Master's Thesis

Post Millennium Poverty Dynamic and Evaluation of Low- and Middle-Income Countries: Asia Continent Case

by

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51220621

September 2022

Master Thesis Presented to

Ritsumeikan Asia Pacific University

In Partial Fulfillment of The Requirements for Degree of

Master of International Cooperation Policy

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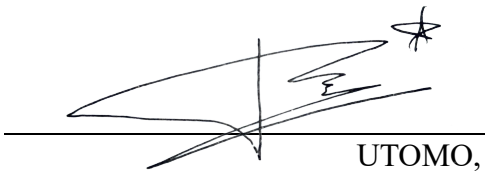
Certification Page

I, Gilang Bayu Utomo (Student ID 51220621) hereby declare that the contents of this Master's Thesis / Research Report are original and true, and have not been submitted at any other university or educational institution for the award of degree or diploma. All the information derived from other published or unpublished sources has been cited and acknowledged appropriately.



UTOMO, Gilang Bayu
2022/08/10

Acknowledgement

First and foremost, I would like to praise Jesus Christ for His unfailing kindness and love. Only by His grace have I made it to this point. I believe this is not the end, but rather the start of a new chapter in my life.

I would like to thank my supervisor, Professor KIM Sangho, for his invaluable support and guidance, as well as Professor KOICHI Yamaura for the significant feedbacks on this study. In addition, I would like to thank all academic and faculty members who have taught me skill, knowledge, and values throughout these extraordinary circumstances. In addition, I have the utmost respect for the Japanese Government and JICA for providing me with this excellent opportunity through the SDGs Global Leader scholarship program. I hope that the knowledge and experience I gained in Japan will allow me to make a greater contribution and strengthen the relationship between Indonesia and Japan.

In appreciation of this event, I would thank to my family for always believing in and supporting the path I have chosen. Also, I would articulate my gratitude to the GKKD Timurdua youth ministry for enabling my spiritual growth. Moreover, I give thanks to God for FGOC and the South East Asia community, which provide not only friends but also family in Beppu.

Last but not least, I would also like to convey my sincere gratitude to those who could not be named here but who have greatly contributed to my studies.

Gilang Bayu Utomo

Beppu, July 25th,2022

Summary

The world has been changing dynamically in the last two decades. It began with the post-Asian financial recovery process; Asia, as the most populous continent, transformed into the new engine of world economic growth. However, poverty is still a challenge that needs to address, especially in low and middle-income member countries. Therefore, this study tries to comprehend and deliver sets of explanations on the essential factors affecting the region's poverty rate.

In brief, the study will examine poverty from several viewpoints: economic performances (growth and trade), human development indicators (education and health), financial inclusion, government intervention, and demographic structures (population and dependency ratio). The scope of the studies is 27 low and middle-income countries in Asia from 1999 to 2019. In addition, the analysis employs the panel data regression technique.

The results show that trade, life expectancy, financial inclusion, population, and dependency ratio are significant. The international trade enhancement has effectively helped the country eradicate the poverty rate. Also, the increase in health that reflects life expectancy improvement supports the lower poverty rate. Finally, the population and dependency ratio could burden society with a more profound poverty rate. The result of financial is inconclusive on the impact on poverty. On the other hand, economic growth, education improvement, and government intervention are insignificant in decreasing poverty.

The study suggests progressive government policy to patch up the inequality that makes the economy's growth distribute equally. Furthermore, it is also vital to ensure the human resources as the output of the education system are compatible with the current industry requirement. At last, massive allocation of government spending on poverty should equip with a decent targeting policy to ensure that all the benefit receives by the needy.

Keywords:

Poverty, Economic Growth, Trade, Government Spending, Human Development, Financial Inclusion, Panel Data, GLS.

Chapter 1. Introduction

1.1 Research Background

Currently, the world is in the first two decades of the new millennium 2000s'. Many things and phenomena happened before this period that shaped the current political, social, and economic structure and relationships among the countries. Two years before the new millennium celebration in 1997-1998, a vast financial crisis began in Asia and then affected the world. The financial crisis has occupied many sectors of the economy. It affected people from the top level of the rich to the lowest decile group of people, the poor and the vulnerable (Félix & Belo, 2019). Since the crisis started in southeast Asia, Asia has been the most agonized by the crisis. For example, there were incremental around 20 million drops under the poverty line. Another significant poverty increase happens in Thailand, India, and Pakistan (Ahmad, 1999). Furthermore, an Asian Development Bank research on the impact of the Asian financial crisis in six countries (South Korea, Lao PDR, Indonesia, Malaysia, Thailand, and the Philippines) concluded that the crisis had social implications such as boosting community cohesion, crime rates, and corruption (Knowles et al., 1999).

However, this study will focus on poverty aspects. Some economists believe that poverty is a multidimensional issue/problem and cannot answer with a single simple solution (Lustig, 2011). Houghton and Khandker (2019) define poverty as the command over resources, usually by comparing individual income or expenditure (Houghton & Khandker, 2009). Simply, poverty is distinct a significant reduction in people's well-being or the situation when the income cannot meet the minimum living standard (Kiendrebeogo et al., 2017). One of the common poverty indicators was the poverty headcount ratio (H0), synthesized from the Foster-Greer-Thorbecke group of poverty

measures (Foster et al., (1984) as cited in (Kiendrebeogo et al., 2017). Later, the H0 will work as the study's primary object (dependent variable).

In addition, the last three years of the world corona virus disease 2019 (Covid 19) pandemic has drawn the tough challenges in the health and economic sector. Low-income households are the most negatively affected category. The World Bank (2021) estimates that the pandemic pushed almost 100 million people into extreme poverty. Unfortunately, East Asia and the Pacific region were the outbreak's starting areas that moved four million people into extreme poverty (USD1.9/day/people). However, the prudent policy response from the country members in that region succeeded in bringing the number of people back to the initial point in the following year (around 20 million people in 2019). Furthermore, the Russian military operation upon Ukraine put another burden on the world's post-pandemic economic recovery. The World Bank Group (2022) estimated that the military operation has to shrink the economy of both countries into a brutal recession by 45.1% and 11.2% for Ukraine and Russia in 2022. This recession will spread to the world economy because they are significant players in the world market, especially wheat and energy.

In the last decade, the world economic growth machines are shifting from the western side (Europe and North America) to the eastern side of the globe. China played the most significant role as the engine of the growth with its manufacture and market size. China's economic performance helps it to eradicate its poverty rate. However, the south and southeast parts of the continent are lagging in converting the economic performance to poverty decreasing factor (Deutsch et al., 2020). In addition, the world is getting interconnected, and each country is a member of the world supply chain. Market liberalization was one of the issues in the post-Asian financial crisis time. With the relatively low labor cost, most Asian countries build their industries and increase their

share in international trade. However, slightly more than half of the world's poor population live in Asia (Osinubi, 2005 as cited in Vijayakumar, 2013).

The massive economic transition that makes higher growth is not always come along with the poverty eradication progress. Some experts believe that government intervention through resource allocation is the key (Anderson et al., 2018). Government intervention could be used directly (subsidies and transfer) or indirectly. Unfortunately, large shares of direct government spending in developing countries failed to reach low-income families for several reasons exceedingly imperfect targeting (Rhee et al., 2014, as cited in Anderson et al., 2018).

Another critical aspect of the poverty issues is human development aspects. The United Nations Development Program (UNDP) defines health and education are the two essential aspects of human development (UNDP, 2022). On the other hand, the low education and health expenditure levels are also characteristic of developing countries (Janjua, 2014). Some believe that those two combinations are one of the effective ways to stop the poverty unending vicious cycle.

Some experts believe that the other dimension of poverty is the lack of access to resources. Then, one of the critical resources that will improve the welfare of the poor people is financial resources. Therefore, through the financial inclusion program, the government in developing countries tries to enlarge the access to formal financial resources for poor people. Financial inclusion will encourage loan growth to enhance economic performance and total factor productivity (Donou-Adonsou & Sylwester, 2015). However, lack of knowledge and access to finance or capital source is one of the issues in the poverty discussion.

Furthermore, they do not have an asset worth being collateral. To tackle this issue, the Government should collaborate with the banking sector (conventional banks and microfinance institutions) to promote financial inclusion programs, especially for poor and vulnerable people. Grameen Bank in Bangladesh, Established by M. Yunus (Nobel Peace Laureate in 2006), will be an excellent example of how financial inclusion could improve the welfare of the people (Yunus, 2009).

In general, developing countries have a significant population and dependency ratio as the main factor in poverty and low employment (Vijayakumar, 2013). Some research considers several demographic features as the determinant factors of poverty. In addition, it would be a nexus between economic growth, poverty, and the number of employments (Vijayakumar, 2013).

In brief, the study will show that vast economic growth failed to deliver the poverty eradication improvement while the international trade enhancement was moderately significant. The government intervention failed to boost the poverty alleviation progress. Furthermore, financial inclusion shows an inconclusive effect on poverty. The secondary education system was incompatible with the industries' requirements and failed to help the poor. Lastly, improving health services that lead to longer life expectancy supports the poverty eradication efforts.

As explained before, poverty is a multidimensional problem that cannot be solved only by higher economic growth. Therefore, this paper will reveal the factors affecting the poverty rate, specifically in Asia countries. The structure of the study consists of an introduction, literature review, methodology, analysis, and conclusion, including policy implications.

1.2 Research Questions

Asia is still struggling with poverty as one of the emerging regions with abundant human and natural resources. The paper will try to examine the poverty phenomenon through several points of view, which are economic performances (growth and trade), demographic structures (population and age dependency ratio), fundamentally human development indicators (health and education), and financial inclusion and government intervention.

The paper will look for evidence if the gain or wealth from good economic performance helps the poor or not. Also, it will try to figure out the impact of demographic structure (number of populations and age dependency ratio) on the poverty incidence within the region. Furthermore, the paper also will examine if the basic human development indicators structure among the countries will affect the poverty in the region. Finally, the study will evaluate how to complete access to financial resources (financial inclusion) and direct government spending impact poor people.

Therefore, the objective of this study is to investigate the following research questions::

- What is the impact of the leading independent variable on poverty?
  - Economic performance (growth and trade)
  - Demographic structures (population and age dependency ratio)
  - Fundamental human development indicators (health and education)
  - Financial inclusion and Government spending

The hypothesis indicates that all the primary and control variables within the model significantly affect poverty.

1.3 Research Objective

The previous section mentioned that this study aims to determine the impact of economic performance, demographic structures, fundamentally human development indicators, financial inclusion, and government spending. In addition, the literature review will enrich the study with an explanation of the poverty eradication policy or program mix in Indonesia and the success story and challenges of the program.

In the third quarter of 2015, the United Nations announced its new objectives to eradicate extreme poverty within 15 years (2030). Some institutions and economists are less confident that economic growth will work as a single driver to achieve the goals. Under the same wealth distribution in each country and optimistic growth rate assumptions, they forecast that the rate will persist between 3.0% and 7.0% (Lakner et al., 2014; Yoshida et al., 2014), as cited in (Anderson et al., 2018). Therefore, it hopes that the study will enlighten the reader about poverty and its factors within the region. Also, provide a recommendation for the policymakers for a better poverty alleviation measure/policy in their territory.

The research will employ panel data, a quantitative method that integrates time series and cross-section. In general, panel data analysis is accomplished using pooled least square, fixed effect, and random effect methods. Several procedures or tests need to select the most efficient method between the three approaches. Also, the selected approach's result should be examined through several tests to ensure the model's robustness. The detail of all the statistic procedures is available in the methodology and analysis chapters.

1.4 Contribution

The study will present some crucial insights from the statistical analysis and policy suggestions based on the evidence of poverty in Asia's low- and middle-income nations.

It will provide a comprehensive understanding and explanations of several significant factors of poverty, such as economic performance, government intervention, human development factors, financial inclusion, and demographic features. In addition, the literature review will cover the existing studies on poverty and other variables that are dependent. The final section of the literature study will concentrate on the evolution and challenges of the implementation of Indonesia's anti-poverty program.

Some people believe that an excellent economy lowers the rate of poverty. The paper will try to provide evidence of that argument, including the international trade enhancement effect. The investigation of the effect of government intervention on poverty is vital because, in low- and middle-income countries, government spending accounts for a considerable share of the economy. Therefore, this research will assess the efficacy of government assistance among low-income households.

In addition, financial services have been one of the fastest-growing industries globally during the past two decades. Unlocking financial access is considered by some to be one of the most effective strategies to assist a low-income family escape poverty. The study will determine if the growth of financial services reaches low-income households and assists them in achieving a higher standard of living.

The economic structure develops continually, as does the growth of technology and markets. Low- and middle-income nations are essential markets and sources of inexpensive labor. In order to participate in the production process, it is vital to make sure that the labor force is in excellent condition and possesses adequate educational credentials. This study will determine if these two factors significantly impact the prevalence of poverty in nations. The research will conclude with an assessment of the impact of the demographic structure.

In brief, the study will provide a complete understanding of the quantitative aspect of the model and a resourceful discussion of the existing studies and developing countries' best practices in Indonesia. It will be a good input for the reader and policymakers to enhance their poverty eradication strategy in their countries during the recent international economic catastrophe.

Chapter 2. Literature Review

2.1 The Evolution Theory and Measurement of Poverty

As discussed in chapter 1, poverty is a multidimensional or multifaceted issue. Measuring poverty combines two crucial activities: identifying the poor and aggregating poverty characteristics upon overall indicator (Sen, 1976). The common approaches to measuring poverty are income, expenditure, or consumption, called unidimensional poverty (Khan et al., 2020). Foster et al. (1984) translated the poverty into some critical equations that are used up to now, which are headcount ratio (H_0), depth (H_1), and severity (H_2) of poverty.

$$FGT_\alpha = {}^1\!/_n \sum_{i=1}^{q} [(Z_i - y_i/z_i)]^\alpha \qquad (1)$$

α : poverty aversion (0,1, and 2). If α is equal to zero, it will calculate headcount, depth, and severity.

