M1711

THE IMPACT OF FINANCIAL DEVELOPMENT, ECONOMIC GROWTH, CORRUPTION AND HUMAN CAPITAL ON INCOME INEQUALITY: EVIDENCE IN LOW AND MIDDLE INCOME COUNTRIES

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DECLARATION

We hereby declare that:

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

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

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

(4) The word count of this research report is 14712.

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LIST OF ABBREVIATIONS

2SLS	Two-Stage Least Square
AGFI	Adjusted goodness-of-fix index
AR (1)	First-order Autoregression Model
AR (2)	Second-order Autoregression Model
BNM	Bank Negara Malaysia
CPI	Corruption
FD	Financial Development
FEM	Fixed Effect Model
GMM	General Method of Moments
HC	Human Capital
IEQ	Income Inequality
LM	Lagrange Multiplier
MM	Method of Moment
OECD	Organization for Economic Co-operation and Development
OLS	Ordinary Least Square
OPCD	Office of Professional and Career Development
PVECM	Panel Vector Error Correction Model
REM	Random Effect Model
RGDP	Economic Growth

SEM	Structural Equation Modelling
SPSS	Statistical Package for Social Science

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PREFACE

This research is submitted to partially fulfil the requirement of Bachelor of Economics (HONS) Financial Economics. This research is supervised by Ms. Vivien Wong Zi Wen.

The income inequality has been getting serious and increasing over the time. Therefore, the gap between the income distributions must be concerned and the factors that influence the income inequality must be investigated.

This research will determine the relationship between the financial development, economic growth, corruption and human capital with income inequality. This research also provides a result showing the effect of the variables (financial development, economic growth, corruption and human capital) on income inequality in low and middle income countries.

ABSTRACT

The purpose of this research is to determine the income effect of financial development, economic growth, corruption and human capital on income inequality in 65 selected low and middle income countries (included 53 middle income countries and 12 low income countries) from the year 1980 to 2015. This study applies GMM estimator to capture the dynamic effect of data and deal with endogeneity problem. System GMM estimator is applied to run the empirical test in this research. The results summarized that RGDP and FD are significant to the income inequality while the HC and CPI are insignificant related to the income inequality.

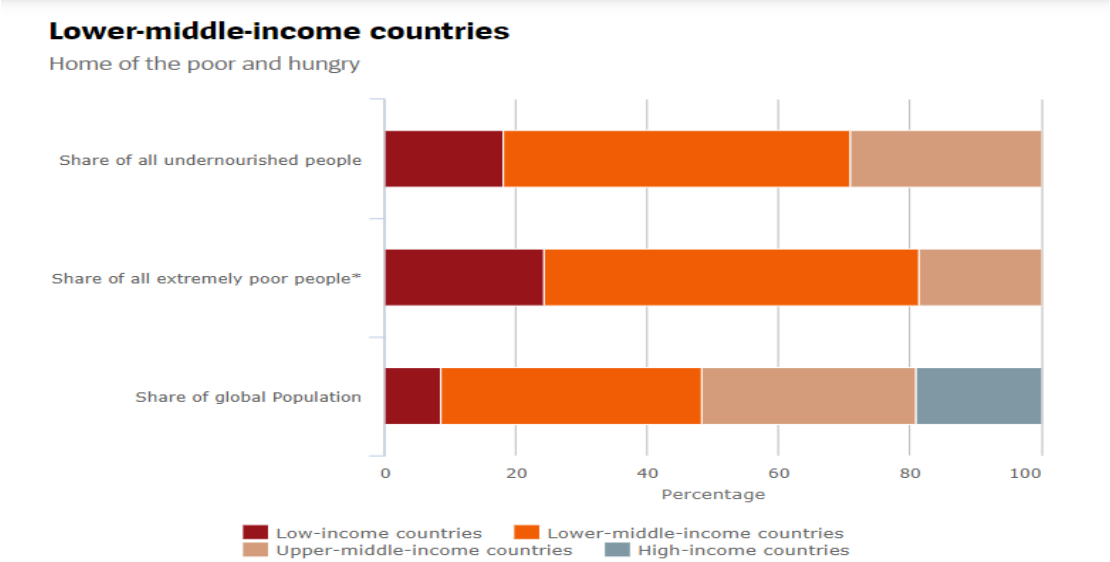
CHAPTER 1: RESEARCH OVERVIEW

1.1 Research Background

Global integration and technology modernization appears to be unstoppable forces of nature that accelerate the improvement of a nation's economic condition. Products, services, and factors of production become mobile in the presence of free-market ideology and consolidation of advancement in transportation and communication. This phenomenon has brought enormous profit to investors and entrepreneurs due to higher production efficiency and lower transportation cost. According to World Inequality Report 2018, the concentration of income is rising around the world due to globalization and technology modernization and the finding exhibits that the richest 1% holds 27% of the world's income while the poorest 50% holds for only 12% (Alvaredo, Chancel, Piketty, Saez & Zucman, 2017). Having a rising number of rich people is not an issue if the average wealth of every individual is rising at an identical rate. In fact, the gap between the income level of rich and poor increases dramatically and there is likely to be discontent. As British epidemiologists, Richard Wilkinson and Kate Pickett document in their book, "The Spirit Level", inequality is proved to be associated with social problems such as crime and drug addiction as well as health problems. Enamorado, López-Calva, Rodríguez-Castelán, and Winkler (2016) said that drug-related crime was greatly reduced with the improvement in income inequality during Mexico's drug war. In China, health issues such as increasing alcohol consumption and smoking are found to be accompanied by a higher level of income inequality (Li & Zhu, 2006). Moreover, wide income gap conduces education attainment become unaffordable to poor due to their undermined economic mobility (Petcu, 2014). In order to rebuild an economy where everyone can be successful, it is crucial to tackling the rising income inequality and reducing the income gap between the poor and the rich.

1.1.1 Income Inequality in Low and Middle Income Countries

Figure 1.1: Poverty in Low and Middle Income Countries in 2015



Source: World Bank (2015)

Low income countries are defined as countries with gross national income per capita of $1005 or less (World Bank Country and Lending Groups, 2018). Figure 1.1 shows 18.1% share of all undernourished people and 24.3% share of all extremely poor people are from low income countries indicates low income countries are facing a serious poverty issue. A study from United Nations Development Programme states that reducing income inequality is the only way for African countries to achieve a low level of poverty which reflects the close relationship between poverty and income inequality in low income countries (Odusola, Cornia, Bhorat & Conceição, 2017). According to Table 1.1, 27 countries in Sub-Saharan Africa (SSA) are categorized as low income countries. In this case, Abdoulaye Mar Dieye, Assistant Administrator and Director UNDP Regional Bureau in Africa, said that Sub-Saharan Africa had

been experiencing a serious income inequality where policies planned were not truly helpful for the citizen in the lower income countries ("UNDP launches study", 2017).

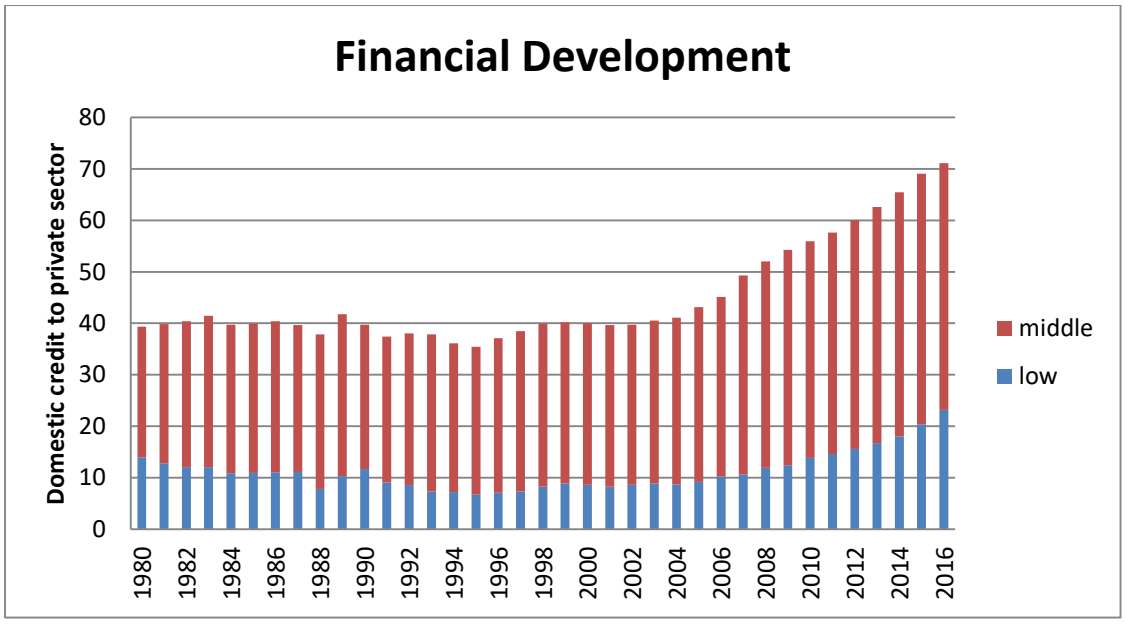
Income inequality is not only a concern for low income countries but also a pressing issue in middle income countries. According to Figure 1.1, 75.7% share of the extremely poor people and 81.9% share of all undernourished people are from the middle income country. Shahin and Dibeh (2000) said that income inequality and poverty are closely correlated. According to Birdsong (2015), issues like high crime rate and poor quality health care exist in the presence of poverty where pro-growth policy established by the government tends to be ineffective. Additionally, the rich are capable to manipulate the legal process and tax structure to gain more profit while the poor become poorer as they cannot participate in the political process (Birdsong, 2015). Eventually, income gap exists due to the ineffective legal process is driven by poverty. This is the reason the income inequality maintained even though the poverty is declining. Among the middle income countries, Iran undergoes comparatively high levels of poverty and income inequality. The government has carried out growth policies to push the economic development in order to combat the increasing income inequality. Eventually, the poverty rate was significantly reduced due to the well-established private social responsibility and social welfare system, in fact, the policy exerts no influence on income inequality in Iran (Moradi, 2009).

In conclusion, income inequality in low and middle income countries is always associated with poverty issues. High crime rate, poor healthcare system as well as influence on the political process by the rich are the intermediaries that linking the two elements. Throughout the years, the government has been figuring out ways to control poverty and reduce income disparity at the same

time. Most of the policies implemented successfully suppress poverty but unsuccessfully lower income inequality. Since governments of low and middle income countries still have no proper solution to solve the income inequality problem, possible alternatives must be identified before it becomes worse.

1.1.2 Financial Development in Low and Middle Income Countries

Figure 1.2: Financial Development in Low and Middle Income Countries



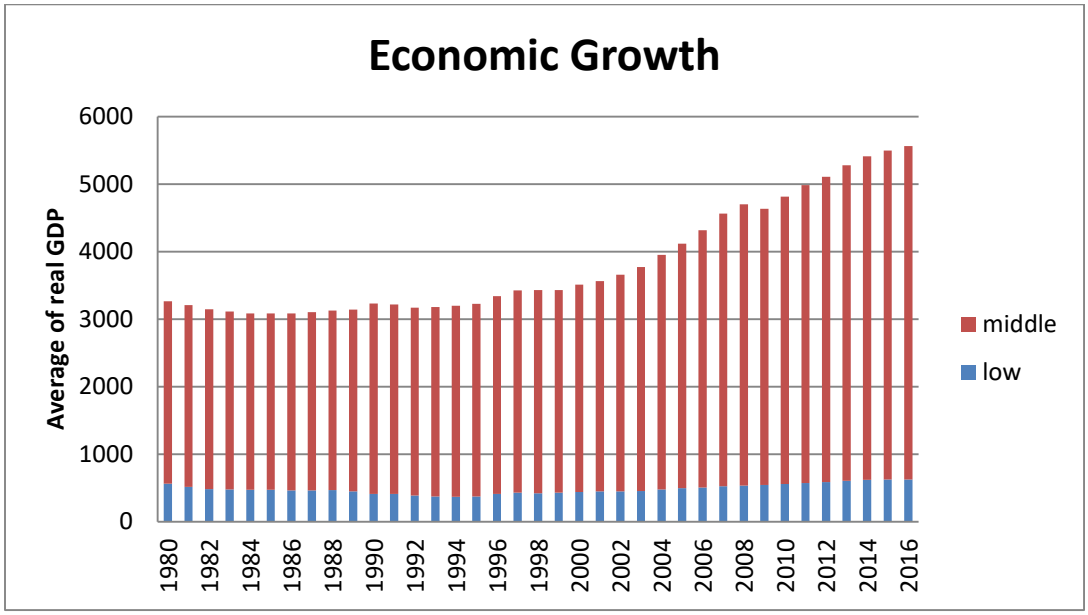
Source: World Bank Government Indicators (2018)

Financial development is defined as a private sector development strategy which consists of establishing and expanding financial institutions and financial markets to sustain investment and growth process (Altay & Topcu, 2017). It also includes development in credit market where credit card,

securitized obligations, and notes are offered to investors. In Figure 1.2, both of the lines indicate that the domestic credit of private sector in low and middle countries are concave-up and it implies a similar financial development trend. At the beginning of 1980, several sub-Saharan Africa (SSA) countries (which are also low and middle income countries) that considered having underdeveloped financial market started to adopt policies to focus on creating the environment that is beneficial to the financial intermediation (Mlachila, Jidoud, Newiak, Radzewicz-Bak & Takebe, 2016). They adjusted their institutional framework that included strengthening banking regulation, promoting monetary policy autonomy as well as establishing central bank credibility. As a result, the supremacy of state-owned financial institutions has been severely diminished, government restrictions have been stripped down, and innovative products and delivery systems have been uplifted in SSA countries (Kuada, 2016). Hence, other countries with a similar situation are likely to follow the performance of SSA resulting greater financial development among low and middle income countries in the following years as demostrated in figure 1.2.

