW	0.015324	0.071890	0.213156	0.8330
LNET_EXPORT	-0.009649	0.018659	-0.517130	0.6098
LHUMAN_CAPITAL	-0.159827	0.768859	-0.207875	0.8371
LTFP__RATIO_	0.063779	0.451764	0.141178	0.8889
C	-0.149761	1.448775	-0.103371	0.9185
RESID(-1)	0.906607	0.207330	4.372762	0.0002
RESID(-2)	-0.390769	0.267355	-1.461615	0.1568
RESID(-3)	0.010456	0.250284	0.041775	0.9670

R-squared	0.494509	Mean dependent var	-3.97E-15
Adjusted R-squared	0.326012	S.D. dependent var	0.107997
S.E. of regression	0.088662	Akaike info criterion	-1.780965
Sum squared resid	0.188664	Schwarz criterion	-1.372827
Log likelihood	38.38593	Hannan-Quinn criter.	-1.643639
F-statistic	2.934822	Durbin-Watson stat	1.978518
Prob(F-statistic)	0.019490		

Appendix 4.2.5.4: Breusch-Godfrey Serial Correlation LM Test – 4 lags

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 4 lags

F-statistic	5.758586	Prob. F(4,23)	0.0023
Obs*R-squared	16.51231	Prob. Chi-Square(4)	0.0024

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 03/03/19 Time: 19:13
Sample: 1982 2014
Included observations: 33
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LEXCHANGE_RATE	-0.040664	0.146710	-0.277174	0.7841
LFDI_NETFLOW	0.025545	0.075612	0.337835	0.7386
LNET_EXPORT	-0.013867	0.020616	-0.672671	0.5079
LHUMAN_CAPITAL	-0.152545	0.780952	-0.195332	0.8468
LTFP__RATIO_	0.004479	0.472779	0.009474	0.9925
C	-0.376804	1.534846	-0.245499	0.8082
RESID(-1)	0.912153	0.210828	4.326526	0.0002
RESID(-2)	-0.438965	0.286924	-1.529899	0.1397
RESID(-3)	0.082258	0.289318	0.284316	0.7787
RESID(-4)	-0.132996	0.255972	-0.519570	0.6083

R-squared	0.500373	Mean dependent var	-3.97E-15
Adjusted R-squared	0.304867	S.D. dependent var	0.107997
S.E. of regression	0.090042	Akaike info criterion	-1.732028
Sum squared resid	0.186475	Schwarz criterion	-1.278541
Log likelihood	38.57846	Hannan-Quinn criter.	-1.579443
F-statistic	2.559371	Durbin-Watson stat	1.985853
Prob(F-statistic)	0.033316		