Z_i : poverty line

Yi : per capita expenditure

q : number of households under the poverty line

n : number of households in a population

From equation (1), Foster et al. (1984) generate a specific function for poverty headcount ratio, depth, and severity of poverty:

- Headcount Ratio

$$FGT_0 = \frac{q}{n} \qquad (2)$$

- Depth or gap of poverty ratio (H_1)

$$FGT_1 = H_1 = \sum_{i=1}^{q}[(\frac{z_i - y_i}{z_i})] \quad (3)$$

- Poverty severity ratio/poverty squared gap (H_2)

$$FGT_2 = H_2 = \sum_{i=1}^{q}[(\frac{z_i - y_i}{z_i})]^2 \quad (4)$$

(Sen, 1976) elaborate that the income approach of the poverty index provides essential information. However, poverty itself is broader than those issues. Echoing the idea of Amartya Sen (1976) on the broader issues of poverty, (Bourguignon & Chakravarty, 2003) incorporate education as the socio-economic factor related to the human development index and SDGs. In brief, they modify the FGT poverty equation by adding education as an extra dimension of poverty (Bourguignon & Chakravarty, 2003). The multidimensional poverty index (MPI) is a combination of the multidimensional headcount ratio (H)[1] with the average deprivation ratio among the poor (A) (Khan et al., 2020).

$$MPI = H\,A \quad (5)$$

The A is the result of the sum of $c_i(k)$ Alternatively, the individual deprivation score is divided by the total number of poor people.

$$A = \frac{\sum_{i=1}^{n} c(k)}{q} \quad (6)$$

Even though the multidimensional poverty approach provides comprehensive information on poor people in society, the data collection requires a more extensive effort. Another issue of the multidimensional poverty index is not comparable among the region. For example, one of the poverty dimensions is calorie intake per day per person. Various meal combinations depend on the culture, geography, and trade, which affect the people's

[1] See equation 2

calorie intake among the countries in the region. It is hard to compare the multidimensional poverty index among different countries. So, this study will use the unidimensional as the main object.

2.2 Economic Performance

2.2.1 Growth and Poverty

In the economic study, there is a belief that the wealth accumulation by the top decile group of people is good for the rest of society because it will distribute to the lower decile (Aghion & Bolton, 1997). It was called by trickle-down effect. However, there are many debates on poverty and economic growth. The early contra argument was raised by Kuznets (1955, 1963). He believes that income inequality and economic growth are correlated in an inverted u-shape curve. It means that higher economic growth will lead to higher income inequality at the beginning. In the initial phase of economic development, the economy's performance will not distribute equitably. Later, the inequality will decrease along with the increase in income per capita. Some studies have supported Kuznets's hypothesis with different datasets (Bahmani-Oskooee & Gelan, 2008; Lin et al., 2006; Shahbaz, 2010).

In the cross-section observation of 75 countries worldwide with a flexible semi-parametric approach, Lin et al. (2006) show an inverted U shape of the Kuznets curve on the relationship between economic development and income inequality. Bahmani-Oskooee and Gelan (2008) employ the data of The United States for more than 40 years from 1957 to 2002 and the Kuznets curve phenomenon. The error correction model distinguishes between short-term and long-term impacts. In the near term, economic growth increases income disparity, according to the study. Long-term, the reversal will allow for improved income disparity. In addition, single countries case on Pakistan data

(1971-2005) echoing the same conclusion of the Kuznets inverted-U curve (Shahbaz, 2010). Most of this paper suggests that the fiscal and monetary policy fostering economic growth should balance with the distribution policies to correct inequality issues.

On the other hand, some studies found the opposites and failed to support the Kuznets hypothesis (Angeles, 2010; Ikemoto & Uehara, 2000; Savvides & Stengos, 2000). In 2010, Angeles employed the World Income Inequality Database[2] and constructed panel data structure and time-series data. The study argues that there is no inverted-U relationship between Gross Domestic Product (GDP) per capita or employment outside agriculture the inequality. Previously, with more minor world panel data (547 observations and 52 countries), Savvides & Stengos (2000) used the threshold regression model and found no evidence of an inverted-U Kuznets curve. Ikemoto & Uehara (2000) showed the same result for Thailand's inequality database in the same year. In this study, they argue that the absence of the Kuznets curve is for two reasons: (i) the foreign direct investment (FDI) boom that accelerated the rate of inequality in the second half of the 1980s; and (ii) Thai economic transition towards domestic market orientation and led to the currency crisis 1997.

2.2.2 Trade and Poverty

Stolper and Samuelson explicate the trade effect on poverty through the increasing real income of the resourceful countries with the positive trend of international trade (Islam et al., 2017). Furthermore, (Krueger, 1983) the developing countries with much un-skilled labor will gain more trade advantages. It comes from comparative advantages in the production of low-skilled goods. Also, the neoclassical economist believes that free trade and resource mobility will benefit the unskilled labor abundance in developing

[2] Comprehensive inequality and variable secondary database that provided by United Nations university - World Institute for Development Economics Research (UNU-WIDER).

countries through the increasing capital inflow (Easterly, 2006). (Islam et al., 2017) has summarized the mechanism of how trade affects the poverty rate for poor people:

- Triangle of trade, growth, and poverty (Dollar & Kraay, 2002, 2004).
- Long-run economic growth enhancement through trade liberalization (Dollar & Kraay, 2002; Prasad et al., 2005).
- Factor prices and product substitutions/complement (Shuaibu, 2017).
- Inter-border resources mobility (Kis-Katos & Sparrow, 2015).
- Technology and production efficiency enhancement (Milanovic, 2002)
- Trade institutional development (L'Huillier, 2016).

In addition, Lall (2000) discovered that export structure is essential for economic growth. The paper found that if less technology-intensive goods dominate the export structure, the growth tends to move slower. On the contrary, the manufacturing good that is more technology-intensive will contribute more to the country's growth and income. The paper divided exported goods into four categories: resources-based, low technology, medium technology, and high technology. The higher the degree of technology used will require a higher level of human resources. East Asia is an excellent example of how technological export goods have driven the economy. Some economist sees this phenomenon as the East Asian Miracle (Birdsall et al., 1993).

These days, nations are connected as members of the global value chain. Many bilateral and multilateral trade agreements have been established to accelerate the international trade process and lower the trade barrier and protection between the countries. In economics, we trust that the increasing volume of international trade is a part of world economic development in the long run. However, at the beginning of the process, some people are worried that the poor will be left behind. Even in the long term, the

enhancement of international trade will have a distributional issue where the poor are the aggrieved party (Winters et al., 2004).

theSeveral empirical studies have examined the connection between trade and poverty. Using data from African nations, le Goff & Singh (2014) attempted to determine the effect of trade openness on poverty. The sample consisted of 30 African nations with an average length of five years between 1981 and 2010. The study found that a high level of trade openness will reduce the rate of poverty in the countries with some conditionalities: deep financial inclusion, good education levels, and institutional solidity. Other empirical studies on 31 emerging countries from 1994 to 2014 indicate that all sectors' total imports and export have diminished poverty and increased the lowest quintile's average income. The study revealed that the service and agriculture sectors are the most effective in decreasing poverty while labor-intensive manufacturing effectively levels up the average income (Islam et al., 2017).

2.3 Demographic and Poverty

Some studies show that the demographic aspect also plays an essential role in affecting the poverty incidence rate in a country. In this case, population and age dependency ratio are the indicators that represent the demographic structure. Cruz & Ahmed (2018) shows that reding dependency ratio has a positive relationship with gross domestic per capita and poverty. Islam et al. (2004) and Vijayakumar (2013) show the same result. Furthermore, Vijaykumar (2013) also considers another demographic variable: employment in agriculture and industry.

2.4 Human Development Indicator

Education and health improvement are strongly correlated with poverty incidence. Furthermore, additional efficient spending on both sectors will strengthen the poverty

eradication progress (Janjua, 2014). Some empirical studies show that education as an aspect of human capital accumulation is the precondition for adopting new technology and enhancing productivity. (Gounder & Xing, 2012) using Fiji datasets, they found that formal education will transform higher economic output and performance. Also, in the same study, they prove that increasing education will increase the probability of people engaging and being aware of health prevention programs.

Islam (2004) comes with Virtuous Circle that explains the links between growth, employment, and poverty (see figure 1). The increase in employment and productivity will lead to higher income for the poor. The increasing income will provide the poor with extra disposable income spent on higher health and education. This spending will increase the human capital endowment among the poor, leading to higher productivity and better economic performance.

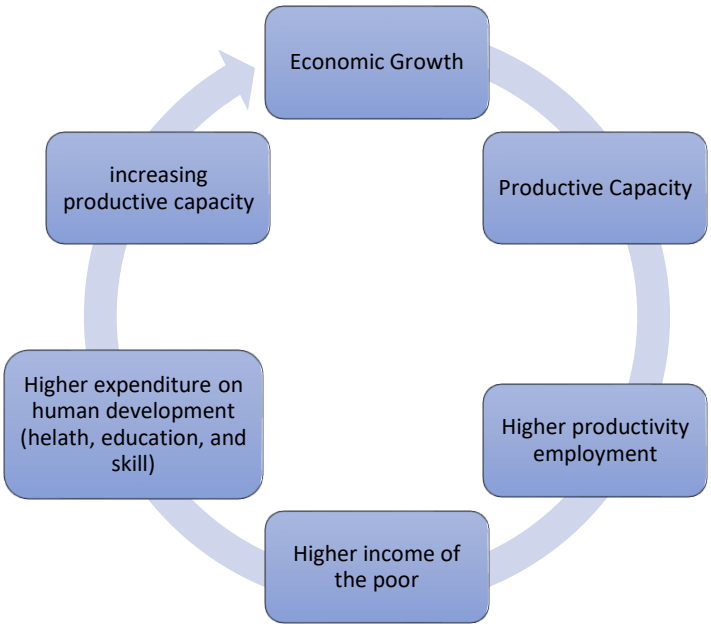


Figure 1 *Virtuous Circle (Growth, Employment, and Poverty)*

Source: (Islam, 2004)

2.4.1 Education Impact on Poverty

As explained before, education is one of the essential factors for people to increase their productivity and margin of output. People believe that a combination of skill and knowledge is fundamental human capital that could afford through formal education or schooling. Therefore, they consider education an investment that will serve as a return for their future (Janjua, 2014). Some studies show evidence of the relationship between education and poverty eradication. Furthermore, a higher level of education offers higher monetary benefits (wage or income) and non-market values such as less-stress life and self-esteem improvement (Heckman et al., 2018).

Janjua (2014) explains how education eradicates poverty through three mechanisms. First, higher educated people will get more. Second, better education quality will enhance economic opportunities, growth, and incomes. Finally, education will provide the poor people with a more comprehensive social benefit that will enable them to have higher health care for their children and women's participation in the labor force. In the research, Janjua decomposed the effect of education into two categories which are direct and indirect effects (see figure 2). The direct effect of education is to increase human capital by improving knowledge and skill.

On the other hand, the indirect effect (see figure 3) works by increasing the poor people's awareness and mobility. The awareness will encourage the improvement of health indicators that enable them to reach higher productivity. Higher education will indirectly increase labor mobility to seek higher employment opportunities. For example, with higher education, people will not learn their national language but also English as an international language. The acquisition of a foreign language will offer wider employment opportunities in a domestic market and overseas. Nowadays, the Philippines

is an excellent example of how the countries send their human resources to the international market with good English proficiency.

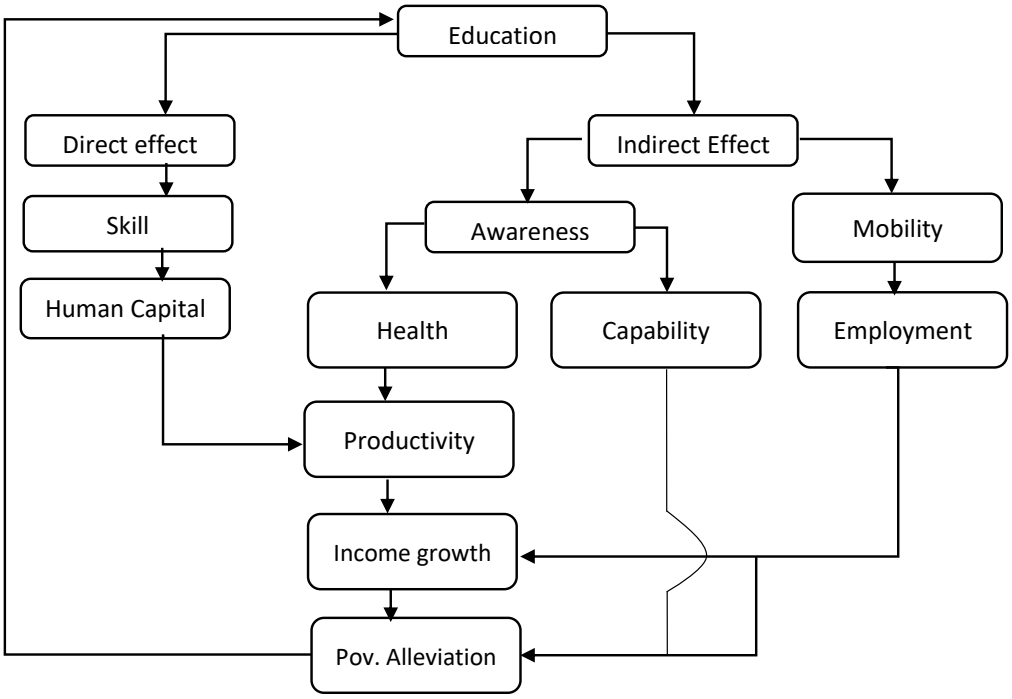


Figure 2 *Education and Poverty Alleviation*

Source: (Janjua, 2014)

A study by (Buchinsky, 1994) on the Current Population Survey database of the United States from 1964 to 1988 gives evidence of the impact of education on poverty. It employs quantile regression techniques for quantitative analysis. The study found a significant education return for the fresh entrants to the labor force. The study also finds that higher education will take the people to the top wage distribution. Furthermore, high school and college education mimic patterns in all quantiles in the United States education system.

Using the same quantitative methodology, the study in a broader sample (15 European Countries and the United States) finds the same positive effect of education on salary

inequality for each level. Also, they believe some factors like the education quality and variation of study fields may affect the result. The study suggests that increasing the people's average level of education cuts the wage inequality for each level (Martins & Pereira, 2004). Five years later, Brunello et al. (2009) used 12 European countries' databases to estimate the impact of compulsory education policy reform, school attainment, and salary distribution. They were also using the quantile regression. The study found that additional years of education will improve the salary distribution (lower inequality).

A study on 32 members of the European Union (EU) by Hofmarcher (2021) strengthens the argument for the positive relationship between education and poverty. This study indicates the evidence of significant poverty lowering impacts on education. Furthermore, using EU Statistics on Income and Living Condition (SILC) survey data, the same study found that higher education levels reduce the possibility of considering oneself to live beneath the poverty standard.

2.4.2 Health Impact on Poverty

The preamble constitution of the World Health Organization defines health as "the state of complete bodily, mental, and social well-being and not only the absence of disease or disability" (WHO, 1946). There are many indicators in approaching the health aspects. We can use Body Mass Index (BMI) for the individual health condition measurement. However, for the national and regional levels in empirical studies, we can use some indicators, e.g., infant mortality rate, life expectancy, the number of medical practitioners, and the number of beds in hospitals (Janjua, 2014).

Janjua (2014) elaborates on how health contributes to poverty alleviation within societies (see figure 3). The study argues that health is an essential aspect of human capital and is

required to improve productivity. Furthermore, there is also an indirect effect on health that contribute to poverty alleviation efforts. First, (Todaro & Smith, 2020), as cited in Janjua (2014), said that health enhancement could affect school performance and positively support societies. The student with a healthy physical body and lifestyle will have less opportunity to be absent from the class and better academic performance. This situation will lead to higher human capital within the societies (Gunetilleke, 2000). In some cases, the long and chronic sickness will increase the possibility of dragging people into poverty. Also, it will put a heavy burden on the poor people that force them to give up their limited assets (house, cattle, and farmland), which will worsen their situation (Lawson, 2004).