1.1.3 Economic Growth in Low and Middle Income Countries

Figure 1.3: Economic Growth in Low and Middle Income Countries



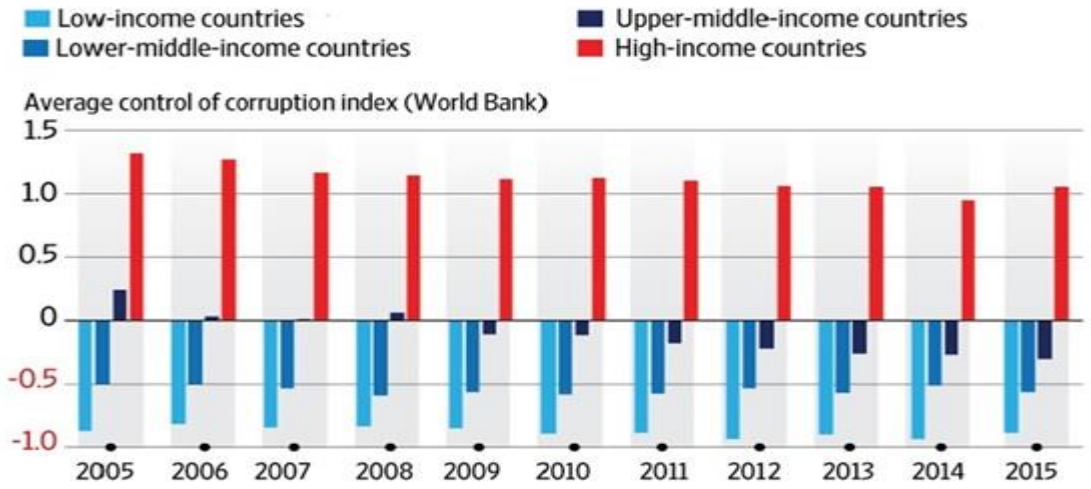
Source: World Bank Government Indicators (2018)

Based on figure 1.3, low income countries were maintaining a relatively low economic growth, but middle income countries were experiencing an increasing economic growth throughout the years. This is due to the international trade of the middle income countries are gradually improved. In the 1980s, most of the middle income countries began to focus on research and development (R&D) and technologies transfer in order to improve the products and services to boost the economic growth. On the other hand, the low income countries may not have enough funds to precede research and development (R&D), so the production efficiency remains the same (Cirera, Pacchioni & Maloney, 2017). Those countries become uncompetitive also having disadvantages in international trade due to the higher cost of production. This

lead to selling price relatively higher compared to countries with better production efficiency (Obasaolufemi, 2015). As a result, the export of low income countries will be affected due to the reduction of foreign demand driven by the higher selling price.

1.1.4 Corruption in Low and Middle Income Countries

Figure 1.4: Average Level of Corruption in Various Income Groups of Countries



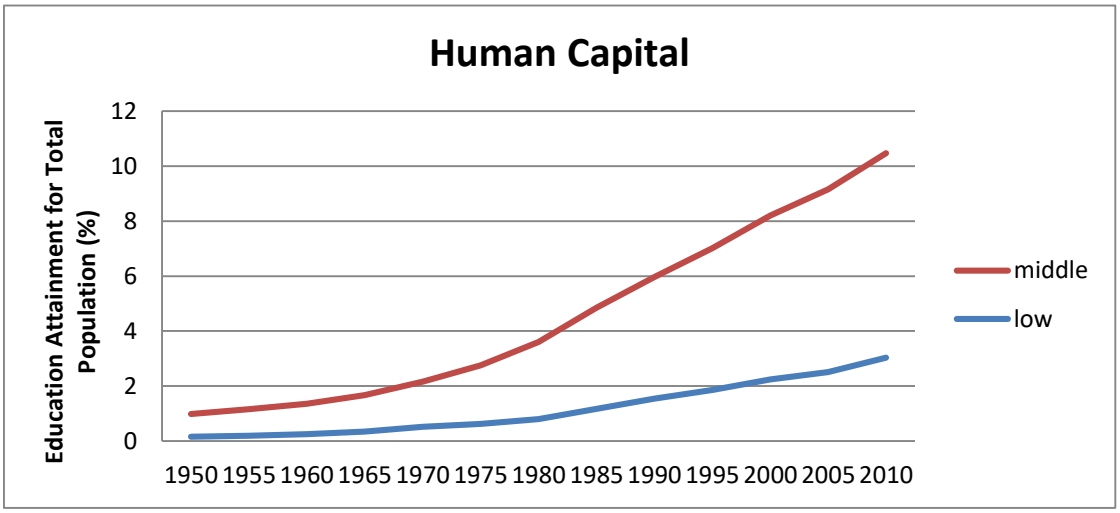
Source: World Bank Government Indicators (2018)

Higher average control of corruption index means lower corruption and vice versa. As illustrated in figure 1.4, high income countries have lower corruption while low and middle income countries have higher corruption. Among the low and middle income countries, India was defined as the highest bribery rate among 16 countries of the Asia-Pacific region. In this case, the corruption in the police is 34%, land or housing is 24%, judicial services are 18% and tax-related public services are 15% in India (Chandra, 2017).

Corruption also widespread in African as there are two African countries are ranked as the highest corrupted countries (Gyimah-Brempong, 2002). If a country has a high level of corruption, it may reduce the fund of both private and public investments. Limited resources forced the government to establish the poor social programs due to the existing of corruption (Gupta, Davoodi & Alonso-Terme, 2002). Consequently, poor are facilitated with the underperformed social program and remain to have a poor living standard.

1.1.5 Human capital in Low and Middle Income Countries

Figure 1.5: Education Attainment for Total Population (%) in Low and Middle Income Countries



Source: World Bank Government Indicators (2018)

In Figure 1.5, the educational attainments in the tertiary study of both low and middle income countries are increasing from the year 1950 to 2010. In the middle income countries, the number of people with educational attainment

in the tertiary study was growing rapidly than the population in low income countries after the year 1970. In the mid-1970s, the new priorities included the individual, national and global competitiveness development has started to reform the education policy around the world. Since then, the increase in the education quality is the superior priority. According to Carlson (2002), during the past 20 years, policymakers have been working out to reform the education system to achieve a better relationship between the education system and the necessities of the economy. In the 20th century, Latin America has started the expansion of mass education by building more universities and enhancing the facilities which cause a rapid increase in university graduates after the year 1970 (Frankema, 2009).

1.1.6 Income Inequality: Is It Fair or Unfair?

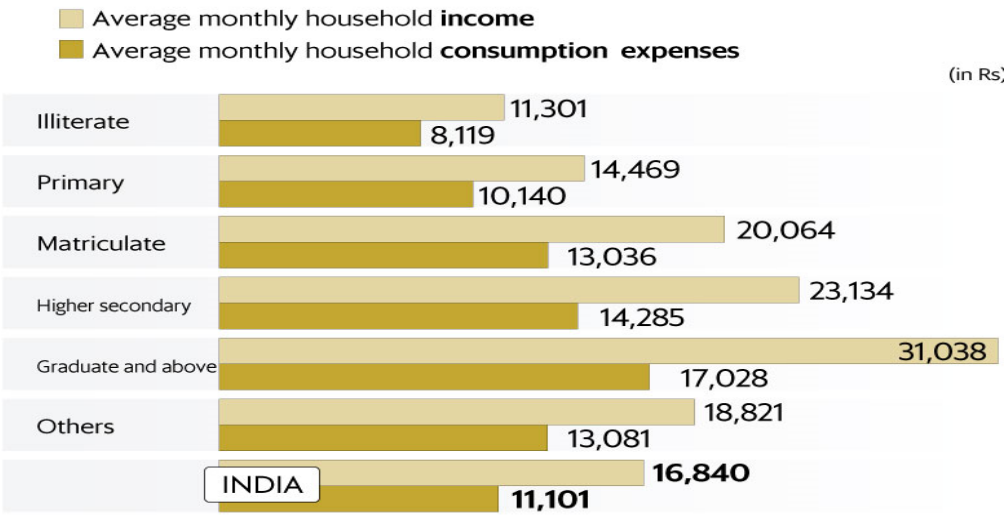
Justice and fairness is a subject that has been debated for centuries. In economic, the fairness of wealth and equity in income distribution are also undergoing intense study among economists. Arthur Brooks, president of the American Enterprise Institute said that "We are not a perfect opportunity society in the United States. But if we want to approach that ideal, we must define fairness as meritocracy, embrace a system that rewards merit, and work tirelessly for the true equal opportunity". According to Cambridge Dictionary, meritocracy is defined as a social system in which individuals have power due to their capabilities and abilities, not because of their social position. In this case, an individual who creates an enormous benefit to the society will allow them to receive high pay salary and this is considered fair and acceptable. For instance, those inventors such as Steve Jobs and Jack Ma whom invented products that are high value-added have gained the opportunity to earn higher income compare to the low-skilled workers as the products invented have

benefited the society. This is categorized as fair as high skilled workers are able to perform the knowledge intensive job and their reward on abilities will reflect in their salary. The relatively higher income obtained by them can be said as it is to compensate the time and efforts spent for further study such as master and Ph.D. program in order to gain high human capital. Also, for successful entrepreneurs, apart from the time and efforts, the high income also acts as a compensation on the risk that they need to bear compared to stable income workers. Therefore, although the inequality is considered fair in this case, it created the income gap between high skilled workers and low skilled workers since the requirements in human capital are different for every job.

On the other hand, low skilled workers will rate this as unfair as income inequality reduced their living conditions. Low skilled workers do not satisfy with the income gap compare to high skilled workers thus it creates unhappiness as low skilled workers are always occupied higher portion of a society. In this case, it will generate issues toward income inequality. This statement can be shown by taking two of our countries of study – China and India as examples. According to Li (2014), even though China is one of the largest markets that involved in producing goods and services for global demand, they faced the unfairness in income inequality as well. This is mainly due to the regional difference as China consists of 33 divisions which included 22 provinces (not including Taiwan), 4 municipalities, 5 autonomous regions and 2 Special Administrative Regions (SAR). The distinction in terms of economic development among urban and rural area have contributed to income inequality as the government is unable to ensure the quality of facilities such as education in every province and region. As such, this country eventually falls into the unfairness in wealth distribution as well as causing the issue of the income gap between rich and poor to become larger. This matter has been facing by most of the low and middle income countries around the world and policies announced might not be able to overcome thoroughly.

Besides, due to the limitation of capital and resource, children who suffer from poverty or born from low income family background tend to have lower participation rate in higher education (Chandrasekhar, Rani & Sahoo, 2016). They obtain higher chances to give up and forfeit on education in order to be employed and involve in the workforce so that they can gain income to supply necessities for themselves as well as provide financial support to their family livings. Some of the low and middle income countries such as India and Pakistan are facing the issue of hiring children as domestic labour and employers tend to exploit them with uncertain working hours as well as insecure rewards ("Child labour", 2018). This is the consequences where the income gap is terribly wide and poverty issues have critically come across the country. Also, when the average age of labour participation in the workforce is low, this means that the absence of professional knowledge is high and the labours were most probably engaged in blue-collar industry. As a result, the room of potential and creativity of an individual will be restricted hence individual with unfavourable and weak education background only able to acquire in a low-skilled or unskilled job which further deteriorates their income as well as living standard.

Figure 1.6: Average Monthly Household Income and Consumption Expenses



Source: ICE 360 Survey (2006)

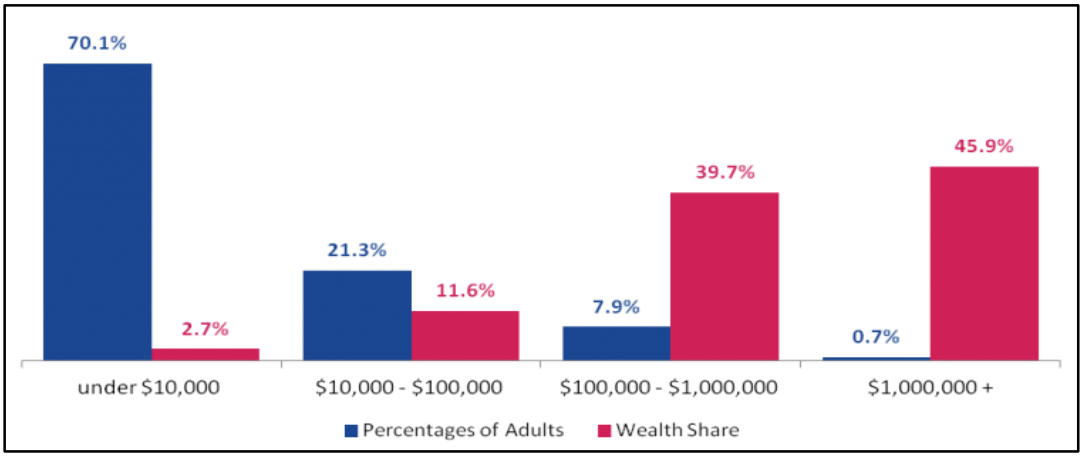
Based on the figure displayed, surveys in India found that there is an enormous influence on the different level of education towards the overall household earnings and consumption. Although there are illiterates earning in high-income quintiles, they can only consider as an exceptional case since they occupied the lowest share in the top income group. These group of people who stand in the position might either success through better luck or better opportunity that occur in their surroundings. In other words, the chances of an individual to obtain higher education attainment could be a golden ticket access to the road of prosperous and successful as those with higher education background seems to attain higher income in comparison. With the reference of all the surveys done by National Sample Survey Office (NSSO) of India, it is shown that education attainment will be a great indicator that decided an individual income in the future as well as safeguard's people that acquired high education level in another way. The above example has proved that investing in education will be one of the remarkable yet accessible strategies to enhance an individual living condition and expenditure capability.