Appendix 4.2.6: Granger Causality Test

Pairwise Granger Causality Tests
Date: 03/03/19 Time: 19:44
Sample: 1982 2014
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
LEXCHANGE_RATE does not Granger Cause LCHINA_GDP_MILLION_USD_	31	1.43364	0.2567
LCHINA_GDP_MILLION_USD_ does not Granger Cause LEXCHANGE_RATE		3.17004	0.0586
LFDI_NETFLOW does not Granger Cause LCHINA_GDP_MILLION_USD_	31	1.29058	0.2922
LCHINA_GDP_MILLION_USD_ does not Granger Cause LFDI_NETFLOW		0.19186	0.8266
LHUMAN_CAPITAL does not Granger Cause LCHINA_GDP_MILLION_USD_	31	1.56215	0.2287
LCHINA_GDP_MILLION_USD_ does not Granger Cause LHUMAN_CAPITAL		2.38995	0.1115
LTFP__RATIO_ does not Granger Cause LCHINA_GDP_MILLION_USD_	31	4.71340	0.0179
LCHINA_GDP_MILLION_USD_ does not Granger Cause LTFP__RATIO_		5.88861	0.0078
LNET_EXPORT does not Granger Cause LCHINA_GDP_MILLION_USD_	31	8.88330	0.0011
LCHINA_GDP_MILLION_USD_ does not Granger Cause LNET_EXPORT		7.56055	0.0026
LFDI_NETFLOW does not Granger Cause LEXCHANGE_RATE	31	2.68145	0.0873
LEXCHANGE_RATE does not Granger Cause LFDI_NETFLOW		0.54505	0.5863
LHUMAN_CAPITAL does not Granger Cause LEXCHANGE_RATE	31	3.10189	0.0619
LEXCHANGE_RATE does not Granger Cause LHUMAN_CAPITAL		0.03080	0.9697
LTFP__RATIO_ does not Granger Cause LEXCHANGE_RATE	31	2.62136	0.0918
LEXCHANGE_RATE does not Granger Cause LTFP__RATIO_		0.86514	0.4328
LNET_EXPORT does not Granger Cause LEXCHANGE_RATE	31	12.6019	0.0001
LEXCHANGE_RATE does not Granger Cause LNET_EXPORT		2.86493	0.0751
LHUMAN_CAPITAL does not Granger Cause LFDI_NETFLOW	31	1.99817	0.1559
LFDI_NETFLOW does not Granger Cause LHUMAN_CAPITAL		1.46783	0.2489
LTFP__RATIO_ does not Granger Cause LFDI_NETFLOW	31	1.82986	0.1805
LFDI_NETFLOW does not Granger Cause LTFP__RATIO_		0.35844	0.7022
LNET_EXPORT does not Granger Cause LFDI_NETFLOW	31	1.35923	0.2745
LFDI_NETFLOW does not Granger Cause LNET_EXPORT		11.9577	0.0002
LTFP__RATIO_ does not Granger Cause LHUMAN_CAPITAL	31	1.48929	0.2441
LHUMAN_CAPITAL does not Granger Cause LTFP__RATIO_		2.10072	0.1427
LNET_EXPORT does not Granger Cause LHUMAN_CAPITAL	31	0.25436	0.7773
LHUMAN_CAPITAL does not Granger Cause LNET_EXPORT		10.6929	0.0004
LNET_EXPORT does not Granger Cause LTFP__RATIO_	31	0.85989	0.4349
LTFP__RATIO_ does not Granger Cause LNET_EXPORT		9.48253	0.0008

Appendix 4.2.7: Augmented Dickey-Fuller Unit Root (ADF) Test

Appendix 4.2.7.1: ADF Test – GDP (DV)

Trend and Intercept (maximum lag=8)

Null Hypothesis: LCHINA_GDP_MILLION_USD_ has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.750809	0.7046
Test critical values:	1% level	-4.273277	
	5% level	-3.557759	
	10% level	-3.212361	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LCHINA_GDP_MILLION_USD_)
Method: Least Squares
Date: 03/03/19 Time: 19:48
Sample (adjusted): 1983 2014
Included observations: 32 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LCHINA_GDP_MILLION_USD_(-1)	-0.120323	0.068724	-1.750809	0.0906
C	1.487333	0.826841	1.798814	0.0825
@TREND("1982")	0.018341	0.008151	2.250211	0.0322

R-squared	0.260420	Mean dependent var	0.112622
Adjusted R-squared	0.209415	S.D. dependent var	0.095785
S.E. of regression	0.085167	Akaike info criterion	-1.999352
Sum squared resid	0.210348	Schwarz criterion	-1.861940
Log likelihood	34.98964	Hannan-Quinn criter.	-1.953804
F-statistic	5.105730	Durbin-Watson stat	1.957742
Prob(F-statistic)	0.012597		

Appendix 4.2.7.2: ADF Test – GDP (DV): 1st difference

Null Hypothesis: D(LCHINA_GDP_MILLION_USD_) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.280555	0.0009
Test critical values:	1% level	-4.284580	
	5% level	-3.562882	
	10% level	-3.215267	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LCHINA_GDP_MILLION_USD_,2)
Method: Least Squares
Date: 03/03/19 Time: 19:48
Sample (adjusted): 1984 2014
Included observations: 31 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LCHINA_GDP_MILLION_USD_(-1))	-1.016947	0.192583	-5.280555	0.0000
C	0.037578	0.035546	1.057171	0.2995
@TREND("1982")	0.004607	0.002060	2.236150	0.0335

R-squared	0.499443	Mean dependent var	0.000603
Adjusted R-squared	0.463689	S.D. dependent var	0.124237
S.E. of regression	0.090983	Akaike info criterion	-1.864529
Sum squared resid	0.231780	Schwarz criterion	-1.725756
Log likelihood	31.90020	Hannan-Quinn criter.	-1.819293
F-statistic	13.96883	Durbin-Watson stat	1.968563
Prob(F-statistic)	0.000062		

