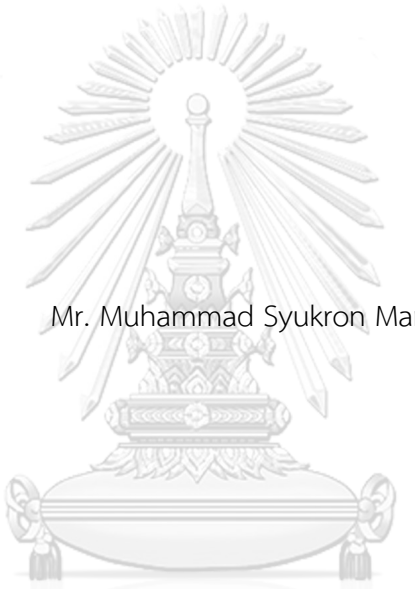
The impact of economic and demographic factors on income inequality: a comparative study of Southeast Asian and Latin American countries

Mr. Muhammad Syukron Mamun



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ผลกระทบของปัจจัยทางเศรษฐกิจและประชากรต่อความไม่เท่าเทียมกันของรายได้: กรณีศึกษาเปรียบเทียบของประเทศ ในเอเชียตะวันออกเฉียงใต้และลาตินอเมริกา

นายมูฮัมหมัด ซูครอน มามุน

สารนิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาศิลปศาสตรมหาบัณฑิต
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Independent Study Title	The impact of economic and demographic factors on income inequality: a comparative study of Southeast Asian and Latin American countries
By	Mr. Muhammad Syukron Mamun
Field of Study	Population Policy and Human Development
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Accepted by the COLLEGE OF POPULATION STUDIES, Chulalongkorn University in Partial Fulfillment of the Requirement for the Master of Arts

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มูฮัมหมัด ซูครอน มามุน : ผลกระทบของปัจจัยทางเศรษฐกิจและประชากรต่อความไม่เท่าเทียมกันของรายได้: กรณีศึกษาเปรียบเทียบของประเทศ ในเอเชียตะวันออกเฉียงใต้และลาตินอเมริกา. (The impact of economic and demographic factors on income inequality: a comparative study of Southeast Asian and Latin American countries) อ.ที่ปรึกษาหลัก : Asst. Prof.ยศ อมรกิจวิกัยPh.D.

เอเชียตะวันออกเฉียงใต้และละตินอเมริกาประสบกับการเติบโตทางเศรษฐกิจอย่างรวดเร็วในช่วงไม่กี่ปีที่ผ่านมา แม้จะมีการเติบโตทางเศรษฐกิจอย่างรวดเร็ว แต่ภูมิภาคทั้งสองนี้ก็ยังคงมีความเหลื่อมล้ำทางรายได้อย่างมีนัยสำคัญ มีทฤษฎีต่าง ๆ ที่บ่งบอกถึงการนำไปสู่ความไม่เท่าเทียมกันของรายได้ แต่ก็ยังไม่มีข้อชี้ชัดว่าทฤษฎีใดมีความเกี่ยวข้องมากที่สุด การศึกษานี้ใช้วิธีการวิเคราะห์ถดถอย*อิทธิพลคงที่*สำหรับแบบจำลองแผงไดนามิกที่มีตัวแปรอิสระล้าหลัง และวิธีการวิเคราะห์ถดถอยอิทธิพลคงที่สำหรับการประมาณค่าด้วยตัวแปรร่วมภายใน เพื่อตรวจสอบผลกระทบของปัจจัยทางเศรษฐกิจและประชากรต่อความไม่เท่าเทียมกันของรายได้ใน 6 ประเทศในเอเชียตะวันออกเฉียงใต้และ 15 ประเทศในละตินอเมริกาตั้งแต่ปีพ.ศ. 2537 ถึง พ.ศ. 2560 อีกทั้งการศึกษานี้ยังสำรวจกลุ่มที่ไม่ได้รับผลกระทบโดยตรงต่อการเติบโตทางเศรษฐกิจในความไม่เท่าเทียมกันของรายได้ รวมทั้งปัจจัยด้านสิ่งแวดล้อมเพื่อสร้างการประมาณที่แม่นยำยิ่งขึ้น ผลลัพธ์เชิงประจักษ์ระบุว่าการปล่อยมลพิษ การเปิดเสรีทางการค้าระหว่างประเทศ อัตราส่วนการพึ่งพาวัยชรา การพัฒนาทรัพยากรมนุษย์ และประชากรเพศหญิง เหล่านี้ช่วยลดความไม่เท่าเทียมกันของรายได้ ในขณะที่ การพัฒนาอุตสาหกรรม การว่างงาน อัตราส่วนการพึ่งพิงวัยเด็ก และความเป็นเมือง เพิ่มความไม่เท่าเทียมกันของรายได้ในประเทศในเอเชียตะวันออกเฉียงใต้ การศึกษานี้ยังพบหลักฐานของสมมติฐานเส้นโค้ง Kuznets นอกจากนี้ การพัฒนาอุตสาหกรรม การเปิดเสรีทางการค้าระหว่างประเทศ การเติบโตของจำนวนประชากร และการพัฒนาทรัพยากรมนุษย์ ช่วยลดความไม่เท่าเทียมกันของรายได้ ในขณะที่การว่างงาน อัตราส่วนการพึ่งพิงวัยเด็ก อัตราส่วนการพึ่งพิงวัยชรา และการลงทุนโดยตรงจากต่างประเทศ เพิ่มปัญหาความไม่เท่าเทียมกันของรายได้ในประเทศแถบละตินอเมริกา การศึกษานี้ยังพบหลักฐานของสมมติฐานเส้นโค้งรูปตัวยู Kuznets การศึกษานี้แสดงให้เห็นว่ามีปัจจัยอื่น ๆ ที่เกี่ยวข้องในการกำหนดความไม่เท่าเทียมกันของรายได้ การศึกษานี้จึงให้กรอบทฤษฎีที่ครอบคลุมมากขึ้นเพื่อตรวจสอบความไม่เท่าเทียมกันของรายได้จากมุมมองของเศรษฐศาสตร์และประชากรศาสตร์ โดยที่การเติบโตของประชากรในเมือง (ความเป็นเมือง) โครงสร้างประชากร การพัฒนาทุนมนุษย์ และประชากรเพศหญิง เป็นองค์ประกอบที่สำคัญ