In conclusion, the facts as discussed disclosed that the unfairness of income inequality is higher compared to saying it is fair to the society. As long as there are differences in opportunity and power between groups of people, the issue of inequality will arise. In this case, whether the gap between the rich and the poor will keep growing wide is a subject remained to be further discussed. As income inequality is more towards the side of unfair, it is a challenge to figure out the determinants of it as well as the current income gaps and trends in order to minimize the real costs imposing on the society.

1.2 Problem Statement

Income inequality is always an issue faced by most of the countries all around the world. According to the project of tracking inequality by the Institute for Policy Studies, global wealth distribution is confronting on the subject of the wide income gap between the highest income group and the lower income group in the world.

Figure 1.7: Global Adult Population and Share of Total Wealth by Wealth Group, 2017



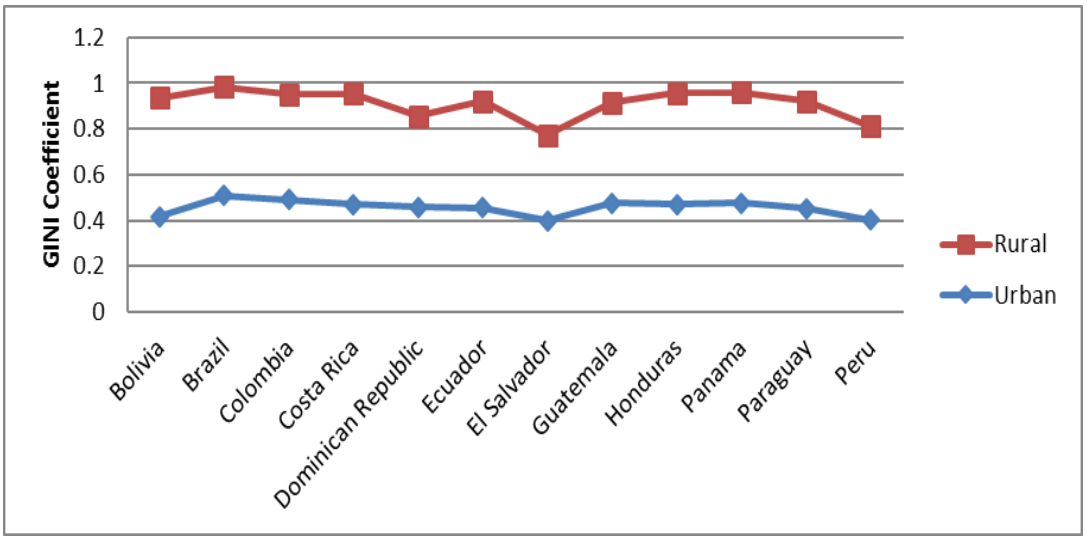
Source: Inequality.org (2017)

Based on Figure 1.7, 70 percent of the adults in the world possessing less than $10,000 of wealth and this huge amount of people only carries 3 percent in total of global wealth. Yet, for the most prosperous group of the population with total assets more than $100,000, although they only hold for 8.6 percent, they own more than 85 percent of global wealth share. This has highlighted the severity of the issue of growing income gap between the richest and the others. As reported in the recent article from The Guardian by Neate (2017), the world richest have obtained a growth of $1 trillion in wealth as a result of the massive increase in the value of the worldwide stock market in 2017. The huge increase in the wealth of the group of the wealthiest population reflects that the wealth of poorer people around the world seen to be stagnated or

reduced and this has consequently caused the gap between them to grow wider (Neate, 2017).

In low and middle income countries, the income disparity is more obvious as the gap between rich and poor is very large. The rich always have sufficient assets to do their financial planning in increasing own wealth, however, the poor might have to work day in and day out continuously just to support their daily life as well as their living expenses. As in this condition, income inequality can be further narrow into two geographical areas in a country which is the urban and rural area.

Figure 1.8: Rural and Urban Inequality in 2015



Source: LAC Equity Lab tabulations of SECLAC (CEDLAS and World Bank) (2015)

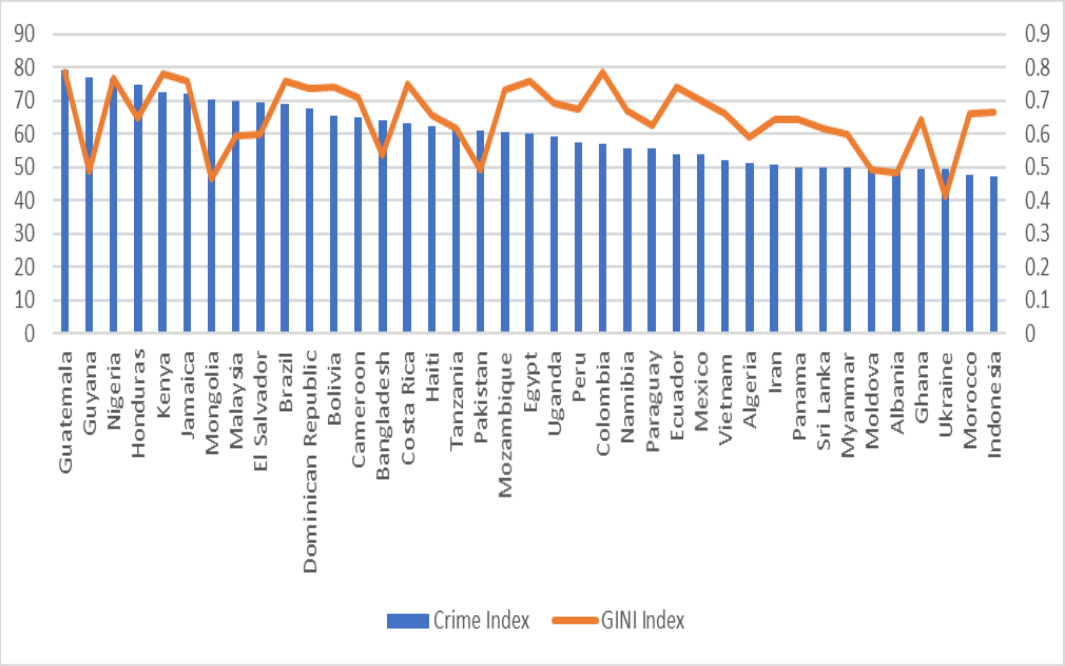
The figure above displays the inequality on income for both rural and urban areas in some low and middle income countries. As 0 indicates that the area is perfectly equal while 1 indicates that it is perfectly unequal, it can be clearly seen that income in the urban area is approximately 50 percent more equal than in rural area. This reveals that there is a gap between populations in these two groups, also the income, wealth as

well as living conditions of the poor are not much better off for these countries but the rich are (Hsu, 2016).

Furthermore, low and middle income countries basically facing the problem where they are lack of effective implementations on the financial market. The underdeveloped financial market is a symptom indicating the immature financial services in a nation and is usually unable to make a contribution to the country growth. When the development of the financial market is low, the income inequality, as well as poverty, will be hard to manage as it plays a critical role in private sector development strategy. Also, without strengthening the banking regulations, the accessibility of the financial products by the rich and the poor will be inconsistent. Thus, it will further lead to a wider income gap between the two groups of people.

As consequences, income inequality has caused a variety of social problems as the poor who are very desperate for higher income are willing to undertake any kind of activities even it is immoral or illegal in order to survive in the current society. This can be proved by the rising of crime rates such as snatch theft and robbery around the world at the same time triggers the public to live in fear. When the poor could not resist the temptation of money, they tend to mask themselves and rob the banks as well as looting people with a sharp weapon at the corner of the street.

Figure 1.9: Crime Rates and Gini Index in 2015



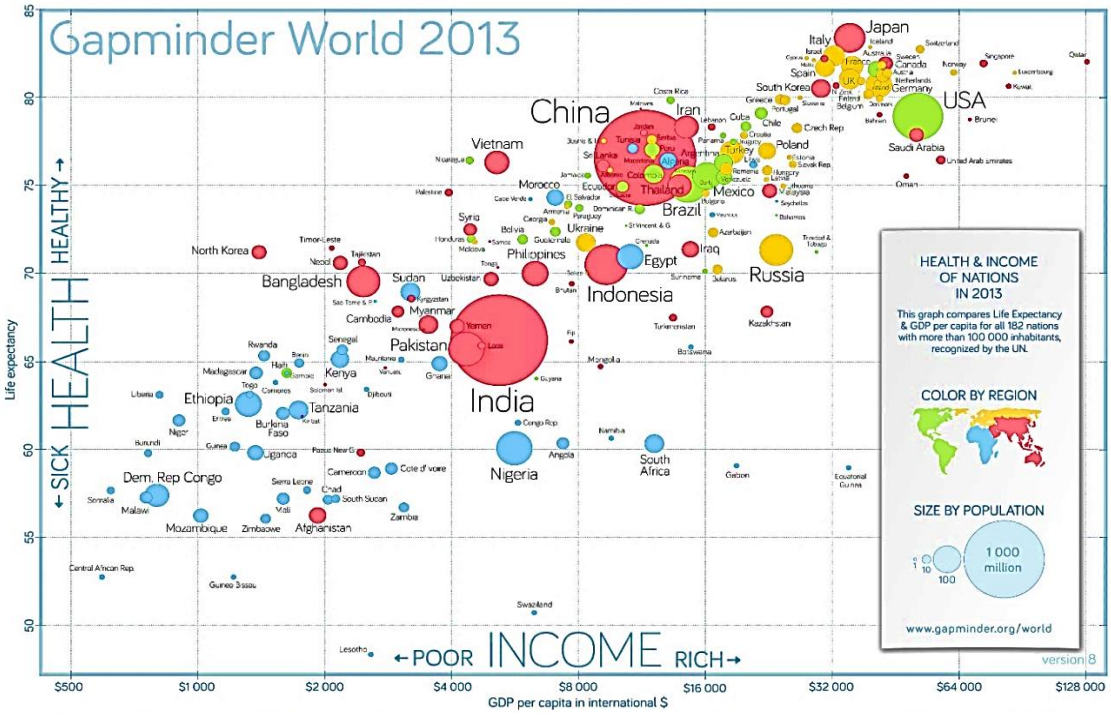
Source: Numbeo (2015)

Figure 1.9 shows that the graph of top 40 countries with the highest crime rate in the year 2015 and their respective GINI index. At the same time, countries with high crime rates such as Brazil, Guatemala, Honduras, and Jamaica have been reported that the main factor causing violence is due to the drastic inequality as well as poverty (Henderson, 2016). All these criminal behaviours not only bringing effects to the perpetrator but also putting innocents lives at risk. At the same time, some of the robbery cases might accidentally evolve into homicide cases when the perpetrator is stimulated due to external or internal factors. Thus, the society nowadays is not as safe as what we thought anymore as anyone might be the next victim on the street.

Besides, as growing inequality leads to increasing poverty, the educational attainment of people will be affected as well. This is because children from poor socio-economic background have a lower opportunity in receiving higher education as their

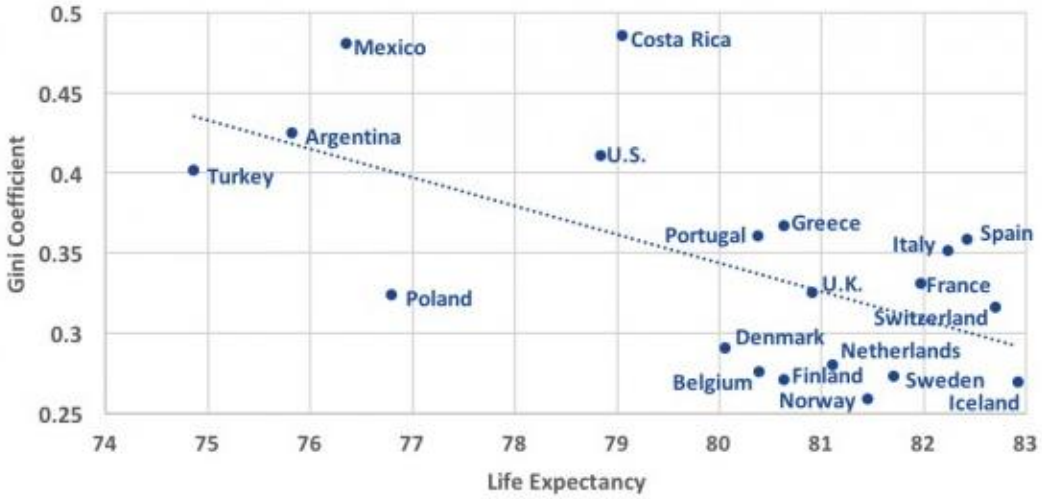
family fails to support them due to the excessive cost of education. In this case, it will affect the numbers of skilled labour in the country thus reducing the growth and productivity of the economy (Okafor, 2018). On the other hand, children from a richer household that received a high quality of education are able to compete in the global market as well as staring up their own business in new industries. This exposes that when there is a huge difference in the investment of children education, it will impact the future financial status of the children. This will further lead to a larger income gap between the rich and the poor (Berg, 2018).