Appendix 4.2.7.3: ADF Test – GDP (DV): 2nd difference

Null Hypothesis: D(LCHINA_GDP_MILLION_USD_,2) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 2 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.419487	0.0000
Test critical values:	1% level	-4.323979	
	5% level	-3.580623	
	10% level	-3.225334	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LCHINA_GDP_MILLION_USD_,3)
Method: Least Squares
Date: 03/03/19 Time: 19:49
Sample (adjusted): 1987 2014
Included observations: 28 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LCHINA_GDP_MILLION_USD_(-1),2)	-3.080271	0.415160	-7.419487	0.0000
D(LCHINA_GDP_MILLION_USD_(-1),3)	1.309351	0.296258	4.419635	0.0002
D(LCHINA_GDP_MILLION_USD_(-2),3)	0.566004	0.170386	3.321889	0.0030
C	0.057909	0.045558	1.271104	0.2164
@TREND("1982")	-0.002403	0.002251	-1.067377	0.2969

R-squared	0.828633	Mean dependent var	-0.000374
Adjusted R-squared	0.798830	S.D. dependent var	0.213591
S.E. of regression	0.095800	Akaike info criterion	-1.692685
Sum squared resid	0.211084	Schwarz criterion	-1.454791
Log likelihood	28.69758	Hannan-Quinn criter.	-1.619958
F-statistic	27.80378	Durbin-Watson stat	2.128777
Prob(F-statistic)	0.000000		

Appendix 4.2.7.4: ADF Test – Exchange Rate (IV)

Trend and Intercept (maximum lag=8)

Null Hypothesis: LEXCHANGE_RATE has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.739864	0.7097
Test critical values:	1% level	-4.273277	
	5% level	-3.557759	
	10% level	-3.212361	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LEXCHANGE_RATE)
Method: Least Squares
Date: 03/03/19 Time: 19:50
Sample (adjusted): 1983 2014
Included observations: 32 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LEXCHANGE_RATE(-1)	-0.088483	0.050856	-1.739864	0.0925
C	0.251121	0.070028	3.586028	0.0012
@TREND("1982")	-0.003534	0.002309	-1.530342	0.1368

R-squared	0.386800	Mean dependent var	0.036538
Adjusted R-squared	0.344511	S.D. dependent var	0.105282
S.E. of regression	0.085239	Akaike info criterion	-1.997656
Sum squared resid	0.210705	Schwarz criterion	-1.860243
Log likelihood	34.96250	Hannan-Quinn criter.	-1.952108
F-statistic	9.146457	Durbin-Watson stat	2.356343
Prob(F-statistic)	0.000832		

Appendix 4.2.7.5: ADF Test – Exchange Rate (IV): 1st difference

Null Hypothesis: D(LEXCHANGE_RATE) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.641220	0.0000
Test critical values:	1% level	-4.284580	
	5% level	-3.562882	
	10% level	-3.215267	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LEXCHANGE_RATE,2)
Method: Least Squares
Date: 03/03/19 Time: 19:51
Sample (adjusted): 1984 2014
Included observations: 31 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LEXCHANGE_RATE(-1))	-1.214245	0.182835	-6.641220	0.0000
C	0.189904	0.043776	4.338072	0.0002
@TREND("1982")	-0.008544	0.002152	-3.970632	0.0005

R-squared	0.611707	Mean dependent var	-0.000167
Adjusted R-squared	0.583972	S.D. dependent var	0.134193
S.E. of regression	0.086555	Akaike info criterion	-1.964315
Sum squared resid	0.209768	Schwarz criterion	-1.825542
Log likelihood	33.44688	Hannan-Quinn criter.	-1.919078
F-statistic	22.05527	Durbin-Watson stat	1.667552
Prob(F-statistic)	0.000002		