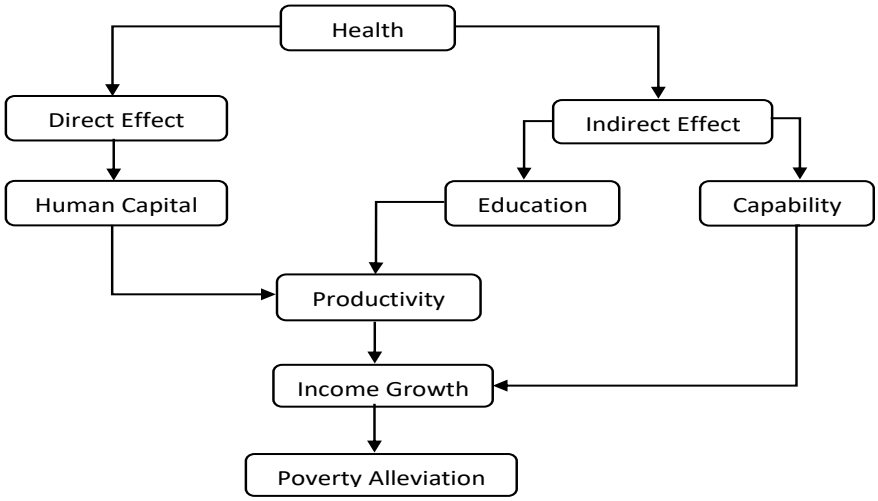


Figure 3 *Health and Poverty Alleviation*

Source: (Janjua, 2014)

The empirical study on health and demographic aspects in Pakistan shows that the health aspect is positively significant in poverty. The study said that households with physical and mental illness would have a higher degree of poor/poverty possibility. The existence of physical or mentally ill members will increase the dependency ratio and decrease the

income per capita. The paper suggests that the government may provide health and financial assistance to these families (Sheikh et al., 2020).

As one of the best health care systems, the United States did not consider the value of health care and health benefit in their poverty measurement. Therefore, Remler et al. (2017) developed health inclusive poverty rates, estimated the impact of three different US government programs (Medicare, Medicaid, and Affordable Care Act), and then compared it with the personal benefits. The results indicate that the private benefit will decrease the poverty rate by less than four percentages point. On the other hand, the public benefits succeed in lowering poverty by around one-third of the overall health-inclusive poverty rate (Remler et al., 2017). One year before, Affairs and Chairs (2019) focused on Medicaid and found that the program significantly reduces the poverty rate by protecting low-income families from growing out-of-pocket health expenditures (Zewde & Wimer, 2019). Furthermore, families headed by an ill-health person have a higher probability of being a low-income family than families headed by a healthy person (Buddelmeyer & Cai, 2009).

2.5 Financial Inclusion impact on Poverty

Some economists and poverty experts believe that financial inclusion positively impacts economic growth, followed by a lower poverty rate with diverse magnitude (Beck et al., 2007; Swamy, 2014). The financial inclusion affirmative program promotes inclusive growth that enables poor people to get more opportunities to contribute more to economic activity. This connection will do through direct or indirect channels (Koomson et al., 2020). Financial inclusion provides several ways to reduce poverty directly. Firstly, it will enlarge the credit access, insurance, and other financial services for their daily economic activity, such as consumption and investment (King & Levine, 1993). It also

improves the possibility for poor people to start their businesses/or to be small entrepreneurs.

Furthermore, there is also an indirect benefit of financial inclusion for the poor in the long run through some channels such as incremental job opportunities and government spending/ transfer (education, health, and social) (Abosedra et al., 2016). However, there is some problem with the unwise overuse of financial services that could trap many people in poverty.

These are some empirical studies on the relationship between financial inclusion. There is an argument that both levels of human development and financial inclusion are moving closer to each other (Sarma & Pais, 2011). Research using 176 countries' data with the Logit regression method shows a strong correlation between financial inclusion, poverty, and inequality. However, The study shows an entirely different result when using the developing Asia Countries dataset (C. Y. Park & Mercado, 2018). However, another study that used general methods of moments (GMM) and general least squares (GLS) technique, data on MENA members (Egypt, Tunisia, Algeria, Jordan, Morocco, Qatar, Saudi Arabia, and UEA;1992-2015) shows that financial inclusion has no relation on poverty (Neaime & Gaysset, 2018)

For more than the last ten years, many kinds of research in ICT and its implication for social-economic progress in several countries. It is argued that a comprehensive level of ICT maturity will enhance the economic growth index (Ali et al., 2020). Specifically, some researchers mention that the ICT network will affect the economic performance indicator (Czernich et al., 2011; James, 2014). A study tries to calculate the impact of ICT development on macroeconomic indicators by using the GLS method. This study says that ICT enhancement contributes to 1.0-3.8% of economic development (Ali et al.,

2020). The other study indicates that it will develop the economic indicators and the people (Asongu & le Roux, 2017; Chiao & Chiu, 2018; Kadijevich et al., 2016). The other study on how ICT has improved the human socioeconomic in Africa also revealed a strong link between them (Obijiofor, 2009). However, some people argue that ICT will not drive economic development without support from the other social aspects (Morales-Gómez & Melesse, 1998).

However, ICT diffusion helps financial inclusion grow faster by extending its coverage and service for poor people. In the pandemic coronavirus situation, those combinations will play a significant role. The ICT-Financial Inclusion has been transformed from an exclusive service for the middle-up economic level to the broader economy after the rapid development of mobile phone-based technology, even in rural areas (Mbiti & Weil, 2016). According to a 2019 study, the diffusion of ICT and financial inclusion enhanced economic growth and reduced poverty and inequality (Mushtaq & Bruneau, 2019). Nevertheless, a study echoes the statement that a combination of ICT and financial inclusion will have a positive and significant influence on low-income countries (LIC) but not in the upper-level countries (Das et al., 2018).

2.6 Government Transfer and Subsidy

The first chapter mentions that it cannot solely rely on economic growth for poverty alleviation. The growth needs to accompany the enhancement of the distributional changes. Some experts believe that government interventions are powerful tools to change the wealth distribution and lift the people from poverty (Anderson et al., 2018). The intervention could be categorized based on the three government roles: allocation, distribution, and stabilization (Rosen & Gayer, 2008). The government could allocate some of their expenditure for some direct pro-poor and empowerment programs through the national annual budget. Regrettably, due to a poor targeting system, large shares of

direct government programs (transfers and subsidies) in developing countries are missing the target (Rhee et al., 2014, as cited in Anderson et al., 2018). In addition, some indirect government programs, such as essential health and education, and physical capital (road, sanitation, water irrigation, and housing), could alleviate poverty by lifting productivity and opportunity (Paternostro et al., 2007). Furthermore, some empirical studies have elaborated on how government expenditure could accelerate poverty alleviation within the country or region.

Recent studies by (Acheampong et al., 2021) examine the macroeconomic policy implication after the Covid 19 pandemic situations using two stages least squares, instrumented variable, and generalized method of the moment. The object of the research is 44 sub-Sahara countries between 2010 and 2019. This study uses government expenditure to GDP ratio and working poverty datasets from International Labor Organization (ILO) to proxy government expenditure and poverty headcount ratio. Surprisingly, the result was significant but positive. So, in the study, the increase in government expenditure is significant and adds to the poverty rate. Also, the education level and the enhancement of trade are not significant for the poverty alleviation in this region.

Study on single country datasets (China) from 1978-2018. They focus on the poverty headcount ratio of rural communities across China and government expenditure on social security. Using cointegration analysis, they found a positive relationship between government social security expenditure and the rural-urban income gap in the long term. Furthermore, they found positive elasticity of rural poverty by the social security expenditure. So, it says that social expenditure helps reduce poverty incidence in rural areas.

Another comprehensive study tries to simulate government subsidies and social assistance into conditional cash transfer in Indonesia (Nugroho et al., 2021). They use dynamic computable general equilibrium (CGE) to simulate the policy impact. They found that conditional cash transfer is the most meaningful and effective way to reduce the poverty rate in urban and rural areas. They suggest transforming the subsidy policies to be more targeted.

2.7 Poverty Eradication Program in Indonesia

Indonesia is the fourth most populous country (280.1 million people) located in Southeast Asia along the earth's equator line. This country has plenty of natural resources, from mining to agricultural commodities. That combination of human and natural resources worked as the foundation of sound economic development after the devastating Asian Financial Crisis in 1997-1998. One year after that crisis, Indonesia manages its economic performance positively and stable. The economic enhancement echoed in the constant decreasing poverty headcount ratio from double-digit (19,1%) to a single digit (9.4%) in 2019. The same evidence also reflected the poverty headcount ratio with a $ 1.90 per day standard. The data illustrate progressive poverty eradication from 37.4% in 1999 to 2.7% in 2019.

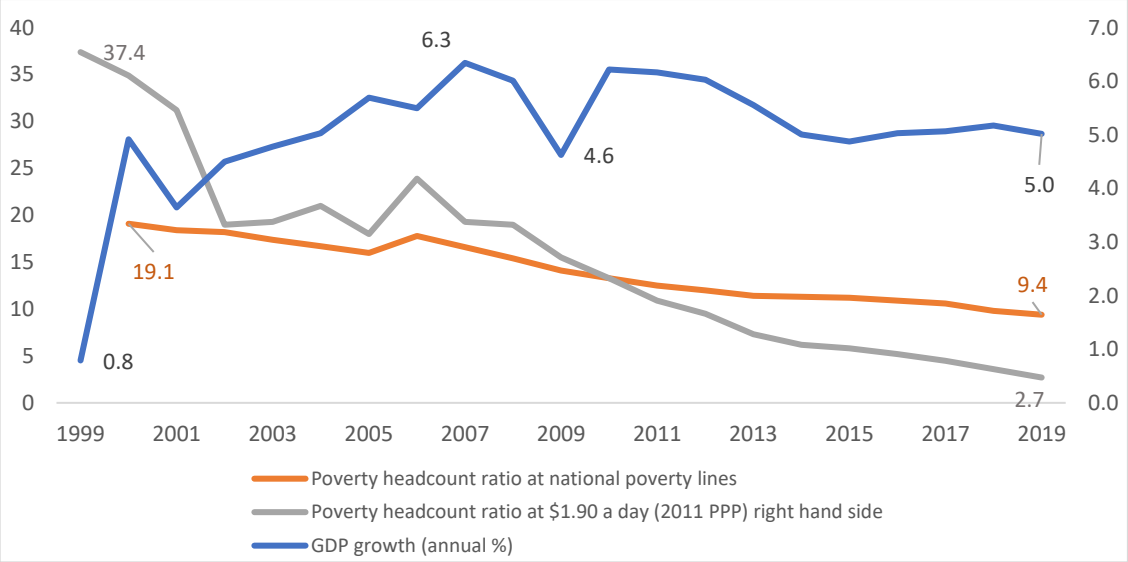


Figure 4 *Indonesia's Economic Growth*[3] *Versus Poverty Headcount Ratio*

Sources: World Bank (2021), Authors calculation

2.7.1 Post Asian Financial Crisis Anti-Poverty Programs

The Asian financial crisis in 1997-1998 was a critical point for Indonesian poverty eradication programs. The anti-poverty spending percentage of the total central government expenditure rose dramatically from 0.4% in 1994/95 to 13.9% in 1999 (Daly & Fane, 2002). In that era, the anti-poverty programs consisted of three schemes: (i) in-kind benefits (rice, health, and education); (ii) job creation programs that included infrastructure and microloans; and (iii) cash transfer as the newest mechanism at that time (Daly & Fane, 2002).

In detail, Daly & Fane (2002) explain the implementation of anti-poverty programs. The cash transfer was distributed to 6.7 million poor households with Rp30,000/month. The government distributed 10 kg of rice at a discounted price (Rp1,000/kg or 30.0% of the market price) for 8 million low-income families as in-kind benefits. This food benefit covered around 5.0% of the average expenditure for a family with two children on the

[3] Indonesia economic growth (right hand side) are using constant local currency 2010.

poverty line. The education scholarship was given to students from low-income families by Rp10.0000, Rp20.000, and Rp25,000/month for elementary, junior, and senior high school. The distribution of the fund and benefits was using the National Family Planning Agency (BKKBN) database.

The evaluation shows that those programs are not well-targeted. In general, all the anti-poverty programs target the lowest two deciles of the household expenditure distribution. Daly & Fane (2002) quote the report of SMERU that found that only half (53.0%) of the families in the targeted families got the in-kind rice benefits. Furthermore, the geographical challenges are another issue that makes the rice distribution take a longer time. In some cases, the head of the village insisted on sharing the allocation to the non-targeted families to avoid the possibility of horizontal social conflict. The education and healthcare programs faced complex administration issues.

2.7.2 Three Cluster National Poverty Alleviation Program

There are no significant changes until the government of Indonesia under Susilo Bambang Yudhoyono's administration rolled out the three clusters approach to national poverty alleviation[4]. The National for Poverty Reduction Acceleration (Tim Nasional Percepatan Pemberantasan Kemiskinan/TNP2K) was established in the following year[5]. This infant institution has three main jobs: formulate policy recommendations, coordinate anti-poverty programs that scatter in many line ministries, and monitor and evaluate. The structure of TNP2K is under the office of the Vice President. They have three working groups referring to the three clusters of poverty alleviation programs (see figure 6).

[4] Presidential Regulation No.13/2009 about the Coordination of Poverty Alleviation
[5] Presidential Regulation No.15/2010 about the Poverty Reduction Acceleration

- **Social Assistance Cluster**

The social cluster aims to reduce the burden/cost of low-income families. This cluster covered the in-kind rice benefits, health insurance, scholarships, and transfer. In this poverty alleviation regime, the cash transfer divides into unconditional and conditional cash transfers. The name of the conditional cash transfer is 'Program Keluarga Harapan' (PKH) or 'Hopeful Family Program.' The program was available for the family who meets the criteria: have a pregnant mother or/and toddler, schooling children with nine-year compulsory education, and older family (Nugroho et al., 2021). This fund will be reimbursed if the family did the required actions, such as a pre-natal checkup for the pregnant mom attending the lesson in a class for the student (Suryahadi et al., 2010).