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Muhammad Syukron Mamun : The impact of economic and demographic factors on income inequality: a comparative study of Southeast Asian and Latin American countries. Advisor: Asst. Prof. YOT AMORNKITVIKAI, Doctor of Philosophy

Despite rapid economic growth, Southeast Asia and Latin America continue to have significant income inequality. This study applies fixed-effects regression estimation with the dynamic panel model with lagged independent variables and the fixed-effects analysis with endogenous covariates to examine the impact of economic and demographic factors on income inequality in 6 Southeast Asian and 15 Latin American countries from 1994 to 2017. Empirical results indicate that emissions, trade openness, old-age dependency ratio, human capital, and female population reduce income inequality, whereas industrialization, unemployment, young-age dependency ratio, and urban population increase income inequality in Southeast Asian countries. This study also finds evidence of the Kuznets curve hypothesis. In addition, industrialization, trade openness, population growth, and human capital reduce income inequality, whereas unemployment, young-age dependency ratio, old-age dependency ratio, and foreign direct investment increase income inequality in Latin American countries. This study also finds evidence of the U-shaped curve hypothesis. This study provides a more comprehensive theoretical framework to investigate income inequality from economic and demographic perspectives, where population growth, urban population, population structure, human capital, and the female population are essential components.

Field of Study:	Population Policy and Human Development	Student's Signature .....
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CHAPTER 1

INTRODUCTION

1.1 Background and problem review

Many countries face a crucial challenge in dealing with severe income inequality. Public concern about rising income inequality has brought the issue to the forefront even in countries with relatively lower income inequality. Income inequality, caused by unequal access to opportunities, is undesirable. Developing countries have seen a significant increase in the gap between the rich and the poor over the last 25 years (OECD 2018). Fewer people have more income and wealth as income inequality increases. The number of poor people increases simultaneously. It is critical to reduce income inequality to encourage social cohesion, a more equitable income distribution, and long-term economic growth. The main factors determining a favorable socioeconomic environment are income distribution and equality (Le, Nguyen et al. 2020). Although income is related to happiness, economic growth is insufficient to increase the average level of happiness. Because severe income inequality can lead to social vulnerability, it is more closely related to happiness (Kanbur 2015, Piketty and Zucman 2015). Income inequality is a topic of public concern because of its increasing trend and impact on society and the global economy. Many economists believe that the primary cause of economic downturns is the widening income gap (Stiglitz 2009). Income inequality limits the growth of mass demand, thus slowing economic growth (Wade 2004). Income inequality also