Appendix 4.2.7.6: ADF Test – Exchange Rate (IV): 2nd difference

Null Hypothesis: D(LEXCHANGE_RATE,2) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 3 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.442292	0.0000
Test critical values:	1% level	-4.339330	
	5% level	-3.587527	
	10% level	-3.229230	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LEXCHANGE_RATE,3)
Method: Least Squares
Date: 03/03/19 Time: 19:52
Sample (adjusted): 1988 2014
Included observations: 27 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LEXCHANGE_RATE(-1),2)	-4.184227	0.562223	-7.442292	0.0000
D(LEXCHANGE_RATE(-1),3)	2.201392	0.454995	4.838280	0.0001
D(LEXCHANGE_RATE(-2),3)	1.302440	0.306832	4.244792	0.0004
D(LEXCHANGE_RATE(-3),3)	0.563839	0.143024	3.942266	0.0007
C	-0.060128	0.041317	-1.455279	0.1604
@TREND("1982")	0.001979	0.001964	1.007542	0.3251

R-squared	0.890321	Mean dependent var	0.007557
Adjusted R-squared	0.864207	S.D. dependent var	0.210375
S.E. of regression	0.077523	Akaike info criterion	-2.083344
Sum squared resid	0.126207	Schwarz criterion	-1.795380
Log likelihood	34.12514	Hannan-Quinn criter.	-1.997717
F-statistic	34.09354	Durbin-Watson stat	2.087338
Prob(F-statistic)	0.000000		

Appendix 4.2.7.7: ADF Test – FDI Net Inflow (IV)

Trend and Intercept (maximum lag=8)

Null Hypothesis: LFDI_NETFLOW has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.122279	0.5139
Test critical values:	1% level	-4.284580	
	5% level	-3.562882	
	10% level	-3.215267	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LFDI_NETFLOW)
Method: Least Squares
Date: 03/03/19 Time: 19:52
Sample (adjusted): 1984 2014
Included observations: 31 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LFDI_NETFLOW(-1)	-0.201602	0.094993	-2.122279	0.0431
D(LFDI_NETFLOW(-1))	0.300065	0.177221	1.693164	0.1019
C	4.430157	1.959364	2.261018	0.0320
@TREND("1982")	0.031658	0.019294	1.640790	0.1124

R-squared	0.276781	Mean dependent var	0.194965
Adjusted R-squared	0.196424	S.D. dependent var	0.273272
S.E. of regression	0.244968	Akaike info criterion	0.144533
Sum squared resid	1.620247	Schwarz criterion	0.329564
Log likelihood	1.759736	Hannan-Quinn criter.	0.204849
F-statistic	3.444369	Durbin-Watson stat	1.806947
Prob(F-statistic)	0.030590		

Appendix 4.2.7.8: ADF Test – FDI Net Inflow (IV): 1st difference

Null Hypothesis: D(LFDI_NETFLOW) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.167022	0.0132
Test critical values:	1% level	-4.284580	
	5% level	-3.562882	
	10% level	-3.215267	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LFDI_NETFLOW,2)
Method: Least Squares
Date: 03/03/19 Time: 19:52
Sample (adjusted): 1984 2014
Included observations: 31 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LFDI_NETFLOW(-1))	-0.769728	0.184719	-4.167022	0.0003
C	0.278917	0.121211	2.301077	0.0290
@TREND("1982")	-0.007786	0.005496	-1.416761	0.1676

R-squared	0.382949	Mean dependent var	-0.015263
Adjusted R-squared	0.338874	S.D. dependent var	0.319574
S.E. of regression	0.259844	Akaike info criterion	0.234297
Sum squared resid	1.890533	Schwarz criterion	0.373070
Log likelihood	-0.631602	Hannan-Quinn criter.	0.279533
F-statistic	8.688579	Durbin-Watson stat	1.823268
Prob(F-statistic)	0.001160		

Appendix 4.2.7.9: ADF Test – FDI Net Inflow (IV): 2nd difference

Null Hypothesis: D(LFDI_NETFLOW,2) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 5 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.325989	0.0851
Test critical values:	1% level	-4.374307	
	5% level	-3.603202	
	10% level	-3.238054	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LFDI_NETFLOW,3)
Method: Least Squares
Date: 03/03/19 Time: 19:53
Sample (adjusted): 1990 2014
Included observations: 25 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LFDI_NETFLOW(-1),2)	-2.936940	0.883028	-3.325989	0.0040
D(LFDI_NETFLOW(-1),3)	1.696418	0.806928	2.102316	0.0507
D(LFDI_NETFLOW(-2),3)	1.077870	0.681415	1.581812	0.1321
D(LFDI_NETFLOW(-3),3)	0.893329	0.533065	1.675837	0.1121
D(LFDI_NETFLOW(-4),3)	0.265626	0.360835	0.736143	0.4717
D(LFDI_NETFLOW(-5),3)	0.557252	0.262664	2.121542	0.0489
C	0.042426	0.165967	0.255629	0.8013
@TREND("1982")	-0.002255	0.007809	-0.288822	0.7762