Figure 2.0: Life Expectancy by Income Level



Source: Gapminder.org (2013)

Figure 2.1: Life Expectancy vs Income Inequality by country, 2012



Source: World Bank Government Indicators (2013)

The chart in Figure 2.0 suggesting low and middle income countries have lower expectancy rate. It proves that people in high income countries live longer than the people in low income countries. The people in high income countries can access healthcare facilities easily that allow their average age to be longer while the people in low and middle income countries could not. As shown in figure 2.1, low and middle income countries like Turkey, Mexico, and Argentina with higher income inequality exhibited lower life expectancy. When the income gap keeps increasing, the life expectancy of the poor will be having ambiguous effect as they did not possess enough wealth to support them in maintaining their health. The income gap will be growing wider and wider as poor health creates income difficulties for the individuals and families. At the same time, low and middle income countries are accompanied by high poverty rate, the quality of healthcare provided particularly from the informal sector are below optimal standard or even violated the standard guidelines (Rezwan, 2018). This has resulted in patients missed the timely treatment as most of them seek initial care from the informal sector because it is much cheaper. Therefore, it is significantly shown that when income inequality arises in low and middle income countries, the poor

will be the one who suffers from diseases as they only afford the low quality of health care and this will reduce the life expectancy of the population.

1.3 Research Objectives

1.3.1 General Objectives

The purpose of this research is to investigate the effect on financial development, economic growth, corruption and human capital on income inequality in low and middle income countries.

1.3.2 Specific Objectives

This paper aims to:

i. Determine the relationship between income inequality and financial development in low and middle income countries.
ii. Determine the relationship between income inequality and economic growth in low and middle income countries.
iii. Determine the relationship between income inequality and human capital in low and middle income countries.
iv. Determine the relationship between income inequality and corruption in low and middle income countries.

1.4 Research Question

There are some research questions have been figured out to fulfil the research objectives in this study:

1. Is there any relationship between income inequality and financial development in low and middle income countries?
2. Is there any relationship between income inequality and economic growth in low and middle income countries?
3. Is there any relationship between income inequality and human capital in low and middle income countries?
4. Is there any relationship between income inequality and corruption in low and middle income countries?

1.5 Hypotheses of the Study

Hypotheses 1

H_0: There is no relationship between income inequality and financial development in low and middle income countries.
H_1: There is a relationship between income inequality and financial development in low and middle income countries.

Hypotheses 2

H_0: There is no relationship between income inequality and economic growth in low and middle income countries.

H_1: There is a relationship between income inequality and economic growth in low and middle income countries.

Hypotheses 3

H_0: There is no relationship between income inequality and human capital in low and middle income countries.
H_1: There is a relationship between income inequality and human capital in low and middle income countries.

Hypotheses 4

H_0: There is no relationship between income inequality and human capital in low and middle income countries.
H_1: There is a relationship between income inequality and human capital in low and middle income countries.

1.6 Significance of the Study

Previous empirical studies related to income inequality such as Atkinson (2003) as well as Atkinson and Brandolini (2001) are mostly based on OECD countries or specifically developed countries, for instance, the United States and Japan in the study of Fields (2003), Lerman and Yitzhaki (1985) and Tachibanaki (2009). Studies on the income inequality in low and middle income countries are relatively less. In fact, unequal income distribution is also a challenge in low and middle income nations as income inequality suppress the economic growth, as well as affect the social welfare and political condition of the countries. Hence, our study is significant to identify the cause of income inequality in low and middle income countries and suggest possible

solution to reduce the income gap. It could be recognized as a step forward from the previous research by narrowing down the income quintile of countries studied.

Studying the economic context of low and middle income countries between 1980 to 2015 is profoundly interesting – in which a country's institutional quality, financial market or economic variable might have changed tremendously throughout the decades due to globalization and modernization. The impact of extended periods of financial development on economic growth in low and medium countries is also thought-provoking. Hence, it is important to study the influence of financial development associated with economic growth on income inequality for a longer time span.

In our study, we include variables from a different area of study to fill the research gap and apply dynamic panel data estimation to analyse the effect of the variables on income inequality. We use Generalized Method of Moments (GMM) which helps us to capture the dynamic effect in dynamic panel data and deal with endogeneity which always exists in thin panels. By solving the endogeneity problem, the test statistic is valid as GMM estimator is unbiased and consistent. In other words, we apply GMM estimator in order to correctly pinpoint the effect of variables on income inequality and obtain consistent and reliable empirical results.

1.7 Chapter Layout

There are five chapters to be discussed in this study. Chapter 1 provides the research background, problem statement, research objectives and questions, hypothesis of the study and significance of the study. Chapter 2 will be discussed in the theoretical literature review for the variables used in this study. Next, a methodology which

includes data description, econometric model and techniques, and diagnosis checking will be focused in Chapter 3. Chapter 4 describes the outcomes and findings that using the econometric model and techniques in the previous chapter. Lastly, Chapter 5 concludes major findings, limitations, recommendations and policy implication.

1.8 Conclusion

In short, the research background and brief introduction to the income inequality in low and middle income countries have been explained with problem statement in this study. Furthermore, the general and specific objectives, the significance of study and hypotheses of study have been pointed with the detailed direction in studying and determining the effect of financial development, economic growth, corruption and human capital on income inequality. Therefore, theoretical framework variables discussion will be included in Chapter 2.

CHAPTER 2: LITERATURE REVIEW

2.1 Theoretical Framework

In our research, financial development, economic growth, corruption and human capital are the independent variables used for determining the dependent variable, income inequality. Besides, we also found that some of the independent variables are correlated with the dependent variable as they can link to each other in two ways.

The impact of financial development on income inequality is claimed to be theoretically ambiguous as Bahmani-Oskooee and Zhang (2015) stated that the financial development can equalize or equalize the income distribution. Firstly, according to Zhang and Chen (2015), inequality-narrowing hypothesis holds that the income gap reduced when there is financial development as the poor have more chance to enjoy financial services. Besides, Galor and Zeira (1993) found that there will be an increase in the number of agents of the economy during the credit market development and it helps to reduce the income inequality. This is due to the agents are able to get sufficient money to invest in human capital. Secondly, Zhang and Chen (2015) also used the inequality-broadening hypothesis to describe the financial development would like to increase the income inequality gap. This is because those with more education savings become the entrepreneurs and those individuals with different saving can choose whether the human capital investment is required. Thirdly, Zhang and Chen (2015) used the inverted U-hypothesis (G-J hypothesis) to conclude the linkage between financial development with income inequality. This hypothesis holds that the first stage of financial development in an economy would raise the income inequality but reduce the income inequality in second or even third stages of development.

Next, the Kuznets hypothesis by Simon Kuznets is used to describe the relationship between economic growth and income inequality as economy grow from an initially rural farming culture to an industrialized urban economy. This hypothesis also holds an inverted U-curve. Precisely, income inequality increased when economic development increases at the lower level of development; however, it shifts at some point beyond and increased development would decrease the income inequality (Kuznets, 1955). This is because there are new investment opportunities in the early stage of economic development and those who are rich could increase their wealth by taking the chance to invest the capital they had. At the same time, rural labours keep receiving the lower wages at the working class, and thus it's widening the income gap. However, rural labours will move to urban area to find a better-paying job, the population in urban area increases which followed by the reduced in the rural-urban gap. Lastly, the income inequality reduced by the process of industrialization (Moffatt, 2017). On the other hand, Kuznets hypothesis also used to explain how the income inequality affecting economic growth. This theory implied that the aggregate consumption and demand structure are being affected by the unequal income distribution among the households which consequently affect the investment allocation, especially investment in human capital (Qin, Cagas, Ducanes, He, Liu and Liu, 2009).

Furthermore, according to Samadi and Farahmandpour (2013), corruption and income inequality can be positively related to each other in both ways. Therefore, an increase in corruption will increase the income inequality; while an increase in income inequality will also increase the corruption. Corruption can influence the income gap through many channels such as the overall growth, biased tax systems, asset ownership and poor targeting of social programs (Gupta et al., 2002). For instance, corruption can lead to tax exemption or tax avoidance in favour of the rich which consequently increase the income inequality. In contrast, Jong-Sung and Khagram (2005) suggested that the increase in income inequality raises the level of corruption. This is because the richer have greater wealth that can be used to buy influence in both legally and illegally ways (Glaeser, Scheinkman, and Shleifer 2003). Thus, they are able to influence many

channels such as law-implementing processes (bureaucratic corruption), interpretations of the law (judicial corruption) and tax reduction. On the other hand, the poor are more likely to rely on petty corruption in order to protect their basic services such as education and healthcare (Jong-Sung & Khagram, 2005). According to Murphy, Schnur, and Schneider (2016), the Game Theory suggested that the individual that makes the decision under uncertainty as rational decision makers who seek for their utility maximization. Therefore, inequality has adversely influenced the social norms about corruption and makes them tolerate the corruption as acceptable behaviour. For example, if people are surrounded by corruption, they may have to accept and even participate in corruption despite their values (Jong-Sung & Khagram, 2005).

Moreover, the impact of human capital on income inequality is also not always theoretically clear (Gregorio & Lee, 2002). This is because some researchers found that they are positively related while some researchers found that they are negatively related. Human Capital Theory, a current extension explanation of wage differential by Adam Smith, claimed that the income earned will be different according to the job. Besides, he also suggested that the cost of learning the job is the main factor that will affect the income earned. It followed by some researchers, such as Jacob Mincer and Gary S. Becker, stating that amount of investment in human capital (included education and training) will also differentiate the income gained (Spalletti, 2014). On the other hand, the variables are stated to be positively related as the nation spend more on education and therefore increase the human capital will earn more income compared to those who are less educated or uneducated. The unequal income distribution might consequently result in income inequality (Chani, Jan, Pervaiz & Chaudhary, 2014). In contrast, income inequality can be reduced when the average educational level of the group is higher. Income varies with inherent factors such as education levels, employment, profession and working experience. Therefore, the higher education will increase the income and thus reduce the income gap (Yue & Liu, 2007). Chani et al. (2012) and Galor and Zeira (1993) also suggested that the income inequality will affect the human capital as well. The individual with more wealth will spend more on education and

therefore have the more human capital while those with lesser income will hard to get the better education.

2.2 Review of Literature

2.2.1 The Relationship between Financial Development and Income Inequality

Ang (2010), Tiwari, Shahbaz, and Islam (2013) did a research by studying income inequality in India had found out that financial underdevelopment exacerbates income inequality by hurting to poor rather than the rich. It reviews that developing the financial system is fundamental to reducing income inequality, but financial sectors reforms affect in the opposite way as the adverse consequences of financial reforms on income inequality is believed to be transitory. Moreover, financial development is theoretically predicted to decrease income inequality through short and long-run investment whether in an economic boom or in an economic bust. Bittencourt (2010) proves that financial development does provide insulation against the bad economic condition in Brazil through a process of financial adaptation whenever people access to financial markets and acquire credit for investment. Even though in the event of high inflation or economic stagnation, the gap between the poor and the rich would remain smaller.

Furthermore, studies show financial deepening is claimed to be fundamental in alleviating economic disparity that is aligned to financial-inequality narrowing hypotheses (Hamori & Hashiguchi, 2012; Shahbaz,

Loganathan, Tiwari, & Sherafatian-Jahromi, 2015). Kim and Lin (2011) also discover that financial development of both stock markets and bank disproportionately assist the poor and eventually refine income distribution. Additionally, Mookerjee and Kalipioni (2010) micro-focused the measures of financial development by collecting the data of barrier to financial services and bank accessibility. The findings display that low-level income inequality is associated with high level of bank accessibility and low barrier to bank access. On the other hand, Rehman, Khan, and Ahmed (2008) analyse finance-inequality relationship according to different income countries and they asserted that financial development is negatively correlated to income inequality in different income group countries.

On the contrary, a study by Law and Tan (2009) indicated that financial development is not a way to address unequal income distribution in Malaysia as the empirical result shows that financial development is insignificant. Hoi and Hoi (2012) claimed that development in the financial system helps alleviate income inequality in Vietnam but the result is unreliable as their estimation error which cannot be avoided due to the limitation of data. The study on finance-inequality nexus in Vietnam is further extended by Hoi (2016) and the findings prove that financial development increases income inequality which is opposed to most of the studies. It is suggested the concept of underdeveloped financial system limits the access to financial services is biased. In addition, Jauch and Watzka (2016) found out a positive relationship between financial development and income inequality that is highly significant. The positive relationship was in fact only of a small magnitude.