implies that economic growth benefits the poor disproportionately (Ravallion 2011). Finally, the poor may engage in disruptive activities such as crime and rioting because of income inequality, thus causing anxiety and social unrest (Barro 2000). Kuznets conducted the first study to examine the relationship between economic growth and income inequality in 1955. According to his research, income inequality increases during the early stages of economic development while it decreases during the later stages. This hypothesis explains why developing countries have high levels of income inequality. Additional research is needed because the existing literature on empirical validation of the Kuznets curve is inconclusive.

Income inequality is a multifaceted issue that lowers living standards. Southeast Asia has evolved from a group of underdeveloped countries to one of the most dynamic economic drivers in the world. Gross Domestic Product continues to grow at 5% per year on average. Latin America has also experienced impressive economic growth. Data indicates that during the period covered by this study, GDP per capita in Southeast Asia and Latin America increased significantly. However, only a few people have benefited from this unprecedented economic growth. Although Southeast Asia and Latin America have experienced remarkable economic growth in recent decades, their economies are less equally distributed than those of other regions. In addition, Latin America is one of the regions with the highest levels of income inequality. Rising income inequality, which will negatively affect economic growth and lead to political and social issues, is one of the negative consequences of

rapid economic growth (Roe and Siegel 2011). Although economic growth is crucial in reducing poverty, it has not been able to close the gaps. Poverty reduction will be ineffective as long as economic growth is distributed unequally.

The economies of Southeast Asia and Latin America have rapidly grown in recent decades. Simultaneously, there have been significant increases in the number of pollutants. The existing income disparities have been made worse by the climate crisis. Environmental degradation is a substantial source of vulnerability for minorities. Environmental degradation aggravates health and disease problems that lead to lower productivity and, consequently, lower income, creating an environmental-poverty trap (Qi and Lu 2015). In addition, because those with higher socioeconomic status can avoid these negative consequences, vulnerable populations suffer the most from environmental degradation (Yang and Sheng 2012). Those with lower socioeconomic status will have more severe health problems because of environmental degradation. Their productivity declines as their health deteriorate, thus increasing the likelihood of being laid off. This trend leads to poverty, and health can explain the relationship between environmental degradation, poverty, and income inequality. Therefore, environmental degradation tends to exacerbate income inequality caused by technological, institutional, and socioeconomic factors. However, the interaction between environmental degradation and income inequality has received little attention.

Although advances in globalization have led to unprecedented levels of economic integration, individuals have benefited disproportionately (Zhuang, Kanbur et al. 2014). Globalization promotes technological change by facilitating the spread of ideas and methods through trade openness and foreign direct investment. However, the gap between capital owners and workers, skilled and unskilled workers, and urban and rural areas could widen due to globalization, thus leading to greater income inequality (Zhuang, Kanbur et al. 2014).

Industrialization and urbanization are two indicators of structural change. The Kuznets curve examines how these two factors interact to explain the relationship between economic growth and income inequality. Urbanization and economic growth are closely related because more people live in urban areas as countries develop (Castells□Quintana 2018). Significant regional disparities in wealth and resources contribute to greater urbanization (Liddle 2017). Urbanization temporarily exacerbates income inequality because urban jobs pay more than rural jobs. However, income inequality will decrease as urbanization becomes more advanced. Therefore, it is unclear how urbanization affects income inequality (Sulemana, Nketiah-Amponsah et al. 2019). High levels of urbanization are primarily responsible for income inequality, urban poverty, and slum proliferation. Understanding how urbanization affects income inequality is critical, particularly in Southeast Asia and Latin America, which have received less attention.

Changes in the proportion of industrial value-added have also stimulated debate. Industrial value-added increased by 3.13 percent annually from 1991 to 2018 (United Nations Industrial Development Organization 2020). This development may contribute to a better understanding of the situation of income inequality. Although industrialization leads to increased urbanization and urbanization benefits industries, urbanization and industrialization are two proxies for structural change. Incorporating these two variables into the econometric model thus indicates how structural change affects income inequality in accordance with the Kuznets hypothesis. In other words, this method provides a more detailed analysis by considering the structural change at various stages of economic development.