R-squared	0.799217	Mean dependent var	-0.000291
Adjusted R-squared	0.716542	S.D. dependent var	0.523930
S.E. of regression	0.278945	Akaike info criterion	0.538730
Sum squared resid	1.322771	Schwarz criterion	0.928770
Log likelihood	1.265873	Hannan-Quinn criter.	0.646911
F-statistic	9.666936	Durbin-Watson stat	2.129200
Prob(F-statistic)	0.000073		

Appendix 4.2.7.10: ADF Test – Human Capital (IV)

Trend and Intercept (maximum lag=8)

Null Hypothesis: LHUMAN_CAPITAL has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 8 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.117515	0.0021
Test critical values:	1% level	-4.394309	
	5% level	-3.612199	
	10% level	-3.243079	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LHUMAN_CAPITAL)
Method: Least Squares
Date: 03/03/19 Time: 19:53
Sample (adjusted): 1991 2014
Included observations: 24 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LHUMAN_CAPITAL(-1)	-0.567838	0.110960	-5.117515	0.0002
D(LHUMAN_CAPITAL(-1))	0.481153	0.143129	3.361676	0.0051
D(LHUMAN_CAPITAL(-2))	0.298244	0.177362	1.681554	0.1165
D(LHUMAN_CAPITAL(-3))	0.300881	0.178859	1.682226	0.1164
D(LHUMAN_CAPITAL(-4))	0.394527	0.209232	1.885594	0.0819
D(LHUMAN_CAPITAL(-5))	0.351023	0.216797	1.619137	0.1294
D(LHUMAN_CAPITAL(-6))	0.359185	0.211122	1.701311	0.1127
D(LHUMAN_CAPITAL(-7))	0.343512	0.213264	1.610739	0.1312
D(LHUMAN_CAPITAL(-8))	0.387206	0.219514	1.763928	0.1012
C	0.282129	0.052165	5.408356	0.0001
@TREND("1982")	0.006680	0.001356	4.927523	0.0003

R-squared	0.930002	Mean dependent var	0.011836
Adjusted R-squared	0.876157	S.D. dependent var	0.004819
S.E. of regression	0.001696	Akaike info criterion	-9.617599
Sum squared resid	3.74E-05	Schwarz criterion	-9.077657
Log likelihood	126.4112	Hannan-Quinn criter.	-9.474352
F-statistic	17.27195	Durbin-Watson stat	2.399154
Prob(F-statistic)	0.000006		

Appendix 4.2.7.11: ADF Test – Human Capital (IV): 1st difference

Null Hypothesis: D(LHUMAN_CAPITAL) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.675759	0.7379
Test critical values:	1% level	-4.284580	
	5% level	-3.562882	
	10% level	-3.215267	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LHUMAN_CAPITAL,2)
Method: Least Squares
Date: 03/03/19 Time: 19:53
Sample (adjusted): 1984 2014
Included observations: 31 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LHUMAN_CAPITAL(-1))	-0.189162	0.112881	-1.675759	0.1049
C	0.002492	0.001805	1.380710	0.1783
@TREND("1982")	-1.65E-05	5.39E-05	-0.306158	0.7617

R-squared	0.091694	Mean dependent var	9.30E-05
Adjusted R-squared	0.026815	S.D. dependent var	0.002625
S.E. of regression	0.002590	Akaike info criterion	-8.982862
Sum squared resid	0.000188	Schwarz criterion	-8.844089
Log likelihood	142.2344	Hannan-Quinn criter.	-8.937625
F-statistic	1.413302	Durbin-Watson stat	1.827814
Prob(F-statistic)	0.260167		