- **Community Empowerment**

The second cluster was the community empowerment inspired by the old community program in Indonesia. The basic idea of this program is a more bottom-up development model that empowers the local people to develop or build their villages according to their needs and specific local characteristic. The program's name was 'Program Nasional Pemberdayaan Masyarakat' (PNPM) OR 'National Program of Community Empowerment.' In international practices, this approach is known as 'Community Driven Development' (CDD). The program is differentiated into specific purposes: 'Kecamatan' or Sub-District Development Program (PPK), Coastal Community Economic Empowerment (PEMP), Urban Poverty Program (P2KP), Agriculture Community Empowerment (P4K). The allocation for each district ranges from USD 55,000 to USD 110,000 per annum, depending on some criteria. The project form of this program also opens the job opportunity for the local

unemployed labor force and enlarges the circular economy within the district (Suryahadi et al., 2010).

- **SME's Empowerment**

From the previous Asian financial crisis, the government of Indonesia learns that SMEs are the buffer. Many people shifted their economic activity from the formal sector to this sector when the economic situation became harder. In addition, many low-income families are working in this sector as a worker or owners of ultra-micro enterprises. Typically, SMEs do not have a bankable assets or even access to formal financial institutions. The government of Indonesia was unifying and extending the existed microcredit program into 'Kredit Usaha Rakyat' (KUR) or Credit for the People. The government subsidized the guarantee premium by 70.0% for SMEs with a feasible business model but did not have a bankable asset as collateral (Suryahadi et al., 2010).

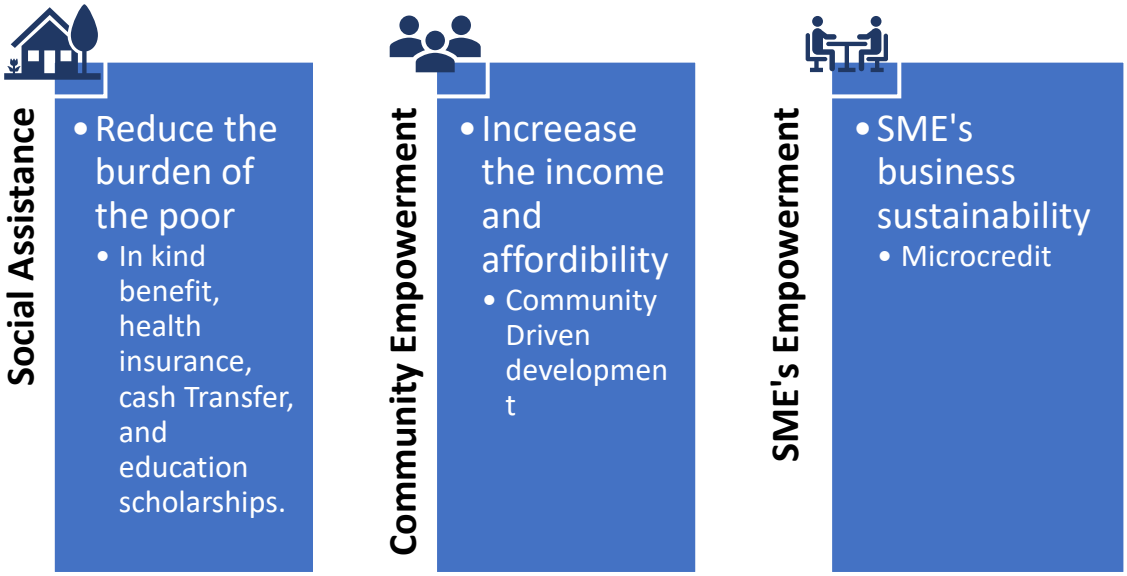


Figure 5 *Three Clusters of Poverty Alleviation Programs*

Sources: (Suryahadi et al., 2010)

2.7.3 The Current Poverty Alleviation Program

The following administration of President Joko Widodo has modified and transformed some of the existed poverty alleviation programs. Furthermore, due to the Covid 19 world pandemic, the government is creating some countermeasures policies to help the poor and vulnerable face this complex pandemic.

One of the programs that are implemented continuously is the PKH. After some years of implementation, some people assess the impact of PKH. Due to the program's limited and brief coverage, the evaluation reveals that PKH is ineffective in raising the child enrollment rate and underage employment issue (Lee & Hwang, 2016). On the contrary, Cahyadi et al. (2018) show that the program has increased children's enrollment by 50.0%. Furthermore, their experiment data from 14,000 beneficiaries' families found that the programs have improved the high school completion rates and other welfare indicators such as child stunting rates, child labor rates, and maternity checkup rates.

The current administration modifies poor student assistance and health assistance into smart Indonesian program 'Program Indonesia Pintar (PIP)' and health insurance contribution assistance 'Penerima Bantuan Iuran-Jaminan Kesehatan Nasional (PBI-JKN).' Those two programs help minimize the out-of-pocket ratio for the poor and near-poor (Nugroho et al., 2021).

In 2018, the government of Indonesia launched the non-cash food assistance 'bantuan pangan non-tunai' (BPNT) as the transformation of the in-kind food assistance (Nugroho et al., 2021). The reform is crucial to enhance the program targeting accuracy through the formal banking systems. The side benefit of implementing BPNT is the improvement of financial inclusion, especially for unreachable low-income families. This program allowed a low-income family member to have a bank account without an initial deposit.

Indonesian economic performance is positive and consistent, pushing the poverty rate to a single digit for the first time in Q3 2019 (9.2%). However, in Q1 2020, the Covid 19 spread and hit the economic performance rebound to double-digit (10.2%). Therefore, the government of Indonesia conducts policies combination including social safety policies, countercyclical policy, and priority programs. The social safety policies consist of PKH, staple food assistance, electricity bill discount, cash transfer, unemployed benefit, and Internet subsidies for education sectors. The Covid 19 pandemic has raised the total spending on social safety programs from IDR308.4 trillion in 2019 to IDR498.0 trillion in 2020 (an increase of 61.5%) (Ministry of Finance, 2021).

Chapter 3. Methodology

3.1 Data

The study employs country-level data for each indicator. Then data comes from many sources and institutions. However, the world bank has compiled the data into one comprehensive online dashboard called World Bank Open Data[6]. Afterward, the data was extracted and structured in a panel that combined cross-section and time-series data. The observations periods were 1999-2019 (21 years) for 27 low- and middle-income countries in Asia:

Table 1 *Country List*

Armenia	Jordan	Pakistan
Azerbaijan	Kazakhstan	Philippines
Bhutan	Kyrgyzstan	Sri Lanka
China	Lao PDR	Tajikistan
Georgia	Malaysia	Thailand
India	Maldives	Thailand
Indonesia	Mongolia	Timor Leste
Iran	Myanmar	Turkmenistan
Iraq	Nepal	Vietnam

Source: Authors dataset.

The World Bank defines the threshold of Gross National Income (GNI) of lower-middle-income countries as $1,036 - $4,045 and upper middle income as $4,046 - $12,535 (The World Bank, 2021). The total numbers of observation were 567. However, the

[6] Sites: https://data.worldbank.org/

quantitative results in chapter 4 reveal a low number of observations due to many missing data. Data is fundamental to measure and check the countries' targets and achievements in the real world, but it is costly in terms of time and cost. As a result, many nations do not regularly count and publish their statistical data.

3.2 Model Specification

The dependent variable is the poverty headcount ratio. In contrast, the independent variable was economic growth, trade volume, life expectancy, secondary school gross enrollment rate, number of bank branches per 10,000 peoples, government expenditure on subsidies and transfer, total population, and dependency ratio. United Nations of Development Program (UNDP) established some indicators regarding the human development index (HDI) to monitor countries' development instead of the economic indicator only. Among many indicators, health and education was the primary indicator. Furthermore, life expectancy and secondary school gross enrollment rates are the operational indicators in the health and education sector.

The general panel data model will formulate as follows:

$$Pov_{i,t} = \beta_1 + \beta_2 Growth_{i,t} + \beta_3 Trade + \beta_4 Life_{i,t} + \beta_5 Educ_{i,t} + \beta_6 Gov_{i,t} + \beta_7 Bank_{i,t} + \beta_8 Pop_{i,t} + \beta_9 Dpdrt_{i,t} + \varepsilon_{it} \quad (7)$$

Then the model is transformed into a log model for the non-percentage variable:

$$Pov_{i,t} = \beta_1 + \beta_2 Growth_{i,t} + \beta_3 Trade_{i,t} + \beta_4 Life_{i,t} + \beta_5 Educ_{i,t} + \beta_6 Gov_{i,t} + \beta_7 lnBank_{i,t} + \beta_8 lnPop_{i,t} + \beta_9 Dpdrt_{i,t} + \varepsilon_{it} \quad (8)$$

$Pov_{i,t}$: Poverty ratio at USD1.9/day per capita

$Growth_{i,t}$: Annual GDP Growth

$Trade_{i,t}$: Annual trade (export + import) percentage to GDP

$Life_{i,t}$: Life expectancy ratio

$Educ_{i,t}$: Gross percentage of school enrolment at the secondary level

$Gov_{i,t}$: Percentage of subsidies and other transfers to the government expenditure

$Bank_{i,t}$: Commercial bank office per 100,000 adults

$Pop_{i,t}$: Population

$Dpdrt_{i,t}$: Dependency ratio

ε_{it} : Error term

3.3 Model Justification

- **Poverty Headcount Ratio**

This study's independent variable was the poverty headcount ratio. Each country has a different poverty line depending on the country's price and life standard. Furthermore, the world bank suggests using the Purchasing Power Parity (PPP) approach instead of nominal rates to make the poverty rate comparable across the countries. Therefore, the study will use the population poverty headcount ratio and $1.90 as the poverty line with the 2011 PPP standard. The code of the variable is SI.POV.DDAY.

- **Annual GDP Growth**

GDP is the broadest economic indicator within the economy because it covers not all economic activity, including trade (Mankiw, 2009). However, the study will employ annual GDP growth to see the annual economic performance affecting the poverty

rate within the countries. In addition, the annual GDP growth uses market prices with constant local currency to avoid the effect of inflation on the data. The code of the variable is NY.GDP.MKTP.KD.ZG.

- **Trade**

Trade has connected all countries and made them part of the global value chain. Each country has its comparative advantage. Most low- and middle-income countries have specialized in unskilled or low technology products and extractive activity. However, some countries specialize in the service sector with a high remittance to GDP ratio. We could not specifically find countries' trade data on the world bank database. In this case, it needs to sum up the annual import (NE.IMP.GNFS. ZS) and export data (NE.EXP.GNFS. ZS).

- **Health**

As part of the primary human development indicator, there are several proxies as the health indicator used for the research. However, this study will use life expectancy as a health indicator. The life expectancy could represent the country's health sector service level. As discussed in the previous section, the health indicator is a good factor affecting the productivity and capability of poor people to join the labor force. In the World Bank database, the general life expectancy code is SP.DYN.LE00.IN.

- **Education**

Other dimensions of human development indicator were education. As mentioned in the previous section, many proxies exist for education variables. One of the international standardized education level indicators was the Program for

International Student Assessment (PISA) score [7]. Nevertheless, despite the comprehensive and worldwide assessment, the test was not held annually. On the other hand, technological and science enhancement has shifted the minimum formal education requirement of the labor force. Therefore, this study will only employ the gross enrolment rate secondary school level instead of primary school. The gross enrollment rate is roughly comparing the total number of enrollments regardless of the age to the number of populations of the age group that formally corresponds to the level of education. In the WB database, the gross enrolment rate of the secondary school is SE.SEC.ENRR.

- **Financial Inclusion/Access**

Some experts believe that one of the main factors of poverty is lack of access. Among all the access needed for the low-income families was financial access. As described in the preceding section, Grameen Bank by M. Yunus in Bangladesh exemplifies how greater access to financial services has transformed an impoverished community. The banking service/facilities will save the poor people from informal financial institutions that charge high-interest rates. Furthermore, the banking service will provide the infrastructure for the government to help the poor people with direct cash transfers or benefits. Even though the banking service was vital as the agent of the poverty alleviation effort, the existence or availability of formal banking institutions is still challenging. This study will use the banking branch per 100,000 adults (code: FB.CBK.BRCH.P5) as one of the independent variables.

- **Government Expenditures**

[7] PISA was education assessment by Organization for Economic Cooperation and Development (OECD) that combining reading, mathematics, and science skill for the 15 years old student around the world (Schleicher, 2019).

According to three government functions: allocation, redistribution, and stabilization (Rosen & Gayer, 2008), they could allocate some budgets for poverty alleviation programs, including transfer and subsidy, between the three functions. The world bank database provides specific government spending data on cash transfer and subsidies (code: GC.XPN.TRFT.ZS) as direct government intervention to the poor or lower decile of income group. We can evaluate the government spending effectiveness on poverty alleviation programs from the result.

3.4 Methodology

The study will employ quantitative analysis with an econometric approach. However, it will begin the data management and data cleaning process. This first data management process uses Microsoft Excel, while the statistic process uses Stata. Microsoft Excel is mighty for data handling and data management. Also, the raw data from the world bank was downloaded in Microsoft Excel extension. So, Microsoft excel was the best option because we do not need to encode the data into another platform format. Stata's use for the statistic work enables data transfer from Microsoft Excel easier. In addition, Stata is powerful and complete in panel data analysis.

3.4.1 Panel Data Regression

From the simple regression time-series and cross-section data, the econometric analysis moves to robust panel data analysis. Some study identifies panel data structure as longitudinal data or pooled data. The panel data analysis combines the strength of those two initial analyses. Panel data regression will examine different entities over specific periods. Therefore, panel data will provide the study time and individual/group effect (H. M. Park, 2011). The basic panel data equation:

$$Y_{it} = \beta_1 + \beta_2 X_{2it} + \beta_3 X_{3it} + u_{it} \qquad (9)$$

$$i = 1,2,3$$

$$t = 1, 2, 3, 4, \ldots, 25$$

In equation 7, *Y* stands for the dependent variable while *X* is for the independent variable. The *i* and *t* stand for entities and time, respectively. If the number of times is the same for every entity, the data will be called balanced panel data. Finally, *u* is an error term of the panel data model.

According to (Gujarati, 2004), there are some reasons why panel data is powerful:

- The analysis takes into account heterogeneity by permitting the individual-specific variables.
- The analysis results provide more informative variation and less collinearity. Furthermore, combining time-series and cross-section data will increase statistic efficiency and degree of freedom.
- The repeating cross-section will deliver dynamic change analysis for the study. In some cases, panel data could provide a complex behavioral model.
- The panel data can measure the unseen effect in simple time-series and cross-section data.
- At last, some panel data models could lower the bias from model aggregate escalation.

There are three methods of panel data analysis: (i) Pooled ordinary least squares (OLS), (ii) Fixed effect, and (iii) Random Effect. The detail and the choosing mechanism will explain in the following subsection (H. M. Park, 2011).