Another factor contributing to income inequality is population aging, a demographic transition characterized by a significant increase in the elderly. The young-age dependency ratio is decreasing while the old-age dependency ratio is increasing, indicating a shift in the demographic structure. Different age groups within the population have varying levels of income inequality. An increase in retirees increases income inequality because retirees earn less than workers. In addition, older people are more likely to have a wide income distribution. The income of the elderly reflects their ability to manage risk, level of savings, and human capital. Therefore, population aging exacerbates income inequality. Conducting empirical studies on the relationship between population aging and income inequality has become crucial.

Income inequality can also be affected by human capital. A crucial issue on a global scale is the growing gap between rich and poor people. A major contributing factor to poverty is illiteracy. Education level, which measures human capital, is a critical factor in determining income. Education can help poor people improve their human capital and earning capacity by increasing their skills and knowledge, thus reducing income inequality. Despite this widespread belief, theoretical and empirical studies have had difficulty determining the precise relationship between human capital and income equality.

How income is distributed has been affected by changes in family structure (Western, Bloome et al. 2008, Blossfeld and Buchholz 2009). More women are now working outside the home than they were a few decades ago. Because of this phenomenon, families and households have new opportunities to earn additional income and mitigate the risks of job loss. However, how this phenomenon affects income inequality is unclear. According to some studies, increased female labor market participation exacerbates income inequality by pairing two high-income or two low-income earners (Schwartz 2010). Due to the fact that women from lower-income households are more likely to work than those from higher-income households, most studies, however, conclude that greater female labor market participation reduces income inequality (Western, Bloome et al. 2008). Unfortunately, few studies on this subject have applied cross-country data and have frequently produced mixed results (Blossfeld and Buchholz 2009).

Income inequality, which has not significantly decreased during these periods of rapid economic growth in Southeast Asia and Latin America, raises concerns. Many researchers believe economic growth can benefit poor people (Kraay 2006). However, other researchers claim that economic growth and globalization can worsen income inequality and make poverty alleviation more difficult (Chen and Ravallion 2007). In other words, rapid economic growth is possible even if poor people do not benefit. The rich have gotten richer, while the poor have gotten poorer. Income inequality makes it difficult for economic growth to effectively reduce poverty (Basu 2013, Thorbecke 2013, Ncube, Anyanwu et al. 2014, Fosu 2018, Ostry, Berg et al. 2018).

1.2 Objectives of the study

There is no agreement on which ones are the most appropriate, although theory suggests several possible causes of income inequality. Therefore, this study empirically examines the determinants of income inequality in Southeast Asia and Latin America, highlights the impact of economic and demographic factors, utilizes balanced panel data for 21 countries – Indonesia, Malaysia, Philippines, Singapore, Thailand, Vietnam, Argentina, Bolivia, Brazil, Colombia, Chile, Costa Rica, Dominican Republic, Ecuador, Honduras, Jamaica, Mexico, Panama, Paraguay, Peru, and Uruguay from 1994 to 2017, and applies the dynamic panel model with lagged independent variables and estimation with endogenous covariates. This study also considers

environmental factors to provide more accurate and applicable practical implications. This study specifically aims to answer the following questions:

1. What is the impact of economic factors on income inequality in Southeast Asia and Latin America?
2. What is the impact of demographic factors on income inequality in Southeast Asia and Latin America?
3. Are there differences in the impact of economic and demographic factors on income inequality between Southeast Asia and Latin America?

The main contributions of this study to the existing literature are summarized as follows. First, there has never been a study on this issue that specifically focused on Southeast Asian countries. Second, the role of demographic factors in explaining income inequality has received less attention. This study fills these gaps and contributes to the empirical literature by focusing on the situation of Southeast Asian countries. While the causes of income inequality have been the subject of numerous studies, how economic and demographic factors affect income inequality, particularly over time and across countries, has not been thoroughly examined.

The rest of this study is organized as follows. The existing literature, which includes theoretical and practical explanations of how economic, environmental, and demographic factors affect income inequality, is summarized in Section 2. Section 3 deals with the data, methodology, and variables used in this study. Section 4

analyzes and discusses the estimation results. Finally, Section 5 concludes this study by summarizing the main findings and practical implications.