Liang (2006), Jalil and Feridun (2011) had studied the linear and non-linear finance-inequality nexus in China. The findings support linear hypothesis showing that financial development significantly reduce income inequality but

it does not exhibit any support to the inverted U-shape hypothesis. Similarly, Clarke, Xu, and Zou (2006) explore the relationship between financial development and income inequality by conducting two different analyses: pure cross-sectional analysis and panel data analysis to capture the process of co-movement between both variables. The results generally align with an inequality narrowing hypothesis while the inverted U-shape hypothesis between financial development and income inequality inferred by Greenwood and Jovanovic (1990) is not well supported and the result is not robust.

However, Tan and Law (2012) successfully provided new evidence that emphasizes the nonlinear U-shaped relationship between income distribution and financial development in developing countries. The analysis uses two data sets of income inequality which are Standardized World Income Inequality Database (SWIID) and University of Texas Inequality Project (UTIP). Both results imply income inequality decrease at the earlier stage of financial development and increase eventually which rejected the inverted U-shaped relationship suggested by the previous researchers. Eventually, Shahbaz et al. (2015) studied on the income inequality in Iran and found out that their findings of the long run relationship between income inequality and financial development are in line with Greenwood-Jovanich (GJ) hypothesis. The short-run relationship between the variables is also proved to be negatively correlated. A further study on the nonlinear relationship in China was done by Zhang and Chen (2015) and the empirical results present an inverted U-shape relationship exists between income inequality and financial development.

2.2.2 The Relationship between Economic Growth and Income Inequality

According to Bruno, Ravallion and Squire (1998) and Ravallion (1995) they proved that there was no impact on the income inequality of economic growth over the period. Moreover, Anand and Kanbur (1993) expected that the U-curve only sensitive for some specific countries for the relationship between the economic growth and income inequality not affected by time. Adelman and Robinson (1989) found that the cross-country relationship can be either U-shape or J-shape in less developed countries which experienced a significant increase income inequality when economic growth increase. However, Ahluwalia (1976), Ahluwalia, Carter, and Chenery (1979), Bacha (1979) and Paukert (1973) agreed on the U-curve relationship between income inequality and the economic growth in cross-countries.

Based on Ram (1988) as well as Reuveny and Li (2003), the empirical findings show a negative relationship between economic growth and income inequality in developed countries. Meanwhile, Birchfirld and Crepaz (1998), Clarke (1995) and Li, Xu, and Zou (2000), they used the combination of less income and high income and get the negative relationship between the economic growth and income inequality. Higher economic growth indicates a country is performing well in investment, generating greater employment opportunity, providing the citizens larger access to work and earn income which decreases the income gap eventually (Majumdar & Partridge, 2009). Clarke et al. (2006) also proved that there was negative relationship by using the Ordinary least squares (OLS) method. They indicated that using panel data to get the result was better than using cross-sectional data.

Despite that, some of the researchers found that there was a positive sign for economic growth and income inequalities. According to ElGindi (2017), the economic growth leads to higher income inequality in the developing countries. In order to capture the changes in the neoliberal era, he used a longer time frame of 31 years and larger sample size of 96 developing countries. Shahbaz (2010) overviewed the past studies related to the nexus between economic growth and income inequality in the case of Pakistan based on ARDL approach. The empirical results show an increase in economic growth leads to higher level of income inequality increase in the short span of time as well as support the presence of Kuznets inverted U-shaped curve in long run. Papanek and Kyn (1986) claimed that the impact on income inequality of economic growth is unsystematic. It is reasoned with the measure of economic growth is based on the income from primary export which is not suitable and suggested to use growth of labour-intensive development instead. The suggested variable, in fact, is further claimed that there is no preliminary documentation on its significance.

On the other hand, the empirical evidence in Tiwari et al. (2013) has proven that the relationship between income inequalities and economic growth in India affected by time period. The results showed that there was a positive relationship in short run but the negative relationship in long run between economic growth and income inequality. Moreover, Deininger and Squire (1998) found that low income countries and high-income countries in the 1960s to 1990s result a two sign of the relationship between income inequality and economic growth. According to Deininger and Squire (1998), the result indicated that there was a negative relationship between income inequality and economic growth in high income countries while in low income countries, the result reveals a positive relationship between them. The sign of economic growth on income inequality is different based on the rural and urban area in the countries. Majumdar and Partridge (2009) suggested that greater population in urban area and influx of immigrants' increase job competition that may lead

to the people is rural are unable to access the job opportunity. Consequently, income inequality increased due to rich is getting richer and poor is getting poorer. The study of Delbianco, Dabús, and Caraballo (2014) emphasized the income group classification of each nations importance in determining the relationship between income inequality and economic growth. They stated that income inequality is positively related to economic growth in low income countries but negatively related in high income countries.

2.2.3 The Relationship between Corruption and Income Inequality

Upon the literature reviewed, researchers like Batabyal and Chowdhury (2015), Chowdhury, Desai, Audretsch, and Belitski (2015) and Matti (2015) used Gini index and corruption perceptions index (CPI) as the proxy for income inequality and corruption respectively to perform Ordinary Least Square (OLS) analysis. At some point in the study, they found out that corruption is positively related to the income inequality. In addition, according to Dincer and Gunalp (2012), Dobson and Ramlogan-Dobson (2010), Gupta, Davoodi and Alonso (2002), Gyimah-Brempong, (2002) and Pedauga, Pedauga and Delgado-Márquez (2017), different proxies of corruption that have been used in their research such as International Country Risk Guide (ICRG), corruption index and perceptions of corruption are also showing a positive relationship between the corruption and income inequality. It provides that the positive relationship is more accurate and reliable. Based on Ferreira de Mendonça and Martins Esteves (2014), Gyimah (2002) and Ullah and Ahmad (2016), they found that there is positively correlated between the two variables when applying the General Method of Moments (GMM). GMM has the additional function of eliminating the non-observable and the omitted variables effects on the

regressions, so they believed that the result obtains from the GMM would be more accurate than the OLS method.

Besides, Apergis, Dincer, and Payne (2010) and Dincer and Gunalp (2008) found out that the corruption is positively correlated and highly significant to income inequality which indicated that increase in corruption will lead to an increase in income inequality. Both of the journals used the same measure of variables which are Gini index and the index of a number of government officials convicted. According to Apergis et al. (2010), they achieved the result of relationship between the two variables in long run from the test of heterogeneous panel co-integration, but they get another result about there is a bidirectional causality between corruption and income inequality in both short run and long run from Granger-causality test that associated with a panel vector error correction model.

Based on Huang (2012), he proved that China and Philippines have a unidirectional causality from the corruption to income inequality from his empirical results through the bootstrap panel Granger causality approach. In other words, the countries could influence income inequality by changing the corruption level. However, there is one-way Granger causality from changing in income inequality result to change in corruption level in Indonesia, Japan, Korea, and Thailand. On the other hand, there is no Granger causality between corruption and income inequality in Malaysia, Singapore, Taiwan, and Vietnam. After that, Huang (2012) said that the corruption has the indirect effect on the income inequality through changing the economic growth. They used panel vector error correction model (PVECM) within the period of 1995 to 2010 in the Asian countries to confirm their suggestion. As a result, corruption hurts the economic growth, so if the decrease in economic growth will cause to reduce the income inequality.

Samadi and Farahmandpour (2013) investigated the effect of income inequality on corruption by using OLS, Breusch and Pagan LM test as well as the Pesaran test. The investigation was based on the economic freedom of a country economic freedom. Their economic freedom was categorized into four groups which are free, mostly free, mostly unfree and unfree countries. They found that if there is a decrease in income inequality in the economic free and mostly free countries, it was likely to reduce the corruption. But income inequality will cause corruption to get worse in the mostly unfree countries due to these countries have the economic-social-administrative structure. Last but not least, Mehrara, Firouzjaee, and Gholami (2011) investigated the relationship of both variables through the panel data and a dynamic panel estimator in OECD and OPEC countries during 2000 to 2007. The empirical results show that the corruption does not significant and have a positive impact on income inequality in OPEC but there is a negative relationship between the corruption and income inequality in OECD.

In short, the relationship between the corruption and income inequality are in positively sign based on most of the results supported by previous studies. Hence, this indicates that when there is an increase (or decrease) in corruption, it will cause an increase (or decrease) in income inequality.

2.2.4 The Relationship between Human Capital and Income Inequality

Human capital measured by the level of education has always been an issue causing income inequality in both low and middle income country. They are both interconnected to each other as most of the researchers found

significant connections either in a positive or negative way between them. In this paper, the relationship between human capital and corruption will be determined by using panel data analysis. The research conducted by Gregorio and Lee (2002) using 49 countries for 30 years has proven that higher education attainment will lead to a lower income gap between population. This conclusion was supported by the findings of Quang Dao (2008) for the research title of human capital, poverty and income distribution in developing countries. In this study, the researcher claimed that completion of the primary study in developing countries has significantly contributed to a reduction in income inequality. Whereas Rodríguez-Pose and Tselios (2009) found that secondary and tertiary educations were vital as well to reduce the income gap caused by the inequality in distributions. All these studies using panel data analysis were backed up by the results of Winegarden (1979) as it is considered as an old study towards the topic and it had made a conclusion of inequality in education is a major factor causing income inequality as well as generating wider income gap.

Besides, there were also researches carried out using time series data which successfully determined that the level of education will have an impact on income disparities. According to the study of Shahpari and Davoudi (2014), there was a test conducted to examine the effect of human capital which represented by the mean level of educated labour towards income distribution in Iran and the result discloses that increase in human capital will reduce the income inequality gap. Also, based on the research of Yue and Liu (2007), Motonishi (2006) and Cameron (2000), they found that income inequality has been affected by education in China and Thailand as well as Indonesia. When the average education of population accelerates, the income gap within the group of people became smaller. This indicated that as the general education increases, it will directly affect and reduce income inequality in these countries. Moreover, although Chiswick (1971) has used cross-sectional analysis to

conduct the research, the conclusion remained the same which is schooling inequality has generated a direct impact on income inequality. Thus, it has been proven that whenever there is rising in the population receiving higher education, the issue of income inequality will be reduced and this is in line with the expected result of our study.

However, the investigation conducted by Chani et al. (2014) on Pakistan shows that even though there is a relationship between human capital and income inequality, it only proved that income inequality will lead to educational inequality. They obtained a conclusion where the level of education did not give a rise to income disparity. In addition, the recent research done for Indonesia by Afandi, Rantung, and Marashdeh (2017) suggested that higher college participation rate has caused income inequality to become higher. The reason behind was tertiary education are expensive and only families with higher income level can afford to send their children to pursue further studies, this is causing income disparity when those graduates having higher possibility to receive a high-skilled job with a higher income than those did not go to university. At the same time, Castelló-Climenta and Doménecha (2017) claimed that it is a must to complete at least primary studies in order to ensure that there is a reduction in income inequality through education. Therefore, education is still playing the main role in affecting the level of income disparity although few of the researchers found that it is not so essential to be focused on.

CHAPTER 3 METHODOLOGY

3.1 Data Description

This study is to investigate the effect of financial development, economic growth, human capital, corruption on income inequality. Data of 53 middle income countries and 12 low income countries from 1980 to 2015 are used in our analysis. The data source and proxy for each selected variable are as below:

Table 3.1: Sources of Data

Variable	Abbreviation	Proxy	Source
Income Inequality	LGIEQ	Gini Index	Luxembourg Income Study
Financial Development	LGFD	Domestic credit to the private sector	World Bank
Economic Growth	LGRGDP	GDP per capita	World Bank
Corruption	LGCPI	Corruption Perception Index	International Country Risk Guide
Human Capital	LGHC	Education attainment	Barro-Lee Dataset

3.1.1 Dependent Variable

3.1.1.1 Income Inequality

Income inequality is defined as the measurement of the income gap between individuals. GINI Index is a popular measurement of inequality within the countries which is appropriate to represent income inequality (Batabyal, & Chowdhury, 2015; Matti, 2015; Meschi & Vivarelli, 2009; Reuveny & Li, 2003). Additionally, Bakare (2012), claimed that GINI coefficients are consistent with Lorenz Curve. GINI scale indicates perfect equality in income distribution when the score is 0.0, perfect income inequality when the score is 1.0. The data is collected from Luxembourg Income Study.

3.1.2 Independent Variable

3.1.2.1 Financial Development

Financial development is defined in terms of efficiency, stability, and size of the financial system in a particular country. Domestic credit to the private sector includes measures of loans and non-equity securities which is suitable to represent financial development. (Beck, Demirgüç-Kunt & Levine, 2007; Hamori, & Hashiguchi, 2012; Jauch & Watzka, 2016; Liang, 2006). The higher measurement of domestic

credit to private sector, the greater financial resources, financing and opportunity to develop and grow.

3.1.2.2 Economic Growth

GDP per capita is a measure of a country's economic output that takes population into accounts. It divides the country's gross domestic product by its total population. GDP per capita (current US$) is a suitable measurement for economic growth (Hartmann, Guevara, Jara-Figueroa, Aristarán & Hidalgo, 2017; Papanek & Kyn 1986; Reuveny & Li, 2003; Shahbaz, 2010).