3.4.1.1. Pooled OLS

The pooled OLS was the basic econometric OLS regression that is appropriate to be applied if the model does not have an individual effect (u_i) is equal to zero or constant for every time and individual (Gujarati, 2004). This method should follow some core assumptions (Greene, 2012):

- The relationship between the dependent with the set of independent variables and the error term is in a linear function (linearity).
- The predicted error does not correlate with any of the equation's variables. (Exogenous).
- The uniform variance of disturbances (homoscedastic) and unconnected (autocorrelation)
- There is no relationship between the independent variable on the model (multicollinearity)

According to (H. M. Park, 2011), the equation of pooled OLS will be.

$$Y_{it} = \alpha + \beta X_{it} + \varepsilon_{it} \quad (u_i = 0) \qquad (10)$$

In this approach, u_i Stand for the individual effect (time or cross-section effect) and consider zero.

In addition, (Gujarati, 2004) argues that the utilization of pooled OLS is possibly naïve. The result seems excellent, with a significant sign for every single independent variable as well as a high value of R^2. On the other hand, the low Durbin Watson gives on a pooled OLS result signals that an autocorrelation problem or specification error is probable.

3.4.1.2. Fixed Effect Model

The fixed effect model is panel data regression analysis that observes the individual effect on the intercept. In this approach, the error term is tolerable to correlate with the other model variable because the individual effect is considered an intercept/constant that varies over time (time-invariant) (Gujarati, 2004). From the previous explanation, the fixed effect equation will be (H. M. Park, 2011).

$$Y_{it} = (\alpha + u_i) + \beta X_{it} + V_{it} \qquad (11)$$

u_i stands for the fixed effect specific to the individual.

Some studies named the fixed effect model Least-Squares Dummy Variables (LSDV) or covariance model (Gujarati, 2004). However, (H. M. Park, 2011) differentiates the LSDV from the fixed-effect model due to dummy variables in the estimation. The non-dummy fixed-effect method will call as "within estimation". This estimation will use the deviation within the group or time instead of a dummy variable. Some potential problems need to take into account in the fixed effect regression method (Gujarati, 2004):

- The excessive use of dummy within the model will lower the degree of freedom.
- Again, the excessive number of variables will increase the chance of multicollinearity. In this case, the existence of multicollinearities will diminish the precision of the estimation.
- The fixed effect approach will be less sensitive to detecting the impact of the time-invariant regressor—for example, ethnicity, race, and sex.

In Stata, the command for the basic fixed effect model is

$$\boldsymbol{xtreg}\ Y_i\ X_i, fe$$

3.4.1.3. Random Effect Model

As mentioned before, the diminishing degree of freedom number and insensitivity of the time-invariant variable is the expensive cost of the fixed effect implementation. Furthermore, (Gujarati, 2004) argues that instead of a dummy variable that does not represent the proper model, there is an alternative of disturbance error utilization. Then this approach will be known as the random effect model or error components model.

Assume that the individual effect (time and cross-section) is independent and not correlated with other regressors. Other assumptions are constant intercept and slope, while the distribution of error variance is random. The random effect estimation model is (H. M. Park, 2011).

$$Y_{it} = \alpha + u_i + \beta X_{it} + (u_i + V_{it}) \qquad (12)$$

u_i stands for the random effect specific to the individual. So, $(u_i + V_{it})$ is the composite error term. In Stata, the command for doing the random effect regression is

$$xtreg\ Y_i\ X_i, re.$$

In summary, (Gujarati, 2004) suggests the best approach to the panel data between fixed effect and random effect based on the number of entities (N) and time-series data (T).

Table 2 *Fixed Effect vs. Random Effect*

N	T	Method
Small	Small	Indifference
Large	Small	Random effect
Small	Large	Fixed Effect

Source: (Gujarati, 2004)

3.4.2 Specification Test

Besides observing the number of entities and time series period, some specification tests will help us decide the best method for our model.

- **F test**

  The F test chooses the best method between the fixed effect method or pooled OLS. The null hypothesis of this test was that all the dummy variable parameters were zero. If the F-test score is higher than the α (significance level/0.05), then the alternative hypothesis is that at least one of the dummy parameters is not equal to zero. In other words, the best method for the model was the fixed effect instead of pooled OLS. The formula of the F test(H. M. Park, 2011).

$$F(n-1, nT-n-k) = \frac{(R^2_{FEM} - R^2_{pooled})/(n-1)}{(1-R^2_{FEM})/(nT-n-k)} \qquad (13)$$

  In Stata, we can conduct this test with the command:

$$\textbf{\textit{testparm}}\ i.year.$$

  However, if we conduct fixed effect panel data regression in Stata, they will directly provide us with the F test result.

- **Breusch – Pagan LM Test**

  This test is the procedure to decide the best panel data regression method between random effect and pooled OLS. LM stands for Lagrange Multiplier. The test will observe if the entity or time-related variance parameter is null. In addition, the LM test result uses the Chi-Square distribution with a degree of freedom of one. Therefore, if the probability of the Chi squares is less than the degree of freedom, it indicates that the model contains a significant

random effect. Then, the random effect regression is the best approach for the model (H. M. Park, 2011). In Stata, we can run the LM test command after the pooled OLS estimation.

$$xttest0.$$

- **Hausman test**

  This test is essential and relevant because it will help us compare fixed and random effects. The hypothesis conjectures that there is no relation between the regressor with the entities or time-specific effect (H. M. Park, 2011). In addition, some econometricians argue that the Hausman test's null hypothesis is that both random and fixed effect estimators are not substantially different. They conclude that it is not simple work to decide the best approach between fixed and random effects (Gujarati, 2004). The result of the test will be on the chi-square distribution. So, if the result (probability if chi-square) is significant, fixed effects are better estimations methods. In Stata, we need to run and keep the fixed and random effect estimation result before running the Hausman test.

$$xtreg\ Y_i\ X_i, fe$$
$$estimates\ \ stores\ fixed$$
$$xtreg\ Y_i\ X_i, re$$
$$estimates\ \ stores\ random$$
$$hausman\ fixed\ random$$

Chapter 4. Result and Discussion

4.1 Descriptive Statistics

As mentioned before, the panel data combined 27 low- and middle-income countries in Asia. The data are annual data from 1999 to 2019 (21 years). Therefore, if all the sample countries continuously published the data, the number of observations was 567. From Table 2, we know that only 3 out of 8 are continuous for every country and time observations. The lowest number of observations is the poverty headcount ratio as the primary dependent variable.

Table 3 *Descriptive Statistics*

Variables	Obs.	Mean	SD	Min.	Max.
Pov	227	9.1	12.2	0.0	61.6
Growth	565	5.9	5.0	(36.7)	53.4
Trade	545	82.0	41.9	0.2	220.4
lnLife	567	4.2	0.1	4.1	4.4
Educ	403	4.2	0.3	3.1	4.7
Gov	328	34.7	16.6	1.5	81.0
lnBank	401	2.3	0.8	0.3	4.3
lnPop	567	16.9	2.02	12.5	21.1
Dpdrt	567	57.4	13.6	30.8	94.5

Sources: Authors' datasets

Table 2 of the descriptive statistics reveals that the poverty headcount ratio is missing several data. From the 567 observations, the available data is 227 (40.0%) only. Other variables that have many missing data are government expenditure (subsidies and transfer), the number of banks, and gross schooling enrolment that only cover 328 (57.8%), 401 (70.7%), and 403 (71.1%), respectively.

The descriptive table also analyses the minimum and maximum for all variables. In the poverty headcount ratio, we see that there are countries that succeed in alleviating poverty into zero poverty conditions. On the other hand, Uzbekistan in 2003 had significantly high poverty rates. The lowest economic growth (-36.7%) happened in Iraq in 2003 when they invaded the United States and the alliance. However, the Iraq economy rebounded (53.4%) in the following years. The other macroeconomic indicator was trading. The datasets show that Malaysia has a trading volume double its GDP from 2000 to 2007 (217.6% – 192.5%). On the contrary, Myanmar has had a shallow trade volume, around 0.2% (2005 to 2011).

Myanmar had the lowest life expectancy (58 years old) from 1999-to 2000, with Lao PDR and Timor Leste. Furthermore, as a small island country, Maldives had the highest life expectancy (77-79 years old) from 2014-to 2019. The lowest gross secondary enrolment rate for education was in Pakistan at 22.5% in 2003. The highest gross enrolment rate was Thailand, with 120.6% in 2015.

The lowest pro-poor government intervention spending for subsidies and the transfer was the Maldives, around 1.5%, while the highest was Nepal, with 81.0% of government expenditures in 2019 (the beginning of Covid 19 outbreak). In addition, the lowest bank availability as the primary and modern financial intermediaries per 100,000 persons was Myanmar (1.42), while the highest was Mongolia (71.2). For dependency ratio, Maldives is the lowest with 30.8 % in 2019, while the highest was Timor Leste at 94,5% in 2003.

4.2 Panel Data Regression Analysis

This section will discuss the regression result and analysis. However, before conducting a panel data regression, the most critical thing is setting the individual properties that

consist of how many samples/objects of the research and how long/frequency of the data observations. For this purpose, we use the tsset command in STATA.

Table 4 PLS, Fixed, and Random Effect Regression Results

	PLS	**Fixed Effect**	**Random Effect**
Growth	0.0310 (0.139)	-0.0036 (0.061)	-0.0940 (0.064)
Trade	-0.0322 (0.016)	**-0.0686**** (0.025)	-0.0191 (0.021)
Life	**-1.0915***** (0.300)	0.1402 (0.347)	**-1.0111***** (0.272)
Educ	-0.0726 (0.046)	-0.0239 (0.031)	0.0022 (0.032)
lnBank	**1.9517*** (0.852)	**-6.1867***** (1.161)	**-3.8211***** (1.126)
Gov	-0.0038 (0.038)	0.0125 (0.045)	0.0262 (0.046)
lnPop	**1.2484***** (0.323)	**-40.3419***** (8.000)	1.1932 (0.952)
Dpdrt	**0.2377**** (0.073)	**0.2023*** (0.093)	**0.3776***** (0.085)
N	69	69	69
AdjRsquare	0.615	0.633	0.427

Sources: Authors calculation.
Note: * if $p < 0.05$; ** if $p < 0.01$; and *** if $p < 0.005$. The second line was the standard error while the first line is coefficient

After we set the panel data individual properties, we run all three-panel data model regression: the pooled least square, fixed-effect, and random effect models in STATA. Each of those three models they have three to four significant variables. The bank branches rate per 100.000 people as the proxy of financial inclusion is significant for all three initial models. In addition, the dependency ratio is also significant straight for all initial models. The variable of the population numbers is only significant in the pooled least square and fixed model. The life expectancy as the proxy of the health indicator is

also significant in two models: pooled least square and random effect. In addition, the trade volume is only significant in the fixed-effect model. Finally, the other three variables, annual economic growth, gross enrollment rate, and direct government intervention/expenditures (subsidy and transfer), are insignificant for all models. The detail for individual analysis will be covered later in the following section.

At last, we need to check and decide the best method or approach for the model with a series of specification tests. On the other hand, we need to check the best linear unbiased estimator (BLUE) assumptions (Greene, 2012).

4.2.1 Model Specification test Output

This section determines the best approach or method to estimate our model. The first step is conducting the fixed effect regression in STATA. The regression result of the fixed effect test in STATA provides the F test to check the model's poolability (details in the appendix). In short, the regression result shows that the probability of F is zero or less than the alpha (0.05). Therefore, the null hypothesis should be discarded. In this instance, the null hypothesis is that all dummy variables are equal to zero, or that the pooling least-squares technique is the optimal method. So, because the probability of F is less than alpha, it means that the fixed effect is a better approach than the pooled least square.

On the other hand, we need to choose between the fixed effect and random effect approach as the next step. In this situation, the Hausman test must be performed. The null hypothesis of this examination is that the fixed effect is superior to the random effect. The Hausman test output shows that the probability of the chi-square is 0.5478. The chi-square probability is more than the alpha (0.05). Therefore, we can conclude that the random effect is the best approach for this model.

4.2.2 BLUE Statistic Assumptions

As mentioned before, the check of the BLUE assumption is essential to ensure that the regression output is unbiased. The three assumptions are multicollinearity, autocorrelation, and homoscedasticity.

- **Multicollinearity**

  This problem makes the output not precise or systematically biased (Greene, 2012). To detect this problem, we can use some methods. First, we can use the correlation table (see table 5). From the correlation table, we could see that all the correlation scores were lower than 0.75. It means that the model does not have multicollinearity problems.

  The other method to detect multicollinearity is the Variation Inflation Factors (VIF) test. The threshold for the VIF test score was 5.0. If the score is more than 5.0, there are solid connections or relations between the variables in the model. The VIF test result shows that all the scores are lower than 5.0 (details see Appendix). Therefore, the model is devoid of multicollinearity.

Table 5 *Correlation Table*

	Pov_i	**Growth**	**Trade**	**Life**	**Educ**	**lnBank**	**Gov**	**lnPop**	**dpdrt**
Pov_i	1.0000								
Growth	0.1940	1.0000							
Trade	-0.4451	-0.0311	1.0000						
Life	-0.6902	-0.2801	0.4618	1.0000					
Educ	-0.5902	-0.1956	0.1620	0.5798	1.0000				
lnBank	-0.1248	-0.0555	0.1171	0.3370	0.0466	1.0000			
Gov	0.0300	-0.0886	-0.3035	-0.1286	0.2704	-0.1964	1.0000		
lnPop	0.3855	-0.0817	-0.2641	-0.1854	-0.3239	-0.2487	0.1370	1.0000	
dpdrt	0.4716	0.2292	-0.1204	-0.5348	-0.3566	-0.2370	-0.0929	-0.1187	1.0000

Source: Authors calculation.

- **Autocorrelation**

  Autocorrelation or serial correlation is the assumption when there is no correlation among the variable in a given series of time (lag) or spatial observation. For regression context, we need to ensure no autocorrelation on error disturbances (Gujarati, 2004).

$$E(u_i u_j) = 0 \qquad i \neq j \qquad (14)$$

  In STATA, we can conduct the Wooldridge test procedure to check the existence of the autocorrelation problem using the command *xtserial*.

  The Wooldridge test's output (see appendix) upon the model says that the probability of F was 0.0004 or lower than the level of confidence (alpha). It means we need to reject the null hypothesis, or we can say there is an autocorrelation problem within the model.

- **Heteroscedasticity**

  Lastly, regression analysis requires a constant error variance equal to the explanatory variable's variance. Heteroscedasticity makes our regression output's conclusion biased or misleading(Gujarati, 2004). Therefore, we must use the Wald heteroscedasticity test to confirm their existence. The null hypothesis implies the model was homoscedastic. However, our test revealed (see appendix) that the chi-square probability is 0.000 or less than alpha (0.05). Subsequently, it indicates that the model has a heteroscedasticity problem.

This section concludes that the model has autocorrelation and heteroscedasticity problems that make the regression model, not BLUE. If the problem was only the autocorrelation, we could implement random effect robust regression or adjusted cluster standard error approach. However, autocorrelation and heteroscedasticity require a

different regression approach called general least squares (GLS). In general, the GLS estimates better when the number of observations is low and the observation time is relatively long.