CHAPTER 2

LITERATURE REVIEW

Besides widely studied economic factors, demographic factors are also crucial in determining income inequality due to differences in population growth, the share of the urban population, the proportion of young and older people, human capital, and the number of females. Several studies have investigated the effect of economic and demographic factors on income inequality and applied different periods, countries, and methodologies and thus have shown varied findings. This section discusses empirical and theoretical studies on the determinants of income inequality, particularly economic factors including income per capita, industrialization, trade openness, foreign direct investment, and unemployment, as well as demographic factors including population growth, urbanization, population structure, human capital, and female population. Most related studies apply pre-tax and pre-transfer income as a proxy for income inequality. Therefore, this study analyzes the effect of those factors on the distribution of pre-tax and pre-transfer income.

2.1 Concept and theory

2.1.1 The Kuznets Curve

Simon Kuznets has explained the relationship between income per capita and income inequality. It indicates that income inequality tends to increase when income per capita increases during the early phases of economic development but will

decrease later. This hypothesis illustrates an inverted U-shaped relationship between income per capita and income inequality.

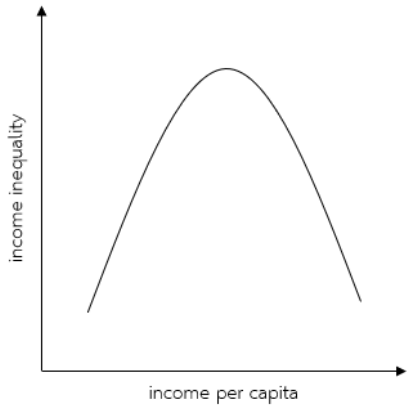

Figure 1. The Kuznets Curve

Many studies have addressed why income inequality initially tends to increase before finally decreasing, most relating to structural change. According to the Lewis model, initial economic growth will accumulate in the industrial sector, which has less employment but higher productivity and income. The Kuznets curve appears when a country transitions from a traditional sector to a modern sector through a continuous process of modern-sector enlargement growth. In other words, returns on education will initially increase when the industrial sector requires skills but then decrease when the number of skilled labor increases. Even though Kuznets did not determine how his inverted-U hypothesis would work, it might theoretically correspond to a hierarchical economic development process. However, the validity of the Kuznets curve is an empirical issue because traditional-sector enrichment and modern-sector enrichment tend to pull income inequality in opposite directions.

2.1.2 Demographic Transition Theory

The demographic transition is a model that describes population changes over time. It observes changes in birth and death rates in society. It is based on social and economic developments, including technological advances over time. This theory was first initiated by Warren Thompson in 1929. Theoretically, the transition involves four stages. The first stage is called High Stationary. There is a close gap between birth and death rates, meaning that there are high birth and death rates. In other words, population growth is balanced. However, the death rate is also increased due to limited access to food and healthcare. In this case, population growth is low, and technology is not that much. The least developed countries are in this stage.

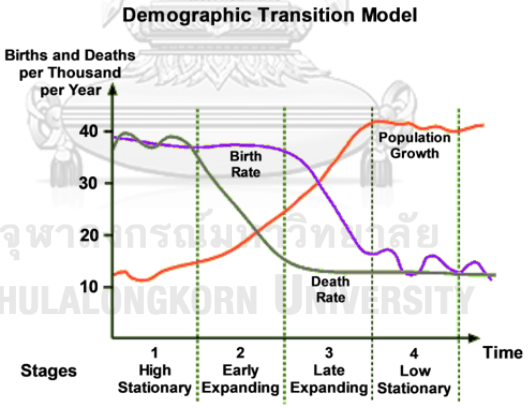

Figure 2. Demographic Transition Theory

The second stage is called Early Expanding. In this stage, the death rate decreases while the birth rate remains high. There is advanced technology and increased food production, making it easier for people to access food. At the same time, access to healthcare increases. This stage indicates increased life expectancy and decreased disease. There is also increased female literacy which improves the

quality of life. In the end, population growth increases. Most developing countries are in this stage.

The third stage is called Late Expanding. Several developing countries are still in this stage. Technology continues improving, and at the same time, there is access to contraception or birth control. There are also increasing urbanization, rising wages, and declining subsistence agriculture. The birth rate is lower while the death rate stays constant or continues to fall, meaning that technological advances help improve healthcare, and social values have changed at this stage. Women feel more confident and very independent. They do not think that it is necessary to have a family and children at an early age. With these social values, the birth rate decreases while the death rate is constant. In this stage, population growth continues to increase but at a decreasing rate. Newly industrialized countries are in this stage.