3.1.2.3 Corruption

Corruption is defined as the use of public office for private gains. Corruption Perceptions Index (CPI) indicates how corrupt a country's public sector is perceived to influence the country's ranks and territories which is suitable as the proxy of corruption (Gupta et al., 2002). Huang (2012) and Matti (2015) also used the CPI as the corruption proxy. The CPI scores are measured by the scale from 0 to 100, 0 indicates that a country is perceived a high level of corruption while 100 indicate that a country is very clean. The data is collected from International Country Risk Guide (ICRG).

3.1.2.4 Human Capital

Human capital is the measure of the economic value of an employees' knowledge and skill. Human capital is represented by the level of education which is obtained by Barro and Lee Dataset. The Barro and Lee Dataset utilized the school enrolment rates as a proxy of human capital where the higher the school enrolment rates, the wider the education coverage. Barro and Lee (2013) also used the education attainment as the proxy of human capital.

3.2 Data analysis

3.2.1 Econometric Model

Regression Model:

$$\mathbf{LGIEQ_{it}} = \beta_0 + \beta_1 \mathbf{LGFD_{it}} + \beta_2 \mathbf{LGRGDP_{it}} + \beta_3 \mathbf{LGCPI_{it}} + \beta_4 \mathbf{LGHC_{it}} + \varepsilon_{it}$$

Where $\mathbf{IEQ_{it}}$ = Income Inequality (Gini Index)

$\mathbf{FD_{it}}$ = Financial Development (Domestic credit to private sector)

$\mathbf{RGDP_{it}}$ = Economic Growth (GDP per capita, constant 2010 US$)

$\mathbf{CPI_{it}}$ = Corruption (Corruption Perceptions Index)

$\mathbf{HC_{it}}$ = Human Capital (Education attainment)

ε_{it} = Error Term

The regression model is used to test the role of financial development, economic growth, corruption and human capital on income inequality within cross-countries (i) and the time period (t). $\boldsymbol{\beta_1}$ is expected to be negative since underdeveloped financial market provoke high level of income inequality and this is supported by Bittencourt (2010) and Hamori and Hashiguchi (2012). $\boldsymbol{\beta_2}$ is estimated to be positive as Deininger and Squire (1998) suggested that economic growth will increase income inequality in low income countries. Gupta et al. (2002) draw an inference that high corruption will lead to high level of income inequality. However, in our study, $\boldsymbol{\beta_3}$ is expected to be negative because our proxy used indicates lower CPI means highly corrupted as Mehrara et al. (2011) also suggested it is negative. $\boldsymbol{\beta_4}$ is expected to be negative sign owing to the fact that Gregorio and Lee (2002) reckoned that greater education attainment results in lower income inequality. Meanwhile, $\boldsymbol{\varepsilon_{it}}$ is error term and $\boldsymbol{\varepsilon_{it}}$~IID (0, $\theta^2$for all i and t) which means for a particular country are serially uncorrelated as well as errors are homoscedastic across time and country.

In the regression model, we will apply the log-log form which is one of the natural logarithms to illustrate the variables. So, the income inequality, financial development, economic growth, corruption and human capital will be transformed into the log-log form. Using the log-log form in regression model will make the model more fit to the data (Yang, 2012). Because the log model is measuring the percentages change, thus it is invariant to the scale of the variables. The log model also standardized the variables measurement units such as scores and index by using percentages change. After that, the results will be more specified which is meaning that the gap of between the independent variables and dependent variable will be reduced after transforming the model into log form. Therefore, the results will become more accurate to the true value.

3.3 Econometric Technique

In panel data, individuals such as persons and countries are observed at several periods of time such as years and months. The use of normal OLS standard error may inappropriate due to the cluster effect. Therefore, robust standard errors which allow the cluster correlation and heteroscedasticity should be used (Vuko & Čular, 2014). The frequently used methods for panel data would be Pooled Ordinary Least Square (POLS), Fixed Effect (FE) and Random Effect (RE).

Firstly, Pooled Ordinary Least Square (POLS) model is a model that assumed there is exogeneity, where disturbances are not correlated with any independent variables. POLS also assume the disturbances have constant variance and not correlated with each other, which mean there are homoscedasticity and no autocorrelation. Besides, POLS will only produce efficient and consistent estimator of the parameter when the individual effect does not occur. However, with the existence of the individual effect, heterogeneity may affect the assumptions of POLS and thus the estimators are no longer best, linear, unbiased and efficient (BLUE) due to the heteroscedasticity problem and serial correlation over time. With the existence of serial correlation over time, the endogeneity problem (where independent variable is correlated with the error term) will be also occurred due to the autocorrelation problem in autoregression (AR). In addition, Aisen and Veiga (2013) described the limitation of using OLS in estimating dynamic model is that it will raise a problem of dynamic panel bias. Dynamic panel bias arises due to the demeaning process where x and y will be subtracted from their respective mean value which consequently creates the correlation problem between independent variable and error term (Nickell, 1981).

On the other hand, Fixed Effect (FE) and Random Effect (RE) model can be used for the presence of individual effect. FE model assumes the individual-specific

effect is time-invariant and considered as a part of intercept. Therefore, FE model is able to control over the unobserved heterogeneity when heterogeneity is constant over time. Besides, the individual effect is allowed to be correlated with the independent variables under FE model. However, this assumption will cause the endogeneity problem happen where there is correlation between error term and explanatory variable. Furthermore, FE model is not able to control the variables that vary over time, thereby, a more complex model is needed to control the time-variant variables.

Next, Random Effect (RE) model is also known as Error Component model which assumes individual-specific effect is a random variable and not correlated with any independent variable. Besides, RE model assumes there is constant variance of individual specific effect and error variance specific to group or time. The disturbance of RE model is an individual specific random heterogeneity or a component error term. Thus, RE model is more efficient than FE model. Nevertheless, when the assumption of RE model does not hold (if individual-specific effect correlated with covariates in the model), the endogeneity problem occurred and the RE model will become not consistent at the same time. Therefore, a more appropriate model is needed to overcome the problems that faced by POLS, FE and RE model.

In this study, the data used are dynamic panel data that included cross-section and time series data. Hence, we choose the Generalised Methods of Moments (GMM) Estimation in order to construct more efficient estimates for our studies. GMM is a general framework for deriving estimators and able to produce estimators with lesser assumptions and greater robust; GMM estimator is a dynamic panel data estimator which is built on more general characteristics of population as it only requires fewer assumptions. GMM estimation also allows incorporate as much restriction as economic theory implies which helps to avoid endogeneity problem. Many researchers had used GMM estimator to perform panel data analysis such as Beck et al. (2007), Hamori and Hashiguchi (2012), Jauch and Watzka (2016), Kim and Lin (2011), Liang (2006), as

well as Tan and Law (2012). According to Roodman (2006), these are the situations to implement GMM: 1) panel data is “small T, large N”, which our time series is 7 years while cross-section is 65 countries; 2) linear relationship between left handed variable and explanatory variable; 3) a dynamic dependent variable at which income inequality level was affected by the past record; 4) independent variable may be endogenous, which our financial development, economic growth, corruption and human capital may be affected by other independent variables in the system; 5) model holds constant average effects of each country – fixed individual effect that could decrease the probability of omitted variable bias; 6) autocorrelation and heteroscedasticity within each country but not across them. In short, GMM is an appropriate estimator to be used in our research.

3.3.1 GMM estimator

Ordinary Least Squares (OLS) is one of the simplest classical linear estimators which could minimize the sum of squared errors to fit a function closely with the data; while two-stage least squares (2SLS) is the extension of OLS estimator, used when error term of regress and is correlated with regressors. In order to understand the weakness of linear regression estimators, we will look into moment condition (statements involving data and parameters) of OLS estimators.

In a linear regression model, $y_t = \beta x_t' + \varepsilon_t$, it is assumed that $E[y_t|x_t] = \beta x_t'$. This indicates the popular moment condition $E[x_t\varepsilon_t] = E[x_t(y_t - \beta x_t')] = 0$. In this case, we defined the respective sample moment conditions as

$$g_t(\hat{\beta}) = \frac{1}{T}\sum_{t=1}^{T} x_t\left(y_t - \hat{\beta}x_t'\right) = \frac{1}{T}\sum_{t=1}^{T} x_t\, y_t - \frac{1}{T}\sum_{t=1}^{T} x_t\,\hat{\beta}x_t' = 0$$

and MM estimator solves the sample moment condition by providing a unique solution

$$\hat{\beta}_{MM} = \left(\sum_{t=1}^{T} x_t\, x_t'\right)^{-1}\sum_{t=1}^{T} x_t\, y_t = (X'X)^{-1}X'Y = \hat{\beta}_{OLS}$$

By considering another regression model, $y_t = \beta_1 x_t' + \varepsilon_t = \gamma_1 x_{1t}' + \gamma_2 x_{2t}' + \varepsilon_t$. K_1 variables in x_{1t} are assumed to be predetermined, while $K_2 = K - K_1$ variables in x_{2t} are endogenous which implies

$E[x_{1t}\varepsilon_t] = 0 \qquad (K_1 \times 1) \qquad$ *(equation 1)*

$E[x_{2t}\varepsilon_t] \neq 0 \qquad (K_2 \times 1) \qquad$ *(equation 2)*

We have K parameters in $\beta_1 = (\gamma_1, \gamma_2)'$, but only when moment conditions of $K_1 < K$. It implies that OLS estimator is inconsistent, the parameters are under identification and cannot be estimated consistently. Now, by assuming K_2, new variables w_{2t} which are correlated with x_{2t} but uncorrelated with ε_t, $E[w_{2t}\varepsilon_t] = 0$ (Equation 3). To simplify notation, the K_2 moment condition in Equation 2 can be replaced by Equation 3:

$$\underset{(K \times 1)}{x_t} = \begin{pmatrix} x_{1t} \\ x_{2t} \end{pmatrix} \qquad \text{and} \qquad \underset{(K \times 1)}{w_t} = \begin{pmatrix} x_{1t} \\ w_{2t} \end{pmatrix}$$

Where x_t are model variables, w_t are instrument variables and w_{2t} are new instruments and x_{1t} are instruments for themselves. The K population moment conditions are $E[w_t\varepsilon_t] = E[w_t(y_t - \beta x_t')] = \underset{(K \times 1)}{0}$ and the respective sample moment conditions are defined as equation 4 as below:

$$g_t(\hat{\beta}) = \frac{1}{T}\sum_{t=1}^{T} w_t\left(y_t - \hat{\beta}x_t'\right) = \frac{1}{T}\sum_{t=1}^{T} w_t\, y_t - \frac{1}{T}\sum_{t=1}^{T} w_t\,\hat{\beta}x_t' = \underset{(K \times 1)}{0}$$

and MM estimator solves the sample moment condition by providing a unique solution

$$\hat{\beta}_{MM} = \left(\sum_{t=1}^{T} w\, x_t'\right)^{-1} \sum_{t=1}^{T} w_t\, y_t = (W'X)^{-1}W'Y = \hat{\beta}_{IV}$$

The MM estimator equates with the simple Instrumental Variable estimator, but it only works with K_2 instruments when moment condition, R=K.

In a dynamic model, we can always use lagged values as instruments and adjust them to get parameters which are different from zero and mean of zero. Endogenous variables are over-identified when there are more instruments than endogenous variables (R > K). In this case, Generalised Methods of Moments (GMM) estimation can address the problem of over-identification. GMM chooses to make (Equation 4) as small as possible using quadratic loss. i.e. GMM estimator $\hat{\beta}$ minimises

$$Q_N(\beta) = \left[\frac{1}{T}\sum_{t=1}^{T} w_t\left(y_t - \hat{\beta}x_t'\right)\right] A_N \left[\frac{1}{T}\sum_{t=1}^{T} w_t\left(y_t - \hat{\beta}x_t'\right)\right]$$

Where A_N is an L×L matrix of weights which is chosen 'optimally' to obtain the smallest variance GMM estimator. By dropping the N and transposing, the solution is

$$\hat{\beta} = \left[\left(\sum_{t=1}^{T} W_t\, X_t'\right) A \left(\sum_{t=1}^{T} X_t\, W_t'\right)\right]^{-1} \left[\left(\sum_{t=1}^{T} W_t\, X_t'\right) A \left(\sum_{t=1}^{T} y_t\, W_t'\right)\right]$$
$$= (WX'AXW')^{-1}(WX'AYW')$$

The equation above is the GMM estimator defined by A which is linear to Y. GMM estimator is consistent, implying that under suitable circumstances, as sample size increase to infinity it converges in probability to β (Hansen 1982). On the other hand, 2SLS is general biased due to the instruments in finite samples are almost always slightly correlated with the endogenous elements of

the instrumented explanatory variables. Correlation coefficients between finite samples of uncorrelated variables are usually not equal to 0.