However, the panel data model in this study is not too extensive. So, the use of adjusted cluster standard error or variance-covariance matrix estimators (*vce*(robust)) is still applicable as the comparison model of the GLS. Therefore, the following sections will compare the result from the adjusted cluster standard error GLS random effect regression with the common GLS approach. At last, both of those approaches will result in a robust standard error for every independent variable.

4.2.3 Random Effect GLS Regression with Adjusted Cluster Standard

Since the number of individuals and observation time is insignificant, the random effect with adjusted cluster standard error is still applicable. In Stata, we can adopt this approach with the command ***xtgls*** *Y_i X_i,****re vce****(robust)*.

The results in table 5 should compare with the results in table 6. From the comparison, it seems that the number of observations is equal. However, the random effect GLS output is equipped with an R square. In detail, the life expectancy and dependency ratio are significant to the poverty ratio. The trade volume, number of banks per 100.000 persons, and number of the population are insignificant. Even though insignificant, the number of bank branches per 100.000 people shows the same direction with the hypothesis that the more extensive access to financial services will help the poor move from poverty. It became significant when the model dropped two other variables: secondary gross enrolment rate and government interventions (see table 5, column 4).

Table 6 *Random Effect GLS Regression with Adjusted Cluster Standard Error Results*

	Random Effect GLS Regression with Adjusted Cluster SE				
	(1)	(2)	(3)	(4)	(5)
Growth	-0.0940	-0.0795	-0.2253	-0.0248	-0.2102
	(0.050)	(0.100)	(0.116)	(0.045)	(0.132)
Trade	-0.0191	-0.0732	-0.0387	-0.0143	-0.0257
	(0.031)	(0.019)	(0.022)	(0.021)	(0.034)
Life	**-1.0111***	**-0.8516*****	**-1.9414*****	**-0.9245*****	**-1.7422*****
	(0.496)	(0.038)	(0.491)	(0.266)	(0.477)
Educ	-0.0262		0.0068		
	(0.068)		(0.111)		
lnBank	-3.8211			**-5.2458****	
	(2.151)			(1.921)	
Gov	-0.0262				**0.1029***
	(0.066)				(0.050)
lnPop	1.1932	0.5487	1.9347	0.0896	1.5236
	(0.308)	(1.667)	(1.674)	(0.957)	(0.791)
Dpdrt	**0.3776*****	**0.8321*****	**0.8764****	**0.3777*****	**0.5996*****
	(0.115)	(0.143)	(0.157)	(0.092)	(0.121)
N	98	223	162	168	140
R-sq overall	0.4272	0.3771	0.4645	0.2996	0.5592

Sources: Authors calculation.

4.2.4 Panel Data Generalized Least Squares (GLS)

As discussed in the previous section, autocorrelation and heteroscedasticity necessitate different treatments. In this case, Gujarati (2004) suggests that generalized least square is one of the options. The study will employ the panel data feasible generalized least squares regression. In STATA, we can implement this method by inputting $\boldsymbol{xtgls}\ Y_i\ X_i$

Surprisingly, implementing the generalized least squares raised the numbers of the significant from three variables in the random effect to five significant variables compared to table 4. The two additional significant variables are trade volume and countries' population number. The economic growth and government expenditures are consistently insignificant in the models. Moreover, as we see in the panel feasible generalized least squares output, the methodology has treated and solved the autocorrelation and heteroscedasticity.

The comparison between tables 5 and 6 shows that the common GLS approach (table 6) provides a better model with more numbers of significant variables. Overall, the probability of chi squares is less than or equal to 0.0 It implies that these models adequately describe the dependent variable from a statistical standpoint. In addition, specific for the financial inclusion variable (the number of bank branches per 100,000 people), table 5 was in line with the hypothesis even though insignificant. So, the partial variable interpretation and analysis in the following section will stick to the standard GLS output (table 6).

Table 7 *General Least Square Regression Results*

	General Least Squares				
	(1)	(2)	(3)	(4)	(5)
Growth	0.0310 (0.133)	-0.0745 (0.165)	0.0539 (0.206)	0.0393 (0.110)	-0.2073 (0.144)
Trade	**-0.0322*** (0.016)	-0.0253 (0.019)	-0.0387 (0.022)	-0.0139 (0.013)	**-0.0366*** (0.016)
Life	**-1.0915***** (0.286)	**-0.8516***** (0.248)	**-1.7506***** (0.342)	**-0.6894***** (0.179)	**-1.2236***** (0.198)
Educ	-0.0726 (0.044)		0.0895 (0.058)		
lnBank	**1.9517*** (0.812)			0.2055 (0.639)	
Gov	-0.0038 (0.036)				0.0089 (0.034)
lnPop	**1.2484***** (0.308)	**1.4374***** (0.370)	**1.4930**** (0.498)	**1.0138***** (0.639)	**1.0063***** (0.293)
Dpdrt	**0.2377***** (0.069)	**0.4348***** (0.078)	**0.3222**** (0.102)	**0.2274***** (0.055)	**0.3532***** (0.067)
N	98	223	162	168	140
Log Likelihood	-286.2035	-817.0725	-587.2054	-527.1094	-442.8362
Prob Chi^2	0.0000	0.0000	0.0000	0.0000	0.0000

Sources: Authors calculation.

4.3 Measuring Economic Performance on Poverty Alleviation

As noted in the literature review, there are disagreements over how the country's economic success will allow the poor to better their economic status. This model employs

two important macroeconomic indicators (economic growth and trade openness) and measures their impact on poverty alleviation.

4.3.1 Economic Growth, Trickle Down Effect Paradox, and Inequality

As we mentioned in the literature review about the trickle-down effect, which believes that the wealth accumulation will trickle until the lowest income group. Therefore, higher economic performance will directly or indirectly benefit poor people to increase their well-being. However, the regression output tells the opposite. Economic growth was insignificant to the poverty headcount ratio for all regression methods. So, we need to find where all the wealth is accumulated.

Since all the countries on the datasets are low and middle-income countries, the phenomenon supports Kuznets's hypothesis. As we discuss in the literature review, Kuznets argues that the economic growth and inequality relation curve will shape an inverted-U shape curve. It means, in the beginning, the higher economic growth will lead to a higher inequality distribution of income until a certain point. After that point, as the economic development happens continuously and income per capita increases, the inequality will decrease and make the slop negative (Akinci, 2018; Kuznets, 1955, 1963).

So, income inequalities are other dimensions and obstacles for the countries to reduce poverty. Some economists argue that the poverty and poverty gap is the cost of inequality (Mai & Mahadevan, 2016). The higher inequality will lead to a higher poverty gap. It needs more efforts to eradicate poverty if the poverty gap is significant. Moreover, the comprehensive sociology study of 125 United States' most significant metropolitan areas by Blau & Blau (1982) reveals that the higher inequality relates to the higher social cost in the form of the higher crime rates. It will be complicated If we consider the inequality and poverty problems. Therefore, each country needs a different approach to solve this

problem. However, it needs further research to proves if the inequality as the real reasons behind. The lesson learned and alternative policy will discuss in the following chapter.

At last, because all the regression output shows that economic growth is insignificant to poverty. So, we cannot interpret the coefficient of economic growth.

4.3.2 International Trade Enhancement and Poverty Eradication

There is a dilemma when discussing international trade enhancement and the impact on poor people. Some people perceive that the trade enhancement drags the world market to another level supported by technology improvement, lower trade barriers, and multinational corporations and banking systems. In that case, the poor people will be marginalized from the rapid growth of the international trade enhancement. Therefore, it is hard to find global equity in this globalization and market-oriented economy (L'Huillier, 2016).

Alternatively, some economists say that increasing international commerce and trade liberalization has created new economic prospects for eradicating poverty. Using CGE simulation, Anderson (2020) shows how trade liberalization is significant in alleviating poverty.

This paper offers evidence that enhancing international trade helps poor people in low- and middle-income countries by providing more extensive economic opportunities. However, if we see the result (details in appendix), the T-test probability was 0.039 or near the alpha (0.050). It means this variable has a low significance. Therefore, the international trade enhancement needs to be supported by affirmative government policy. So the poor people will get more benefits from those rapid international trade enhancements (Anderson, 2020).

In addition, from the output, it could say that increasing one percent of trade volume within the country will eradicate poverty by 0.03% poverty headcount ratio.

4.3.3 Better Health Service, Life Expectancy, and Poverty

As the primary human capital, healthiness is essential for people joining the workforce or being productive. There are many proxies that we can employ for the health indicator. However, indicators will conclude in the form of how long the life span of the people within the country is. In the statistic, we could find the life expectancy data.

In the beginning, we hypothesize that the longer life expectancy results from good health services and insurance will enable the poor to be productive. They could help themselves to move from poverty. There is also an indirect effect, where students who have a good and healthy lifestyle could follow all the schooling activities and get higher academic scores. This situation will lead to a higher level of human capital within the community (Gunetilleke, 2000). On the other side, the high healthcare expense might cause low-income households to become more impoverished (Lawson, 2004). Therefore, national health insurance systems are also essential to keep the vulnerable group of families drop to a lower or poor level.

The regression output echoes the same direction. From the first GLS output in table 3, the life expectancy was highly significant, with the probability of Z less than 0.001. The improvement in the health sector, including national health insurance, will highly support the poverty eradication program. From the regression output, we can project the decline of the poverty rate by 1.2% for every one-year growth in the life expectancy.

4.3.4 Measuring impact of Education Impact on Poverty

Besides good health or physical body, education is another essential human capital. We believe that a higher level of education will enable the workforce to contribute and

produce higher marginal output for the economy. Because in the economic theory, we believe that the most effective and efficient will be the market champion. The best way to achieve an efficient production process is by developing the technology. It needs more than primary education for the labor force to work with advanced technologies. Therefore, this study uses the secondary education gross enrollment rate instead of the primary education gross enrollment rate.

Surprisingly, the secondary education indicator is insignificant for all regression methods. There are several possible explanations for this evidence. First, there is a mismatch between the secondary education graduates' profiles with the needs of the industry. For instance, many people graduate from non-vocational high school, while the industry needs more specific skills gained through vocational education systems. At the worst, there is a probability that the economy is still lean on nature extractive and agricultural activities that do not require skilled human capital. Therefore, the government should connect education with current and future industry needs.

4.3.5 Financial Inclusion and Poverty

Another dimension of poverty is the lack of access. One of the critical accesses for the poor people is the access to formal financial institutions. Some reasons hold low-income families away from access to financial services. Begin with the low-income families' low financial literacy or education until the poor people's assets are bankable. It needs sets of policies by the government and banking sectors to increase the financial inclusion for the poor people.

This study tries to comprehend the impact of financial inclusion on poverty through estimation. The results show an inconclusive result. In the fixed effect and random effect model, the result was in line with Neaime & Gaysset (2018) result where the number of

bank availability is significant and harmful to the poverty headcount ratio. However, the pooled least squares and generalized least square approach have provided significant results yet differently. It seems that bank branches within the community did not positively contribute to poverty alleviation.

4.3.6 Government Intervention in Poverty Eradication

Government has an essential role in the poverty eradication process. Charles Darwin (1845), as cited in (L'Huillier, 2016), says that "if the misery of our poor is caused not by the law of nature, but by our institutions, great is our sin." This research examines the efficacy and efficiency of direct government intervention (subsidies and transfers) in the program to reduce poverty.

Surprisingly, from the regression output, we found that all the regression methods show that government support is insignificant in reducing poverty rates. It is fascinating to discuss the possible answer to this evidence. First, as discussed in the literature review, some developing countries have a problem with the targeting scheme (Anderson, 2020). This argument is supported by Nugroho et al. (2021), which compare direct cash transfer (social assistance) and in-kind subsidies. Direct cash transfer is significant and more effective in helping the poor. Nevertheless, this scheme needs support from an inclusive banking system and unified database.

In addition, the fiscal measures on how the government gathers the resources to finance the poverty alleviation programs also matter (McKay, 2002 as cited in Anderson, 2020). The direct income tax is pro-poor because most low-income families' income is under the exemption threshold. Also, some low-income families are working in the informal sector, which is out of the tax system.

4.3.7 Demographic Features Impact on Poverty

The model's two demographic features are the population number and the age dependency ratio as the control variables. The vast number of populations is a good factor for the country to boost its economy. This significant population will provide enough human resources for the production activity and the potential market for domestic goods. We can learn how the government of China maximize the abundant stock of human resources to build their industry and economy by inviting international investor and improving the quality of human resources. However, some countries failed to convert their massive population to be an engine of economic growth. The study provides an empirical example of that conversion failure.

From the generalized least square regression output, we found that the number of populations is significant and positive. So, the increasing population in the sample by 1.0% will trigger an increasing 1.2% of poverty headcount ratio.

Lastly, the study shows the impact of the dependency ratio on poverty. A higher age dependency ratio will lead to a heavier burden on the economy because more people are out of the labor force and the denominator for the poverty headcount ratio. The regression output tells that the age dependency ratio is significant and positive to the poverty headcount ratio. From the coefficient, we can estimate that increasing the dependency ratio by 1.0% will increase the poverty headcount ratio by 0.2%.

Chapter 5. Conclusion and Recommendations

5.1 Conclusion

This study delivers information for policymakers, especially in Asia, on poverty dynamics and its determinants. As a multidimensional issue, it needs a multidimensional approach to address the poverty issues. The study also shows that the market mechanism failed to distribute the wealth. The collaboration between public and private are essential to ensure the effectiveness of the poverty alleviation measures.

In recent decades, many industries have emerged and flourished across Asia continents due to the richness of natural and human resources. Therefore, some countries reach a higher economic growth compared to other regions. However, the sweetness of the impressive economic performance is not well transmitted to the lower part of the community. The economic growth is insignificant relative to the poverty rates. The inequality issues created a substantial income gap among the societies and obstructed income redistribution.

On the other hand, trade contributes to poverty as part of the GDP. The international trade enhancement has unlocked new opportunities for poor people. However, all the low and middle countries need to pay more attention to the risk of external market distortion. For example, the Asian financial crisis in 1998-1999 has not suffered the financial sector but the entire economy, including the low-income families. They do not have enough assets or saving as a buffer to face the crisis. It needs an intervention from the government to sustain the livelihood of the poor people during the crisis.

The essential endowment for the people to join the labor market was health and education. In this study, life expectancy as the proxy of the health indicator is significant in reducing

poverty. This study, written during the pandemic Covid 19, gives us a precious experience of how the health sector was necessary even in the international economy and poverty issues. The World Bank Group projected that the pandemic would drag 88 to 101 million people into extreme poverty in 2020 and 151 million in 2021 (The World Bank Group, 2020). The World Health Organization released enormous additional extreme poverty by half a billion people from the Covid 19 crisis in the following years. They urge the country member to implement universal health coverage to sustain the livelihood of the poor and vulnerable from the impact of the crisis (The World Health Organization, 2021). In low- and middle-income countries, the out-of-pocket ratio is still relatively high because they lack national health insurance. Furthermore, the availability of medical centers is hard to find. The government needs to prioritize its budget for these issues. For example, Indonesia has committed to spending 5.0% of its budget as mandatory spending for the health sector.