The last stage is called Low Stationery. In this stage, the birth rate is getting closer to the death rate because people have a stronger level of social values, and they change their lives because they have more access to better healthcare. They have more access to a variety of healthier foods and change their lifestyle to get more exercise, thus allowing them to live longer and healthier lives. At the same time, women are becoming more independent, given that they have higher education, the value of having many children is decreasing, and the cost of having children is increasing with urbanization. To have one child, an individual has to pay for a lot of education, raising them in society, and living expenses. In this case, birth

and death rates are low. In this stage, population growth is either steady or starting to fall. This stage represents an increasing rate of population aging. Most advanced countries are in this stage.

2.2 Relevant research

Many researchers have focused on the factors that contribute to economic growth due to the Kuznets hypothesis, which determines income inequality at various phases of economic development. As the economy develops, income inequality decreases due to the trickle-down effect. The term "income inequality" describes unfair income distribution among people or households. Researchers frequently use the proportion of income held by various population segments to determine the level of income inequality. Income inequality is closely related to unfairness when rich people have a larger share of income (Todaro 1989). Income inequality can be measured in a variety of ways, including using the Gini coefficient. Income inequality has a high degree of inertia, thus preventing rapid and significant change. Consequently, there is a relationship between past and current income inequality (Dincer and Gunalp 2012).

2.2.1 Environmental degradation and income inequality

Environmental degradation and income inequality have received little attention from researchers. According to some researchers, socioeconomic status differences between individuals and groups affect the chances of being exposed to pollution in different ways (Graff Zivin and Neidell 2013). Individuals with higher socioeconomic

status are more likely to work indoors, where they are less exposed to various pollutants (Picatoste, Ruesga-Benito et al. 2018). In addition, factories are typically located near low-income households (Daniels and Friedman 1999) because costs are lower in these areas (Wolverton 2009). This situation further exacerbates income inequality caused by pollution (Forastiere, Stafoggia et al. 2007). Individuals with lower socioeconomic status suffer more damage because they are more vulnerable to pollution-related diseases (Pinault, Crouse et al. 2016). The health and educational attainment of the poor, marginalized groups, and individuals with low socioeconomic status are more affected by environmental degradation. Then, poor health and illiteracy lead to lower productivity, fewer job opportunities, and lower income. Those who are more negatively impacted by pollution and have fewer resources to mitigate its effects experience a higher loss in productivity. Income typically falls after productivity drops due to pollution, and individuals with lower socioeconomic status suffer disproportionately (Qi and Lu 2015). As this trend continues, pollution and income inequality will be connected by poor health and illiteracy. Therefore, different levels of human capital may result from differences in the capacity to mitigate pollution-related risks (Graff Zivin and Neidell 2012). There is a correlation between changes in human capital and productivity, which is essential for income (Jun, Zhong-kui et al. 2011). Many studies indicate that pollution reduces productivity by affecting education, health, and earning capacity. The main factor causing disease and early death, according to a report by the Lancet Commission, is

pollution (Landrigan, Fuller et al. 2018). Minorities are disproportionately affected by pollution-related diseases in many countries. Individuals with higher socioeconomic status can mitigate the effects of pollution, indicating that vulnerable populations suffer the most (Miao and Chen 2010). Based on the provincial data of China, the pollution-related health burden is negatively associated with the healthcare and education levels (Zheng and Walsh 2018). Few papers investigate the effect of environmental degradation on income inequality. The Gini coefficient from reported market income is much higher when accounting for damage caused by pollution (Muller, Matthews et al. 2018). Still, individuals with higher education have the resources and knowledge to mitigate pollution and promote better health and higher productivity in the long term (Liu, Zheng et al. 2020). Lastly, pollution worsens income distribution via a negative effect of pollution on health (Zhou and Li 2021).

H1. Environmental degradation has a positive effect on income inequality

2.2.2 Economic development and income inequality

Many researchers have studied the inequality-growth nexus extensively because economic development is one of the most important factors. However, no agreement has been reached. Kuznets (1955) introduced the idea of an inverted U-shaped relationship between economic development and income inequality. His argument was based on the assumption that as an economy grows, the structure of production shifts from agriculture to industry. Therefore, agriculture represents a

larger share of the economy, and the country has low per capita income and income inequality.