3.3.2 Difference GMM and System GMM

Generalised Methods of Moments (GMM) estimation for dynamic panel data had been successfully established and applied since last decade. Arellano and Bond (1991) was the pioneer of this GMM estimation application for panel data It is started by transforming all explanatory variables by differencing and uses GMM (Hansen 1982), and it is known as Difference GMM. Difference GMM estimation has become famous in the use of the empirical growth literature. The Arellano and Bond estimator – Difference GMM was initially promoted in different topics related to growth. For instance, Caselli, Esquivel, and Lefort (1996) used this estimator to analyse the Solow model while Greeanway, Morgan, and Wright (2002) investigates the impact of trade liberalisation in developing countries by using this difference GMM estimation as well as Banerjee and Duflo (2003) also used the difference GMM to determine the effect of income inequality on growth.

However, the introduced of Blundell and Bond (1998) estimator-System GMM had gained a greater attention compare to the Arellano and Bond (1991) estimator in the empirical growth literature. Arellano-Bover/Blundell-Bond estimator elevate Arellano-Bond by making an extra assumption, which first differences of instrument variables are uncorrelated with the fixed effects – and is called System GMM. Consequently, more instruments are allowed to enhance the efficiency of the model. For example, Dalgaard, Hansen, and Tarp (2004) used the system GMM estimator for the studies on aid and growth;

Cohen and Soto (2007) also used the estimator in their studies of Growth and human capital: good data, good results; and the studies of exchange rate volatility and growth by Aghion, Bacchetta, Ranciere and Rogoff (2009) was also applying this estimation.

In specifically, we use the system GMM estimation to analyse our study. This is due to the usefulness and capabilities of system GMM estimation. Firstly, the correlation problem between the lagged dependent variable and the error term requires the use of instruments to solve it. Moreover, one of the important features for instrumental variables is their exogeneity which relate to the overidentifying restriction tests. The difference GMM estimation often rejects the exogeneity due to the weak instruments, the lagged of the independent variable, for the differenced variables (Uddin, Ali & Masih, 2017). However, the system GMM estimation would result in overidentifying restriction tests which never reject the exogeneity and most suitable to be used to solve the problem (Blundell & Bond, 2000). Next, Oseni (2016) also suggested that the system GMM estimation can cope with the persistence in panel data even the persistence is very high. Therefore, the system GMM estimation could offer the lowest bias and highest precision for analysis. In addition, system GMM is the more trustworthy estimator in terms of Type-I error and power of significance tests. This is because there are a lot of estimators such as OLS estimator, Within estimators and difference GMM estimator are often making the wrong rejections of hypothesis which in term of Type-I error and power of significance tests.

3.4 Diagnosis Checking

3.4.1 Sargan-Hansen test

The Sargan-Hansen test or Hansen J-statistic is a statistical test of over-identifying restrictions, suggested by John Denis Sargan in 1958 (Sargan, 1958). It was modified by Lars Peter Hansen proposing that GMM can be extended to general non-linear GMM in time series context (Hansen, 1982). The error term is assumed to be independent and identically distributed (i.i.d.) in order to obtain a valid result (Sargan, 1988). By having the over-identifying restriction test, we can identify whether the model is correctly specified even when there are more moment conditions than parameters.

H_0: The instruments are valid (Uncorrelated with the error term)
H_1: The instruments are invalid (Correlated with the error term)

Higher J-stats leads to higher probability to reject the null hypothesis. If the data is correctly described, test statistic will be very close to 0 and J-stat will be very low. It will be asymptotically chi-squared distributed under the null hypothesis of the correctly identified model. On the other hand, higher ρ-values indicates the model is valid and can be accepted. It is possible to fulfil all the moment restriction simultaneously, even there are more moment conditions than parameter. J-stat will reject a model if an incorrect moment restriction is added into the model implying that the restriction is not consistent with the parameters necessary.

3.4.2 Arellano-Bond Serial Correlation Test

The Arellano-Bond (AB) Serial Correlation Test is an estimator to estimate the dynamic panel data for GMM models. This test was first proposed and suggested by Arellano and Bond (1991) in their identification of tests that were suitable to be used in verifying a valid result. The serial correlation problems may occur between the instrument of current period with past period, and this will cause the instrument to be invalid (Brañas-Garza, Bucheli & García-Muñoz, 2011). In the case that estimator following the assumption of white noise errors, whenever there is serial correlation occurs between the lags, it will lead to inconsistency and the results will become biased. Thus, the importance of specification test has been determined by Arellano and Bond (1991) and they found the essentialness in ensuring the absence of serial correlation so that the validity of test statistics was guaranteed.

H_0: There is no serial correlation (The instruments are valid)
H_1: There is a serial correlation (The instruments are not valid)

The null hypothesis is that the instruments are valid, which means the serial correlation problem did not exist within the instrument. The serial correlation is tested using an Autoregressive process where the first order process, AR (1) shows the current value is based on the past value while the second order process, AR (2) shows the current value is based on the past two values.

CHAPTER 4 DATA ANALYSIS

4.1 Result of POLS, FE and RE Estimation

Table 4.1: Result of Pooled OLS, Random Effect, and Fixed Effect

	Pooled OLS	Random Effect	Fixed Effect
LGFD	-0.0295842*** (0.0113967)	-0.0283239*** (0.0108772)	-0.0288763** (0.0114808)
LGRGDP	0.0589054*** (0.0121063)	0.0246468 (0.0161950)	0.0170955 (.0206682)
LGCPI	0.0609815*** (0.0222708)	0.0300522* (0.0163970)	0.0251274 (0.0168745)
LGHC	-.0508176*** (0.0092388)	-0.0123024 (0.0088842)	-0.0006739 (0.0094203)
Constant	-0.7723418*** (0.0811619)	-0.5269073*** (0.1181688)	-0.4605313*** (0.1523377)
Breusch-Pagan LM Test	315.64 (0.000)		
Hausman Test			17.02 (0.0019)
Observation	373	373	373

Table 4.1 illustrates the estimated models by using Ordinary Least Square (OLS), fixed effect and random effects estimations are well stated. According to the empirical result of OLS estimation, at 1% significance level, LGFD and LGHC are negatively correlated to LGIEQ while LGRGDP and LGCPI are positively correlated to LGIEQ. Based on Random Effect Model, LGFD and LGCPI are significantly

positively correlated to LGIEQ at 1% significant level and 10% significant level respectively. In Fixed Effect Model, only LGFD is shown to be significantly negatively related to LGIEQ. To decide between POLS or Random Effect model, we run Breusch-Pagan LM Test where null hypotheses are POLS estimation is preferable while the alternative is REM is preferable. Since the probability value in Breusch-Pagan LM Test is smaller than 0.01, it indicates that random variable is preferable. Then, we further proceed to use Hausman Test which is also described as a test for model misspecification. In panel data analysis, Hausman test helps to identify whether a regression model is fixed effect model or random effect model. The null hypothesis is that the preferred model is random effects while the alternate hypotheses are the model is FEM. The empirical result in Table 4.1 rejects null hypotheses because p-value is lesser than 0.01. Fixed Effect Model is preferable.

However, based on Appendix 1.6, empirical result of Fixed Effect estimation shows that correlation between independent variables and disturbance term is 0.0730. It indicates endogeneity problem exists in the Fixed Effect Model. The estimate of the independent variable become inconsistent and useless as it will not converge to the true population parameters even with greater sample size (Antonakis, Bendahan, Jacquart, and Lalive, 2014). Eventually, the test statistic of Fixed Effect Estimation become invalid.

4.2 Result of Difference GMM Estimation

Table 4.2: Results of Difference GMM Estimation

	1 step Difference GMM (Model 1)	2 Step Difference GMM (Model 2)	2 Step Difference GMM with robust version (Model 3)
LGIEQ	0.20231	0.13988	0.13988
	(0.73)	(0.52)	(0.38)
LGCPI	-0.04089	0.02441	0.02441
	(-0.58)	(0.63)	(0.62)
LGRGDP	0.30102 **	0.22608 *	0.22608
	(2.10)	(1.83)	(1.41)
LGHC	-0.01884	0.03108	0.03108
	(-0.28)	(0.64)	(0.41)
LGFD	-0.12322 **	-0.08837 **	-0.08837
	(-2.34)	(-2.15)	(-1.37)
Constant	-	-	-
Sargan Test	0.014	0.014	0.014
Hansen Test	-	0.315	0.315
AR(1)	0.678	0.965	0.976
AR(2)	0.181	0.101	0.126
Obs	268	268	268
N	58	58	58
No. of instruments	26	26	26

*t statistics in parentheses * p<0.10, ** p<0.05, *** p<0.01

Table 4.2 displays the dynamic panel Difference GMM estimations for income inequality in low and middle income countries. The lagged term of LGIEQ under difference GMM estimator is insignificant at 1%, 5% and 10% significance level which

implies that difference GMM estimator is not suitable to be used in our research. Even though corruption and financial development are significant as illustrated in 1 step Difference GMM and 2 Step Difference GMM, the results are capricious. In this case, we proceed to use system GMM estimator in our analysis.

4.3 Result of System GMM Estimation

Table 4.3: Result of System GMM Estimation

	1-step System GMM (Model 4)	2-Step System GMM (Model 5)	2- Step System GMM with robust version (Model 6)
LGIEQ	0.76773*** (6.84)	0.78224*** (14.57)	0.78224*** (6.68)
LGCPI	0.04685 (0.61)	0.01676 (0.62)	0.01676 (0.28)
LGRGDP	0.10896*** (3.11)	0.11292*** (6.50)	0.11292*** (2.61)
LGHC	-0.00182 (-0.06)	0.00800 (0.55)	0.00801 (0.26)
LGFD	-0.06219* (-1.89)	-0.06378*** (-4.42)	-0.06378* (-1.82)
Constant	-	-0.86354*** (-6.45)	-0.86354*** (-2.84)
Sargan Test	0.645	0.645	0.645
Hansen Test	-	0.416	0.416
AR(1)	0.102	0.002	0.095
AR(2)	0.590	0.136	0.199
Obs	325	325	325
No. of groups	59	59	59
No. of instruments	42	42	42

* t statistics in parentheses p<0.10, ** p<0.05, *** p<0.01

Model 4, 5 and 6 in Table 4.3 represent system GMM estimation for income inequality in low and middle income countries. Our empirical results under system

GMM estimator reveals that lagged income inequality (LGIEQ) in Model 4, Model 5 and Model 6 are statistically significant at 1%, 5% and 10% significance level which indicates that system GMM is an appropriate estimator for our research and the results are reliable. Therefore, we perform the statistical inference on the hypothesis.

In one-step system GMM, the relationship between LGCPI and LGIEQ are negatively related; however, the relationship is insignificant due to p-value is greater than 1%, 5%, and 10% significance level. LGRGDP is shown to be significantly correlated to income inequality at 1% significance level. The relationship between LGRGDP and LGIEQ is positive: when economic growth increase by 1%, on average, income inequality increases by 0.10896%, holding other variables constant. Moreover, income inequality decreased by 0.00182% when human capital increase by 1%, on average holding other variables constant. The negative relationship between LGHC and LGIEQ are insignificant as p-value is greater than 10% significance level. LGFD proved to be negatively correlated with LGIEQ and the relationship is significant at 10% significance level. 1% decrease in financial development will lead to 0.06219% increase in income inequality, on average, holding other variables constant. Hwang and Sun (2015) suggested going further using two-step GMM to obtain a better result when the advantage of using the optimal weighting matrix offsets the cost of estimating it. Diagnostic tests for endogeneity and overidentifying restrictions are invalid when heteroskedasticity is existed. Hence, Baum, Schaffer, and Stillman (2003) recommended implementing heteroskedasticity–consistent or "robust" standard errors and statistics to avoid the problems. Therefore, we further analyze by using 2-step system GMM with robust version.

In 2-step system GMM with robust version, the result is consistent to 2-step system GMM showing that economic growth and financial development are significantly related to income inequality; whereas, human capital and corruption are insignificantly correlated to income inequality at 1%, 5%, and 10% significance level.

The insignificant relationship between income inequality and human capital is supported by Chani et al. (2014) who stated that human capital is statistically significant to education inequality but insignificant to income inequality. As illustrated in Model 2, economic growth is statistically significant to income inequality at 1%, 5%, and 10% significance level. Income inequality is shown to increase by 0.11292%, on average when economic growth increase by 1% holding other variable constant indicating a positive relationship between the variables. Our empirical result rejects most of the research studied by Clarke (1995), Hartmann et al. (2017), Li et al. (2000), Ram (1988), and Tiwari et al. (2013), who signified the negative relationship between economic growth and income inequality. On the contrary, our findings are in line with the results of Shahbaz (2010). Hence, it is deduced that economic growth increases income gap through changing the economic structure and increasing job competition. Due to globalization and active participation in trade activities by countries, more migrant worker inflow into the countries with the lower demand of wage rate raising the job competition among the poor. Consequently, the poor may demand lower wage rate too in order to be employed. It is undisputed that wider income gap is associated with economic growth when the poor earn a lower income.

Moreover, LGFD is statistically significant at 10% significance level but insignificant at 1% and 5% significance level. In our study, domestic credit to the private sector is used as the proxy for financial development and the result exhibits that financial development is negatively correlated to income inequality as financial development decrease by 1%, income inequality increase by 0.06378%, on average, holding other variables constant. In a simpler way, income inequality will be relatively higher when the banking sector is less developed in low and middle income countries due to credit constraints. This result is similar to the findings of Beck et al. (2007). Clarke et al. (2006) and Liang (2006). In fact, Tornell and Westermann (2003) proposed that middle income countries are characterized as countries with credit constraints where poor do not have equal access to the financial market. In low and middle income countries, income inequality is raising because poor are unable to

borrow money because they do not have collateral and close relationship with financial institutions, while the rich are able to access to credit easily which allows them to earn more money through investment, increasing the gap between the poor and the rich (Ang, 2010). On the other hand, our result rejects the hypothesis stated by Rajan and Zingales (2003) which inferring that increasing income inequality is associated with increasing financial development.