Education is also essential for poor people to increase their skillset and productivity. With the recent industrial development, primary education seems inadequate. Therefore, this study employs the secondary gross enrollment rate as one of the independent variables. Surprisingly, even though it signaled a negative relationship with poverty, it was insignificant in affecting poverty. Perhaps, there is a missing link between the education system with the recent industry's needs. Some industries require more specific skills that did not train in the general secondary education in low- and middle-income countries in Asia

Access to formal financial institutions was crucial for poor people. In this study, a bank branch works as the formal financial institution that can support the poor with affordable low-interest credit for their working capital or incidental needs. Also, the bank helps poor

people to keep and accumulate their assets. However, this study tells an inconclusive story. For all the method, the indicator is significant but have a different direction.

The economic theory says that the economy's wealth will distribute efficiently to the societies. However, a gap or inequalities among the societies makes the distribution not equally spread. Through the regulations, the government intervenes to fix the wealth distribution. The literature review indicates that the interventions could be placed on the revenue or expenditure sides. However, this study focuses on the expenditure side, especially the pro-poor expenditures such as subsidies, grants, and many social benefits. Unfortunately, the study determined that the government's pro-poor spending is insignificant to the poverty headcount ratio. It is interesting because many developing countries allocate an impressive amount of their budget to this expenditure—the issue of program targeting is suspected as the main reason. In low- and middle-income countries, many subsidies or other kinds of government support are not well received by the real low-income families. For example, more than 80.0% of the gasoline subsidy in Indonesia is benefited by the top half of the wealth distribution (Rhee et al., 2014, as cited in Anderson et al., 2018).

Finally, the demographic features on the model show that the dependency ratio is the burden that contributes to the additional national poverty ratio. In addition, the low- and middle-income countries cannot take advantage of converting the vast populations as an endowment to boost economic output.

5.2 Policy Recommendation

From the whole discussion, this study will recommend some policies on poverty alleviation programs that might increase the effectiveness and efficiency of the existing ones.

- Surprisingly, the study indicates that economic growth is insignificant while the international trade enhancement is significantly positive and supports the poverty eradication progress. Therefore, the government needs to promote redistribution policies through their fiscal instrument's expenditure and revenue side.
    - As discussed in the previous chapter, the expenditure side shows that the effectivity is higher if the program is targeted (i.e., social assistance, cash transfer) than in-kind or commodity subsidies (i.e., electricity and fuel subsidies). Furthermore, the government could cooperate with the commercial bank to make an account for the poor people. So, the effectiveness of the intervention could be higher. However, the government should pay attention to the policy design and institutions' readiness. Without those combinations, the direct poverty intervention could stimulate social conflicts (Sumarto, 2021).
        - On the other hand, with the new bank account, the poor people got the government transfer and access to the formal financial services from the bank. So, it will increase financial inclusion.
    - On the revenue side, the study suggests that government can impose a progressive income tax to promote the redistribution policies. Gupta & Jalles (2022) argue that tax reforms are more practical to implement in adverse or weak economic conditions and improve income distribution faster. However, needs more studies to decide the degree of progressivity to keep the top distribution of income from discouragement.
- Since trade volume is significant to the poverty alleviation process, the government needs to support the sector that involves many poor people in their business. In this case, agriculture is the sector that needs attention from the government. There is an example of how the government tries to modernize and industrialize the agriculture

sector in Thailand. It increases the agricultural workers' value-added and income following poverty rate reduction (Watanabe et al., 2009). Furthermore, those governments and trade authorities should be more open to international trade and active in many trade agreement forums. Also, as the developing countries group, they should unite and promote multilateral trade agreements that support the low- and middle-income countries' interests in many forums, such as World Trade Agreement (WTO) and ASEAN + 3.

- This study finds that health is also a significant factor in the poverty issues. However, the out-of-pocket ratio is relatively high in developing and less developed countries. Therefore, it needs to establish national health insurance schemes that cover all citizens with fee or price discrimination based on their income. The government subsidizes low-income families' annual national health insurance fees in some cases. Furthermore, the government should invest from the preliminary stage of the development of its people and pay attention to some issues such as immunization, stunting, and nutrition.
- The government should pay extra attention to education. Education enables the country to shift its production and economy to a higher level. Surprisingly, the study reveals that education is insignificant and contributes to poverty. There is a missing link between education and industry needs. The government needs to provide an education program relevant to the market demand and technology enhancement mastery. In this case, the secondary education gross enrollment was used as the education indicator. Perhaps secondary education in sample countries is currently very general and does not equip the students with the specialized skill set needed by the industries. So, the government needs to promote vocational high schools instead of regular high schools only.

- In the Indonesian case, the government established an education endowment fund called LPDP to allow talented citizens to pursue higher degrees and research even in the world's top universities. Today, some awardee has produced many contributions not only in academic but also to the economy because some of them are establishing start-up business and becoming the promising young leader in many companies across the nation.

5.4 Limitation

Future research should cover the poverty issues and the inequality as the obstacle to wealth distribution. Furthermore, there is a concern about the low number of observations because some indicators have missing data. In the real world, not all countries do and report their statistics because it is effort and budget costly. Therefore, it needs to expand the database to have more observations in the future.

In the end, poverty is a multidimensional issue. So, it will be more comprehensive if we can put more relevant variables in the model that this study has not covered yet. Example: financial crisis dummy, infrastructure, public good governance ratio, and geographical dummy.

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Appendix I

1. The Pooled Least Squared Regression Output

```
. reg pov_i growth Trade life educ_sch lnBank gov lnPop dpdrt
```

Source	SS	df	MS		
Model	3614.2959	8	451.786988	Number of obs	= 98
Residual	1974.31614	89	22.1833274	F(8, 89)	= 20.37
				Prob > F	= 0.0000
Total	5588.61204	97	57.6145571	R-squared	= 0.6467
				Adj R-squared	= 0.6150
				Root MSE	= 4.7099

pov_i	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
growth	.0310109	.1393535	0.22	0.824	-.2458816	.3079035
Trade	-.032186	.0163259	-1.97	0.052	-.0646253	.0002532
life	-1.091466	.3002831	-3.63	0.000	-1.688122	-.4948101
educ_sch	-.0726267	.0458968	-1.58	0.117	-.1638227	.0185693
lnBank	1.951717	.851605	2.29	0.024	.2595965	3.643838
gov	-.0037842	.0375652	-0.10	0.920	-.0784254	.070857
lnPop	1.248421	.3230619	3.86	0.000	.6065036	1.890338
dpdrt	.2377257	.0728045	3.27	0.002	.0930647	.3823868
_cons	54.83676	22.11879	2.48	0.015	10.88719	98.78632

2. The Fixed Effect Regression Output

```
. xtreg pov_i growth Trade life educ_sch lnBank gov lnPop dpdrt ,fe

Fixed-effects (within) regression               Number of obs      =        98
Group variable: id                              Number of groups   =        19

R-sq:                                           Obs per group:
     within  = 0.7315                                         min =         1
     between = 0.0987                                         avg =       5.2
     overall = 0.1295                                         max =        15

                                                F(8,71)            =     24.18
corr(u_i, Xb)  = -0.9957                        Prob > F           =    0.0000
```

pov_i	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
growth	-.0035946	.061429	-0.06	0.954	-.1260806	.1188913
Trade	-.0686301	.0245847	-2.79	0.007	-.1176506	-.0196096
life	.1401652	.347202	0.40	0.688	-.5521359	.8324663
educ_sch	-.0239233	.0307126	-0.78	0.439	-.0851624	.0373159
lnBank	-6.186726	1.161181	-5.33	0.000	-8.502056	-3.871396
gov	.0125096	.0446465	0.28	0.780	-.0765131	.1015322
lnPop	-40.34193	8.503796	-4.74	0.000	-57.29801	-23.38584
dpdrt	.2022967	.093484	2.16	0.034	.0158949	.3886985
_cons	688.1795	132.2695	5.20	0.000	424.4415	951.9174
sigma_u	80.10465					
sigma_e	1.7764097					
rho	.99950846	(fraction of variance due to u_i)				

```
F test that all u_i=0: F(18, 71) = 30.81                     Prob > F = 0.0000
```

3. The Random Effect Regression output

```
. xtreg pov_i growth Trade life educ_sch lnBank gov lnPop dpdrt ,re

Random-effects GLS regression                   Number of obs     =         98
Group variable: id                              Number of groups  =         19

R-sq:                                           Obs per group:
     within  = 0.6381                                         min =          1
     between = 0.5325                                         avg =        5.2
     overall = 0.4272                                         max =         15

                                                Wald chi2(8)      =     145.85
corr(u_i, X)   = 0 (assumed)                    Prob > chi2       =     0.0000
```

pov_i	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
growth	-.093987	.0641103	-1.47	0.143	-.2196408	.0316668
Trade	-.0191304	.021447	-0.89	0.372	-.0611657	.0229049
life	-1.01107	.2715241	-3.72	0.000	-1.543247	-.4788926
educ_sch	.0021766	.0324347	0.07	0.946	-.0613942	.0657474
lnBank	-3.821059	1.126043	-3.39	0.001	-6.028062	-1.614057
gov	.0261712	.0461954	0.57	0.571	-.0643702	.1167126
lnPop	1.193208	.9520321	1.25	0.210	-.6727407	3.059156
dpdrt	.3776109	.0848969	4.45	0.000	.2112161	.5440057
_cons	47.7648	22.20427	2.15	0.031	4.245219	91.28437
sigma_u	6.5688595					
sigma_e	1.7764097					
rho	.93185198	(fraction of variance due to u_i)				

4. Hausman Test Output

```
. hausman FE RE
```

	Coefficients (b) FE	(B) RE	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
growth	-.0035946	-.093987	.0903924	.
Trade	-.0686301	-.0191304	-.0494997	.0120181
life	.1401652	-1.01107	1.151235	.2163883
educ_sch	-.0239233	.0021766	-.0260999	.
lnBank	-6.186726	-3.821059	-2.365667	.2834972
gov	.0125096	.0261712	-.0136616	.
lnPop	-40.34193	1.193208	-41.53513	8.450336
dpdrt	.2022967	.3776109	-.1753142	.0391379

```
                b = consistent under Ho and Ha; obtained from xtreg
     B = inconsistent under Ha, efficient under Ho; obtained from xtreg

  Test:  Ho:  difference in coefficients not systematic

              chi2(8) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                      =        6.90
            Prob>chi2 =      0.5478
            (V_b-V_B is not positive definite)
```

5. Correlation table

```
. corr pov_i growth Trade life educ_sch lnBank gov lnPop dpdrt
(obs=98)
```

	pov_i	growth	Trade	life	educ_sch	lnBank	gov	lnPop	dpdrt
pov_i	1.0000								
growth	0.1940	1.0000							
Trade	-0.4451	-0.0311	1.0000						
life	-0.6902	-0.2801	0.4618	1.0000					
educ_sch	-0.5906	-0.2511	0.1620	0.5798	1.0000				
lnBank	-0.1248	-0.0555	0.1171	0.3370	0.0466	1.0000			
gov	0.0300	-0.0886	-0.3035	-0.1286	0.2704	-0.1964	1.0000		
lnPop	0.3855	-0.0817	-0.2641	-0.1854	-0.3239	-0.2487	0.1370	1.0000	
dpdrt	0.4716	0.2292	-0.1204	-0.5348	-0.3566	-0.2370	-0.0929	-0.1187	1.0000

6. Variance inflation factor test

```
. vif
```

Variable	VIF	1/VIF
life	2.90	0.344645
educ_sch	2.32	0.430712
dpdrt	1.62	0.618622
lnPop	1.51	0.663786
Trade	1.48	0.673468
gov	1.41	0.710587
lnBank	1.34	0.746745
growth	1.14	0.875004
Mean VIF	1.72	

7. Heteroscedasticity test

```
. xttest3

Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model

H0: sigma(i)^2 = sigma^2 for all i

chi2 (19)  =    2161.89
Prob>chi2 =      0.0000


. *if *P Value (Prob>Chi2)<Alpha 0,05 --> heterocedastic
.
end of do-file

. do "C:\Users\GILANG~1\AppData\Local\Temp\STD00000000.tmp"

. quietly reg pov_i growth Trade life educ_sch lnBank gov lnPop dpdrt

. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of pov_i

         chi2(1)      =    39.16
         Prob > chi2  =   0.0000
```

8. Autocorrelation Test Output

```
. xtserial pov_i growth Trade life educ_sch lnBank gov lnPop dpdrt

Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
    F(  1,       5) =     69.201
           Prob > F =      0.0004
```

9. Generalized Least Squares [1]

```
Cross-sectional time-series FGLS regression

Coefficients:  generalized least squares
Panels:        homoskedastic
Correlation:   no autocorrelation

Estimated covariances      =         1          Number of obs     =         98
Estimated autocorrelations =         0          Number of groups  =         19
Estimated coefficients     =         9          Obs per group:
                                                              min =          1
                                                              avg =   5.157895
                                                              max =         15
                                                Wald chi2(8)      =     179.40
Log likelihood             = -286.2035          Prob > chi2       =     0.0000
```

pov_i	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
growth	.0310109	.1328006	0.23	0.815	-.2292734	.2912953
Trade	-.032186	.0155582	-2.07	0.039	-.0626795	-.0016925
life	-1.091466	.2861626	-3.81	0.000	-1.652335	-.5305978
educ_sch	-.0726267	.0437386	-1.66	0.097	-.1583528	.0130993
lnBank	1.951717	.8115591	2.40	0.016	.3610908	3.542344
gov	-.0037842	.0357987	-0.11	0.916	-.0739483	.06638
lnPop	1.248421	.3078703	4.06	0.000	.6450062	1.851836
dpdrt	.2377257	.069381	3.43	0.001	.1017415	.3737099
_cons	54.83676	21.07868	2.60	0.009	13.52331	96.15021

10. Generalized Least Squares [2]

```
Cross-sectional time-series FGLS regression

Coefficients:  generalized least squares
Panels:        homoskedastic
Correlation:   no autocorrelation

Estimated covariances      =         1          Number of obs     =        223
Estimated autocorrelations =         0          Number of groups  =         27
Estimated coefficients     =         6          Obs per group:
                                                              min =          1
                                                              avg =   8.259259
                                                              max =         21
                                                Wald chi2(5)      =     152.41
Log likelihood             = -817.0725          Prob > chi2       =     0.0000
```

pov_i	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
growth	-.074495	.1650064	-0.45	0.652	-.3979015	.2489116
Trade	-.0253278	.0187647	-1.35	0.177	-.0621058	.0114503
life	-.8516255	.2476876	-3.44	0.001	-1.337084	-.3661668
lnPop	1.437426	.3702427	3.88	0.000	.7117633	2.163088
dpdrt	.4347973	.0776918	5.60	0.000	.2825241	.5870705
_cons	24.36734	21.73941	1.12	0.262	-18.24111	66.9758