Appendix 4.2.7.12: ADF Test – Human Capital (IV): 2nd difference

Null Hypothesis: D(LHUMAN_CAPITAL,2) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.207511	0.0011
Test critical values:	1% level	-4.296729	
	5% level	-3.568379	
	10% level	-3.218382	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LHUMAN_CAPITAL,3)
Method: Least Squares
Date: 03/03/19 Time: 19:54
Sample (adjusted): 1985 2014
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LHUMAN_CAPITAL(-1),2)	-1.002287	0.192470	-5.207511	0.0000
C	-2.85E-05	0.001139	-0.025027	0.9802
@TREND("1982")	7.14E-06	5.84E-05	0.122338	0.9035

R-squared	0.501096	Mean dependent var	3.01E-07
Adjusted R-squared	0.464140	S.D. dependent var	0.003779
S.E. of regression	0.002766	Akaike info criterion	-8.848050
Sum squared resid	0.000207	Schwarz criterion	-8.707931
Log likelihood	135.7208	Hannan-Quinn criter.	-8.803225
F-statistic	13.55932	Durbin-Watson stat	1.999825
Prob(F-statistic)	0.000084		

Appendix 4.2.7.13: ADF Test – Net Export (IV)

Trend and Intercept (maximum lag=8)

Null Hypothesis: LNET_EXPORT has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.957795	0.0019
Test critical values:	1% level	-4.273277	
	5% level	-3.557759	
	10% level	-3.212361	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNET_EXPORT)
Method: Least Squares
Date: 03/03/19 Time: 19:54
Sample (adjusted): 1983 2014
Included observations: 32 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNET_EXPORT(-1)	-0.875984	0.176688	-4.957795	0.0000
C	0.980153	0.410069	2.390214	0.0236
@TREND("1982")	0.133630	0.031644	4.222884	0.0002

R-squared	0.460313	Mean dependent var	0.087223
Adjusted R-squared	0.423093	S.D. dependent var	1.292194
S.E. of regression	0.981478	Akaike info criterion	2.889545
Sum squared resid	27.93566	Schwarz criterion	3.026958
Log likelihood	-43.23272	Hannan-Quinn criter.	2.935094
F-statistic	12.36743	Durbin-Watson stat	2.048551
Prob(F-statistic)	0.000131		

Appendix 4.2.7.14: ADF Test – Net Export (IV): 1st difference

Null Hypothesis: D(LNET_EXPORT) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.760876	0.0000
Test critical values:	1% level	-4.284580	
	5% level	-3.562882	
	10% level	-3.215267	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNET_EXPORT,2)
Method: Least Squares
Date: 03/03/19 Time: 19:55
Sample (adjusted): 1984 2014
Included observations: 31 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNET_EXPORT(-1))	-1.365354	0.175928	-7.760876	0.0000
C	-0.038758	0.487532	-0.079498	0.9372
@TREND("1982")	0.009714	0.025417	0.382183	0.7052

R-squared	0.682665	Mean dependent var	0.006771
Adjusted R-squared	0.659998	S.D. dependent var	2.167195
S.E. of regression	1.263685	Akaike info criterion	3.397707
Sum squared resid	44.71322	Schwarz criterion	3.536480
Log likelihood	-49.66446	Hannan-Quinn criter.	3.442944
F-statistic	30.11735	Durbin-Watson stat	2.236821
Prob(F-statistic)	0.000000		

Appendix 4.2.7.15: ADF Test – Net Export (IV): 2nd difference

Null Hypothesis: D(LNET_EXPORT,2) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 6 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.636902	0.0059
Test critical values:	1% level	-4.394309	
	5% level	-3.612199	
	10% level	-3.243079	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNET_EXPORT,3)
Method: Least Squares
Date: 03/03/19 Time: 19:55
Sample (adjusted): 1991 2014
Included observations: 24 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNET_EXPORT(-1),2)	-7.858366	1.694745	-4.636902	0.0003
D(LNET_EXPORT(-1),3)	5.596661	1.592767	3.513798	0.0031
D(LNET_EXPORT(-2),3)	4.331504	1.384167	3.129321	0.0069
D(LNET_EXPORT(-3),3)	3.191373	1.086985	2.935987	0.0102
D(LNET_EXPORT(-4),3)	2.171901	0.748065	2.903357	0.0109
D(LNET_EXPORT(-5),3)	1.300403	0.428247	3.036573	0.0083
D(LNET_EXPORT(-6),3)	0.550129	0.172714	3.185205	0.0061
C	0.280275	0.807256	0.347195	0.7333
@TREND("1982")	-0.015140	0.037260	-0.406343	0.6902