4.4 Diagnosis Checking

4.4.1 Sargan-Hansen Test

According to the results shown in Table 4.2, the p-values for Sargan Test in Difference GMM are 0.014. As it is smaller than the significance level of 10%, therefore the null hypothesis in this test are being rejected. In this case, the instruments in Difference GMM are considered as non-reliable due to the existing correlation between instruments and error term.

In contrast, the p-values for Sargan and Hansen Test in System GMM shown in Table 4.3 are 0.645 and 0.416 respectively. Since both of the p-values are greater than 10% significance level, thus we do not reject the null hypothesis which indicates the variables did not correlate with the error term. In another word, this can be defined as the instruments are valid in the models and the results are trustable in identifying the relationships between them. As a conclusion, the model from System GMM will be chosen in this study because of the instruments did not correlate to the error term and the validity is affirmed.

4.4.2 Arellano-Bond Serial Correlation

The p-values of first-order serial correlation, AR (1) for 1 Step Difference GMM, 2 Step Difference GMM and 2 Step Difference GMM with robust version are 0.678, 0.965 and 0.976 respectively. At the same time, the p-values for second-order serial correlation, AR (2) are 0.181, 0.101 and 0.126. As all the p-values are greater than 10% significance level, the null hypothesis is failed to reject. This denotes that the problem of first-order serial correlation and second-order serial correlation did not exist in the model. Thus, the results of Difference GMM are reliable in this study.

Besides, the p-values of first-order serial correlation, AR (1) for 1 Step System GMM, 2 Step System GMM and 2 Step System GMM with robust version are 0.102, 0.002 and 0.095 respectively. Since the values of 2 Step System GMM and 2 Step System GMM with robust version are lesser than 10% significance level, we proceed to second order serial correlation, AR (2) to further determine the existence of serial correlation in these models. From the results obtained in AR (2), which are 0.590, 0.136 and 0.199 for the three models in System GMM, it shows that the second-order serial correlation does not exist in the situation. Which means the results are acceptable and the final models chosen would be System GMM as compared to Difference GMM because of passing both of the correlation tests.

CHAPTER 5 CONCLUSION

5.1 Conclusion

Income inequality is considered as a global issue that faced by most of the countries in the world, especially low and middle income countries. Even though there were some policies being implemented to reduce the income gap, people are still suffering from the problems created due to this issue. It has caused a variety of negative impacts towards the economy and society such as those mentioned in the earlier chapter, which are crime intention, reduced quality of facilities as well as unreliable health care. With the intention of solving these problems, the determinants of income inequality should be found so that effective policies can be executed to enhance the economy. Therefore, this research has been carried out to examine the linkage of financial development, economic growth, corruption and human capital towards income inequality in low and middle income countries.

This study included 65 countries (53 middle income countries and 12 low income countries) over the period 1980 to 2015 to determine the linkage between income inequality and financial development, economic growth, human capital, and corruption by using dynamic panel data estimator. In this case, System GMM approach is being used to perform the empirical analysis since this estimation enables to solve the endogeneity problem as well as provide the lowest bias and highest precision results.

In short, this study has achieved the primary objectives as the ultimate results discovered that the economic growth and financial development are statistically significantly related to the income inequality while the corruption and human capital

are statistically insignificant related to the income inequality. Also, the results indicated that only economic growth has the positive relationship with income inequality while the other three variables (corruption, human capital, and financial development) have the negative relationship with the income inequality, where these are in line with the expected sign suggested according to the literature reviewed.

5.2 Policy Implication

Our findings imply that financial development is negatively affecting income inequality in low and middle income countries. This proves that an underdeveloped financial system will hurt the poor more than the rich, raising the income gap between the two groups. Hence, generating a more widely available financial and credit markets is an important strategy to achieve a more equitable income distribution in low and middle income countries.

In the low and middle income countries where there is a commonness of widespread poverty, poor segments cannot acquire credit from banks, and it had been existing for decades due to the poor institutional infrastructure in rural areas. To regress the issues and improve access of the poor, the government should build banks in the rural area and those banks are different to the fully fledged commercial banks in the urban area, which are microfinance institutions. A microfinance institution is an organization which is able to help the poor by providing them a small amount of loan to launch and operate a business. With the money borrowed, the poor can make more productive investments such as investing in small manufacturing sectors to earn interest. Over the time, they will have savings and ability to pay back the loan from the institutions. A microfinance institution is definitely a form of financial development which can reduce the income inequality in low and middle income countries as it

supports the poor by assisting them to build savings and it is working towards into part of a nation's official financial system.

Furthermore, there are many migrant workers in low and middle income countries due to the globalization effect. Most of them do not own a proper identification of residence that will make them unable to access to financial services. Since our findings unveil that financial development is significant to reduce income inequality in low and middle income countries, the government should achieve greater breadth and depth in the financial system. Government is suggested to launch a biometric identification project which can improve the financial services to be accessed by the poor. Biometric identification system gives each of the individuals a unique identity number supported by their biometric details. This idiosyncratic identity will expand financial inclusion by improving the credit accessibility among the immigrants, and eventually decrease income inequality in low and middle income countries.

On the other hand, economic growth is a significant element which must be considered in solving the high level of income inequality in the low and middle income countries. First of all, fiscal redistribution is commonly known as distributing the share of the social spending as well as increasing the subsidies provided to the poor by implementing taxes to the rich. One of the ways in performing this fiscal redistribution is through income tax. This means that government may increase the portion of income tax collected from the high-income group, at the same time maintain or reduce the portion collected from low income group. The taxes collected from the high-income group will be used to finance the low income group by providing incentives or subsidies to them. Although this may affect the economic growth of the country as the tax revenue will be diminished, the income inequality issue can be reduced through this event. This will cause a direct effect on income inequality as well since the redistribution decreases the gap between the rich and poor.

5.3 Limitation and Recommendation

Every research will have their own restrictions and weaknesses, including this study. There are some recommendations that can be used as a suggestion by future researchers on improving the research on this topic.

First of all, the panel data of 12 low income countries and 53 middle income countries from 1980 to 2015 has been used in this study. As the sample is considered small for both low and middle income countries, the result might not be too persuasive as it is only representing some of the countries within the income group. As a suggestion, the future researcher can either expand the sample size to examine the effect in a larger point of view by including high income countries or keep their focus in one country to examine that determinant of income inequality in a more detailed version. By knowing the factors of income inequality, policymakers can tailor-made a best solution in reducing the income gap between the people.

In addition, our main concern in this study is on how the financial development affects income inequality. There are only a few of other variables have been taken into account in this case. This shows that our study is not comprehensive of all the possible factors that affecting income inequality in low and middle income countries. There will be other possible variables such as inflation, unemployment, and government effectiveness will bring an outcome to income inequality as well. These variables should be considered when doing a further research on this topic for identification purposes.

In short, future research of this study can focus more on their countries selection as well as bring up more possible instruments that can cause the serious effect to the

issue. These considerations will be much more appreciated in order to reduce the income gap that happened for a long period of time all around the world.

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APPENDICES

Apendix 1.1: List of Middle Income Countries

Albania	Dominican Republic	Macedonia, FYR	Solomon Islands
Algeria	Ecuador	Malaysia	South Africa
American Samoa	Egypt, Arab Rep.	Maldives	Sri Lanka
Angola	El Salvador	Marshall Islands	St. Lucia
Argentina	Equatorial Guinea	Mauritania	St. Vincent and the Grenadines
Armenia	Fiji	Mauritius	Sudan
Azerbaijan	Gabon	Mexico	Suriname
Bangladesh	Georgia	Micronesia, Fed. Sts.	Swaziland
Belarus	Ghana	Moldova	Syrian Arab Republic
Belize	Grenada	Mongolia	Tajikistan
Bhutan	Guyana	Montenegro	Thailand
Bolivia	Guatemala	Morocco	Timor-Leste
Bosnia and Herzegovina	Honduras	Myanmar	Tonga
Botswana	Iran, Islamic Rep.	Namibia	Tunisia
Brazil	Iraq	Nauru	Turkey
Bulgaria	India	Nicaragua	Turkmenistan
Cabo Verde	Indonesia	Nigeria	Tuvalu
Cambodia	Jamaica	Panama	Ukraine
Cameroon	Jordan	Pakistan	Uzbekistan
China	Kazakhstan	Papua New Guinea	Vanuatu
Colombia	Kenya	Paraguay	Venezuela, RB
Congo, Rep.	Kiribati	Peru	Vietnam
Costa Rica	Kosovo	Philippines	West Bank and Gaza
Croatia	Kyrgyz Republic	Romania	Yemen, Rep
Cuba	Lao PDR	Russian Federation	Zambia
Côte d'Ivoire	Lebanon	Samoa	
Djibouti	Lesotho	São Tomé and Principe	
Dominica	Libya	Serbia	

Appendix 1.2: List of Low Income Countries

Afghanistan	Eritrea	Madagascar	Sierra Leone
Benin	Ethiopia	Malawi	Somalia
Burkina Faso	Gambia	Mali	South Sudan
Burundi	Guinea	Mozambique	Tanzania
Central African Republic	Guniea-Bisau	Nepal	Togo
Chad	Haiti	Rwanda	Uganda
Comoros	Kore, Dem. Rep.	Senagal	Zimbabwe
Congo, Dem. Rep.	Liberia	Senegal	

Appendix 1.3: 53 Middle Income Countries (sample)

Albania	Colombia	Honduras	Mongolia	Senegal
Algeria	Costa Rica	India	Morocco	Serbia
Armenia	Côte d'Ivoire	Indonesia	Myanmar	Sri Lanka
Azerbaijan	Dominican Republic	Iran, Islamic Rep.	Namibia	Thailand
Bangladesh	Ecuador	Jamaica	Nigeria	Tunisia
Bolivia	Egypt	Jordan	Pakistan	Turkey
Botswana	El Salvador	Kazakhstan	Panama	Ukraine
Brazil	Gabon	Kenya	Paraguay	Vietnam
Bulgaria	Ghana	Malaysia	Philippines	Zambia
Cameroon	Guatemala	Mexico	Peru	
China	Guyana	Moldova	Romania	

Appendix 1.4: 12 Low Income Countries (sample)

Ethiopia	Haiti	Malawi	Sierra Leone
Gambia, The	Liberia	Mali	Tanzania
Guinea	Madagascar	Mozambique	Uganda

Appendix 1.5: Low Income Countries and their Regions

Countries	**Regions**	**Countries**	**Regions**
Afghanistan	South Asia	Liberia	Sub-Saharan Africa
Benin	Sub-Saharan Africa	Madagascar	Sub-Saharan Africa
Burkina Faso	Sub-Saharan Africa	Malawi	Sub-Saharan Africa
Burundi	Sub-Saharan Africa	Mali	Sub-Saharan Africa
Central African Rep.	Sub-Saharan Africa	Mozambique	Sub-Saharan Africa
Chad	Sub-Saharan Africa	Nepal	South Asia
Comoros	Sub-Saharan Africa	Rwanda	Sub-Saharan Africa
Congo, Dem. Rep.	Sub-Saharan Africa	Senegal	Sub-Saharan Africa
Eritrea	Sub-Saharan Africa	Sierra Leone	Sub-Saharan Africa
Ethiopia	Sub-Saharan Africa	Somalia	Sub-Saharan Africa
Gambia, The	Sub-Saharan Africa	South Sudan	Sub-Saharan Africa
Guinea	Sub-Saharan Africa	Tanzania	Sub-Saharan Africa
Guniea-Bisau	Sub-Saharan Africa	Togo	Sub-Saharan Africa
Haiti	Latin America & the Caribbean	Uganda	Sub-Saharan Africa
Korea, Dem. Rep.	East Asia and Pacific	Zimbabwe	Sub-Saharan Africa

Appendix 1.6: Empirical Result of Fixed Effect Estimation

```
Fixed-effects (within) regression               Number of obs      =       373
Group variable: code                            Number of groups   =        60

R-sq:  within  = 0.0248                         Obs per group: min =         1
       between = 0.0302                                        avg =       6.2
       overall = 0.0377                                        max =         7

                                                F(4,309)           =      1.97
corr(u_i, Xb)  = 0.0730                         Prob > F           =    0.0995
```

lieq	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lfd	-.0288763	.0114808	-2.52	0.012	-.0514667	-.0062858
lrgdp	.0170955	.0206682	0.83	0.409	-.0235727	.0577637
lcpi	.0251274	.0168745	1.49	0.137	-.008076	.0583308
lhc	-.0006739	.0094203	-0.07	0.943	-.01921	.0178623
_cons	-.4605313	.1523377	-3.02	0.003	-.7602819	-.1607808
sigma_u	.16537795					
sigma_e	.09737813					
rho	.74254981	(fraction of variance due to u_i)				

F test that all u_i=0: F(59, 309) = 13.54 Prob > F = 0.0000