11. Generalized Least Squares [3]

```
Cross-sectional time-series FGLS regression

Coefficients:  generalized least squares
Panels:        homoskedastic
Correlation:   no autocorrelation

Estimated covariances      =         1          Number of obs     =       162
Estimated autocorrelations =         0          Number of groups  =        23
Estimated coefficients     =         7          Obs per group:
                                                               min =         1
                                                               avg =  7.043478
                                                               max =        20
                                                Wald chi2(6)      =    153.68
Log likelihood             = -587.2054          Prob > chi2       =    0.0000
```

pov_i	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
growth	.0538967	.2060053	0.26	0.794	-.3498664	.4576597
Trade	-.038727	.0217987	-1.78	0.076	-.0814517	.0039977
life	-1.750592	.3415089	-5.13	0.000	-2.419938	-1.081247
educ_sch	.0894889	.0576931	1.55	0.121	-.0235874	.2025652
lnPop	1.493053	.4978956	3.00	0.003	.5171956	2.46891
dpdrt	.3221822	.1020755	3.16	0.002	.122118	.5222465
_cons	86.07223	28.33034	3.04	0.002	30.54578	141.5987

12. Generalized Least Squares [4]

```
Cross-sectional time-series FGLS regression

Coefficients:  generalized least squares
Panels:        homoskedastic
Correlation:   no autocorrelation

Estimated covariances      =         1          Number of obs     =       168
Estimated autocorrelations =         0          Number of groups  =        26
Estimated coefficients     =         7          Obs per group:
                                                               min =         1
                                                               avg =  6.461538
                                                               max =        16
                                                Wald chi2(6)      =    120.02
Log likelihood             = -527.1094          Prob > chi2       =    0.0000
```

pov_i	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
growth	.0392829	.1099587	0.36	0.721	-.1762322	.2547981
Trade	-.0138799	.0131586	-1.05	0.292	-.0396702	.0119104
life	-.6894204	.1794806	-3.84	0.000	-1.041196	-.3376448
lnBank	.2055142	.6386583	0.32	0.748	-1.046233	1.457261
lnPop	1.013838	.273322	3.71	0.000	.4781362	1.549539
dpdrt	.2273861	.0554166	4.10	0.000	.1187716	.3360006
_cons	25.96083	15.15334	1.71	0.087	-3.739179	55.66083

13. Generalized Least Squares [5]

```
Cross-sectional time-series FGLS regression

Coefficients:  generalized least squares
Panels:        homoskedastic
Correlation:   no autocorrelation

Estimated covariances      =         1          Number of obs     =        140
Estimated autocorrelations =         0          Number of groups  =         19
Estimated coefficients     =         7          Obs per group:
                                                              min =          1
                                                              avg =   7.368421
                                                              max =         21
                                                Wald chi2(6)      =     187.94
Log likelihood             = -442.8362          Prob > chi2       =     0.0000
```

pov_i	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
growth	-.2072791	.143665	-1.44	0.149	-.4888573	.0742992
Trade	-.0366393	.0155645	-2.35	0.019	-.0671453	-.0061334
life	-1.22358	.1979793	-6.18	0.000	-1.611612	-.8355474
gov	.0089381	.0339369	0.26	0.792	-.0575769	.0754532
lnPop	1.006283	.2933592	3.43	0.001	.43131	1.581257
dpdrt	.3531561	.0666684	5.30	0.000	.2224885	.4838238
_cons	62.42051	18.17355	3.43	0.001	26.80101	98.04002

14. Random Effect GLS Regression with Adjusted Cluster Standard Error [1]

```
Random-effects GLS regression                   Number of obs     =         98
Group variable: id                              Number of groups  =         19

R-sq:                                           Obs per group:
     within  = 0.6381                                         min =          1
     between = 0.5325                                         avg =        5.2
     overall = 0.4272                                         max =         15

                                                Wald chi2(8)      =     142.41
corr(u_i, X)   = 0 (assumed)                    Prob > chi2       =     0.0000

                                  (Std. Err. adjusted for 19 clusters in id)
```

pov_i	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
growth	-.093987	.0497367	-1.89	0.059	-.1914692	.0034952
Trade	-.0191304	.0314519	-0.61	0.543	-.0807749	.0425141
life	-1.01107	.4956751	-2.04	0.041	-1.982575	-.0395646
educ_sch	.0021766	.0678516	0.03	0.974	-.13081	.1351632
lnBank	-3.821059	2.151603	-1.78	0.076	-8.038123	.3960041
gov	.0261712	.0662073	0.40	0.693	-.1035928	.1559352
lnPop	1.193208	.9864844	1.21	0.226	-.740266	3.126682
dpdrt	.3776109	.1145785	3.30	0.001	.1530411	.6021807
_cons	47.7648	28.99282	1.65	0.099	-9.060087	104.5897
sigma_u	6.5688595					
sigma_e	1.7764097					
rho	.93185198	(fraction of variance due to u_i)				

15. Random Effect GLS Regression with Adjusted Cluster Standard Error [2]

```
Random-effects GLS regression                   Number of obs     =        223
Group variable: id                              Number of groups  =         27

R-sq:                                           Obs per group:
     within  = 0.6682                                         min =          1
     between = 0.3512                                         avg =        8.3
     overall = 0.3771                                         max =         21

                                                Wald chi2(5)      =      60.13
corr(u_i, X)   = 0 (assumed)                    Prob > chi2       =     0.0000

                                    (Std. Err. adjusted for 27 clusters in id)
------------------------------------------------------------------------------
             |               Robust
       pov_i |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      growth |  -.0794714   .1003889    -0.79   0.429    -.2762301    .1172873
       Trade |  -.0732124   .0383696    -1.91   0.056    -.1484154    .0019907
        life |  -1.789389   .4911269    -3.64   0.000     -2.75198   -.8267983
       lnPop |    .548715   1.666642     0.33   0.742    -2.717844    3.815274
       dpdrt |   .8320929   .1431491     5.81   0.000     .5515259     1.11266
       _cons |   86.90037   44.22463     1.96   0.049     .2216805    173.5791
-------------+----------------------------------------------------------------
     sigma_u |  12.026171
     sigma_e |  4.5597706
         rho |  .87431102   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

16. Random Effect GLS Regression with Adjusted Cluster Standard Error [3]

```
Random-effects GLS regression                   Number of obs     =        162
Group variable: id                              Number of groups  =         23

R-sq:                                           Obs per group:
     within  = 0.7021                                         min =          1
     between = 0.4428                                         avg =        7.0
     overall = 0.4645                                         max =         20

                                                Wald chi2(6)      =      63.02
corr(u_i, X)   = 0 (assumed)                    Prob > chi2       =     0.0000

                                    (Std. Err. adjusted for 23 clusters in id)
------------------------------------------------------------------------------
             |               Robust
       pov_i |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      growth |  -.2252746   .1160183    -1.94   0.052    -.4526663     .002117
       Trade |  -.0804508   .0436076    -1.84   0.065    -.1659201    .0050186
        life |   -1.94144   .4906683    -3.96   0.000    -2.903132   -.9797476
    educ_sch |  -.0068291   .1106051    -0.06   0.951    -.2236112    .2099529
       lnPop |   1.943719   1.674243     1.16   0.246    -1.337736    5.225175
       dpdrt |   .8764125   .1572939     5.57   0.000     .5681221    1.184703
       _cons |   72.93894    41.2141     1.77   0.077    -7.839209    153.7171
-------------+----------------------------------------------------------------
     sigma_u |  11.732223
     sigma_e |  4.3401192
         rho |  .87962404   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

17. Random Effect GLS Regression with Adjusted Cluster Standard Error [4]

```
. xtreg pov_i growth Trade life lnBank lnPop dpdrt, re vce(robust)

Random-effects GLS regression                   Number of obs     =        168
Group variable: id                              Number of groups  =         26

R-sq:                                           Obs per group:
     within  = 0.6538                                         min =          1
     between = 0.3546                                         avg =        6.5
     overall = 0.2996                                         max =         16

                                                Wald chi2(6)      =      40.82
corr(u_i, X)   = 0 (assumed)                    Prob > chi2       =     0.0000

                                  (Std. Err. adjusted for 26 clusters in id)
------------------------------------------------------------------------------
             |               Robust
       pov_i |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      growth |  -.0247939   .0452745    -0.55   0.584    -.1135303    .0639425
       Trade |  -.0142952   .0207439    -0.69   0.491    -.0549526    .0263622
        life |  -.9245228   .2663063    -3.47   0.001    -1.446474   -.4025721
      lnBank |  -5.245773   1.921323    -2.73   0.006    -9.011497   -1.480049
       lnPop |   .0896231    .956594     0.09   0.925    -1.785267    1.964513
       dpdrt |   .3776824   .0918521     4.11   0.000     .1976556    .5577093
       _cons |   62.87244   21.70067     2.90   0.004     20.33991     105.405
-------------+----------------------------------------------------------------
     sigma_u |  7.4953356
     sigma_e |  2.0883607
         rho |   .9279624   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

18. Random Effect GLS Regression with Adjusted Cluster Standard Error [5]

```
. xtreg pov_i growth Trade life gov lnPop dpdrt, re vce(robust)

Random-effects GLS regression                   Number of obs     =        140
Group variable: id                              Number of groups  =         19

R-sq:                                           Obs per group:
     within  = 0.6100                                         min =          1
     between = 0.6685                                         avg =        7.4
     overall = 0.5592                                         max =         21

                                                Wald chi2(6)      =      68.72
corr(u_i, X)   = 0 (assumed)                    Prob > chi2       =     0.0000

                                  (Std. Err. adjusted for 19 clusters in id)
------------------------------------------------------------------------------
             |               Robust
       pov_i |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      growth |  -.2102403   .1321886    -1.59   0.112    -.4693252    .0488446
       Trade |  -.0257104   .0343057    -0.75   0.454    -.0929482    .0415275
        life |  -1.742207   .4774889    -3.65   0.000    -2.678068   -.8063462
         gov |   .1029369   .0501826     2.05   0.040     .0045808     .201293
       lnPop |   1.523651   .7906862     1.93   0.054    -.0260652    3.073368
       dpdrt |   .4995756   .1208892     4.13   0.000     .2626372    .7365141
       _cons |   77.21217   41.27171     1.87   0.061    -3.678892    158.1032
-------------+----------------------------------------------------------------
     sigma_u |  6.4519717
     sigma_e |  3.2556618
         rho |  .79705366   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

Appendix II

	PLS	Fixed Effect	Random Effect	General Least Squares					
				(1)	(2)	(3)	(4)	(5)	(6)
Growth	-0.06370894	0.08210166	0.00617777	-0.06370894	-0.0745	-0. 0929	0.0271	-0.2073	-0.0820
	(0.1268)	*(0.0482)*	*(0.00575)*	*(0.1200)*	*(0.165)*	*(0.1618)*	*(0.1029)*	*(0.144)*	*(0.1656)*
Trade	-0.01769444	-.08034706***	-0.0193008	-0.01769444	-0.0253	-0.01983325	-0.0110	-0.0366*	-0.0245*
	(0.0155)	*(0.0216)*	*(0.0206)*	*(0.0146)*	*(0.019)*	*(0.0178)*	*(0.0112)*	*(0.016)*	*(0.0188)*
Life	**-1.0915*** **	0.1402	**-1.0111*** **	**-1.0915*** **	**-0.8516*** **	**-0.6048***	**-0.4184***	**-1.2236*** **	**-0.8683*** **
	(0.2804)	*(0.2918)*	*(0.272)*	*(0.2655)*	*(0.248)*	*(0.2458)*	*(0.1681)*	*(0.198)*	*(0.2500)*
Educ_prm	0.03433602	**-0.15421233****	-.03946699	0.03433602		**0.1696***			
	(0.9827)	*(0.0452)*	*(0.2696)*	*(0.0782)*		*(0.0722)*			
lnBank	**1.5966615***	**-8.3649097*** **	**-5.8720207*** **	**1.5966615****			0.92411		
	(0.6487)	*(1.0870)*	*(1.1915)*	*(0.6141)*			*(0.5625)*		
lnATM	**-2.1568421*** **	**1.5492922****	**1.2451033***	**-2.1568421*** **			**-1.9470*** **		
	(6068)	*(0.5202)*	*(0.5642)*	*(0.5745)*			*(0.4171)*		
Gov	0.05540941	0.05038133	0.04785332	0.05540941				0.0089	
	(0.354)	*(0.0.0345)*	*(0.0400)*	*(0.0335)*				*(0.034)*	

lnPop	**1.1847823*** **	**-42.831746*** **	0.62317543	**1.1847823*** **	**1.4374*** **	**1.2523*** **	**0.9708*** **	**1.0063*** **	**1.4331*** **
	(0.2686)	*(6.9450)*	*(0.9838)*	*(0.2543)*	*(0.370)*	*(0.3622)*	*(0.2310)*	*(0.293)*	*(0.3702)*
Dpdrt	**.2586678*** **	**.19619812***	**0.3200842*** **	**0.2586678*** **	**0.4348*** **	**0.5428*** **	**0.0857**	**0.3532*** **	**0.4315*** **
	(0.0730)	*(0.0914)*	*(0.0933)*	*(00691)*	*(0.078)*	*(0.0817)*	*(0.0571)*	*(0.067)*	*(0.0780)*
Fincr_d	1.9459683	0.5716436	0.59748038	1.9459683					-0.8697
	(1.1631)	*(0.4958)*	*(0.5794)*	*(1.1011)*					*(1.8065)*
N	106	106	106	106	223	210	158	140	223
AdjRsquare	0.5462	0.0954	0.1915						

Sources: Authors calculation.

Note: * if $p < 0.05$; ** if $p < 0.01$; and *** if $p < 0.005$. The second line was the standard error while the first line is coefficient.

This model tries to modify the first model for better estimation/quantitative models to explain the poverty phenomenon. Instead of the secondary gross enrolment rate, this new model employs primary education as the proxy for education and human development indicators. The model shows the same story that education is not significant in decreasing the poverty headcount ratio. Furthermore, the model engages other new variables: the number of ATMs per 100,000 adults and the dummy variable of the financial crisis. The additional ATM is working as the additional proxy of financial inclusion. After we check the correlation between the dependent variable, we see no strong correlation between the number of ATMs and the number of bank branches per 100.000 people. So, the model runs those two financial inclusion proxies simultaneously. The direction of the ATM coefficient is different yet inconclusive.

Finally, to identify the impact of the subprime mortgage world financial crisis in the United States, the model applies the financial crisis dummy from 2007-to 2009. From the regression result, the subprime mortgage financial crisis is not affecting/significant to the poverty headcount ratio on the model. The sample countries are primarily small and close economies that are not directly connected with the world financial market. In addition, some countries in the model are populous countries that provide the economy with an extensive and robust market. So, they could not affect their economy significantly.