R-squared	0.931750	Mean dependent var	-0.037824
Adjusted R-squared	0.895349	S.D. dependent var	3.784010
S.E. of regression	1.224117	Akaike info criterion	3.522313
Sum squared resid	22.47694	Schwarz criterion	3.964083
Log likelihood	-33.26776	Hannan-Quinn criter.	3.639515
F-statistic	25.59739	Durbin-Watson stat	2.370691
Prob(F-statistic)	0.000000		

Appendix 4.2.7.16: ADF Test – Technology Advancement (IV)

Trend and Intercept (maximum lag=8)

Null Hypothesis: LTFP__RATIO_ has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.427087	0.8332
Test critical values:	1% level	-4.273277	
	5% level	-3.557759	
	10% level	-3.212361	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LTFP__RATIO_)
Method: Least Squares
Date: 03/03/19 Time: 19:55
Sample (adjusted): 1983 2014
Included observations: 32 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LTFP RATIO (-1)	-0.128588	0.090105	-1.427087	0.1642
C	-0.067405	0.058371	-1.154768	0.2576
@TREND("1982")	0.002864	0.001872	1.530148	0.1368

R-squared	0.075127	Mean dependent var	0.019694
Adjusted R-squared	0.011342	S.D. dependent var	0.028954
S.E. of regression	0.028789	Akaike info criterion	-4.168593
Sum squared resid	0.024035	Schwarz criterion	-4.031180
Log likelihood	69.69748	Hannan-Quinn criter.	-4.123044
F-statistic	1.177821	Durbin-Watson stat	1.216828
Prob(F-statistic)	0.322250		

Appendix 4.2.7.17: ADF Test – Technology Advancement (IV): 1st difference

Null Hypothesis: D(LTFP__RATIO_) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.630102	0.0434
Test critical values:	1% level	-4.284580	
	5% level	-3.562882	
	10% level	-3.215267	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LTFP__RATIO_,2)
Method: Least Squares
Date: 03/03/19 Time: 19:55
Sample (adjusted): 1984 2014
Included observations: 31 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LTFP_RATIO_(-1))	-0.643264	0.177203	-3.630102	0.0011
C	0.009742	0.011179	0.871491	0.3909
@TREND("1982")	0.000175	0.000573	0.306244	0.7617

R-squared	0.320306	Mean dependent var	-9.38E-05
Adjusted R-squared	0.271756	S.D. dependent var	0.033196
S.E. of regression	0.028329	Akaike info criterion	-4.198114
Sum squared resid	0.022470	Schwarz criterion	-4.059341
Log likelihood	68.07077	Hannan-Quinn criter.	-4.152878
F-statistic	6.597504	Durbin-Watson stat	1.998142
Prob(F-statistic)	0.004491		

Appendix 4.2.7.18: ADF Test – Technology Advancement (IV): 2nd difference

Null Hypothesis: D(LTFP__RATIO_,2) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.952125	0.0000
Test critical values:	1% level	-4.296729	
	5% level	-3.568379	
	10% level	-3.218382	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LTFP__RATIO_,3)
Method: Least Squares
Date: 03/03/19 Time: 19:56
Sample (adjusted): 1985 2014
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LTFP_RATIO_(-1),2)	-1.379366	0.173459	-7.952125	0.0000
C	-0.003877	0.012987	-0.298559	0.7676
@TREND("1982")	0.000146	0.000665	0.219545	0.8279

R-squared	0.701201	Mean dependent var	-0.001311
Adjusted R-squared	0.679068	S.D. dependent var	0.055659
S.E. of regression	0.031531	Akaike info criterion	-3.981048
Sum squared resid	0.026844	Schwarz criterion	-3.840928
Log likelihood	62.71572	Hannan-Quinn criter.	-3.936222
F-statistic	31.68092	Durbin-Watson stat	1.973068
Prob(F-statistic)	0.000000		