In comparison, industry represents a smaller share of the economy, and the country has high per capita income and income inequality. As the economy grows and people transition from agriculture to industry, those who make the transition earn more money, thus increasing income inequality. Therefore, there is a positive correlation between economic development and income inequality during the early stages. Therefore, in the initial stages of development, economic growth and income inequality are positively correlated. As more workers transition from agriculture to industry, the agricultural labor supply shrinks, leading to higher wages. In addition, those transitioning to the industrial sector work harder to earn the same amount of money as the rich. There is a negative correlation between economic growth and income inequality when income inequality decreases as development advances (Barro 2000). Since the pioneering work of Kuznets (1955), a great deal of work has been done to verify the relationship between economic development and income inequality. Increasing income inequality has motivated many researchers to investigate the Kuznets hypothesis. Empirical investigations of the link between economic development and income inequality lead to ambiguous and inconclusive results (Brida, Carrera et al. 2020). The effect of economic development on income inequality varies; it could be positive, which suggests that income inequality might increase with the level of economic development (Castelló-Climent 2010, Shahbaz

2010, Wahiba and El Weriemmi 2014, Rubin and Segal 2015), negative which suggests that income inequality might decrease with the level of economic development (Chambers and Krause 2010, Khalifa and El Hag 2010, Herzer and Vollmer 2012), or even mixed (Huang, Fang et al. 2015) due to different specifications of models, datasets, and estimation methods. The question of how economic development affects income inequality has no definitive answer. First, there may be differences between long-term and short-term effects. Economic development, in the short and medium term, exacerbates income inequality in all countries. As for the long-term effect, economic development decreases income inequality in developing countries but has the opposite effect in developed countries (Chambers 2010). Income inequality increases among the wealthiest country groups and decreases in the poorest (Riggs, Hobbs et al. 2012). Second, the relationship between economic development and income inequality cannot be determined because the model incorporates different determinants. For example, by taking trade openness and human capital as the determinants of income inequality, economic development is positively associated with income inequality in Tunisia (Wahiba and El Weriemmi 2014). On the contrary, taking growth volatility and human capital as the determinants of income inequality, economic development has a negative impact on income inequality (Ogus Binatli 2012). Lastly, the sensitivity of various income groups to economic development has been considered as a factor in determining income inequality, leading to a variety of empirical findings. The high-income group was more

sensitive than the low-income group to wealth and to performance-based compensation schemes (bonuses, stock, and option grants) in the United States (Rubin and Segal 2015). In addition, as the economy developed, the rich benefited from increased wealth and performance-based compensation. They concluded that income inequality is exacerbated by economic development. Conversely, several studies have shown that economic development does not affect income inequality (Perera and Lee 2013). While some researchers found an inverted U-shaped relationship in African countries (Meniago and Asongu 2018), others documented an S-shaped nexus between economic development and income inequality in South Korea, Japan, China, and the United States (Yang and Greaney 2017). There is debate on how income inequality and economic growth are related. Those varied results call for further investigation to determine the nature of the relationship between the two variables, particularly by taking the new factors that can affect our economies.

H2. Economic development has a non-linear effect on income inequality

H3. Industrialization has a negative effect on income inequality

2.2.3 Globalization and income inequality

While examining how economic development affects income inequality, some studies hypothesized a specific factor driving economic development, such as globalization. The Kuznets hypothesis has been tested extensively in many studies along with considering other variables in the model, such as globalization (Jaumotte, Lall et al. 2013, Azzimonti, De Francisco et al. 2014, Topuz and Dağdemir 2020).

Globalization is the key driver of economic development (Zhuang, Kanbur et al. 2014). The Stolper-Samuelson theorem explains how trade openness can affect income inequality. In a two-country two-factor framework, increased trade openness, through tariff reduction, in a developing country where low-skilled workers are abundant would result in an increase in the wages of low-skilled workers and a decrease in the compensation of high-skilled workers, leading to a reduction in income inequality (Stolper and Samuelson 1941). After tariffs on imports are reduced, the price of the high-skill intensive product declines, and so does the compensation of high-skilled workers. The price of the low-skill intensive product and the compensation of low-skilled workers increases. The reverse would hold for a developed country where high-skill factors are relatively abundant, with an increase in trade openness leading to higher income inequality. There are several additional channels through which trade openness can affect income inequality. Wage dispersion can also come from higher income of 'superstars,' which could be boosted by economic integration through greater tradability of services and larger market size abroad. In addition, trade openness might lead to a massive reallocation of resources and thus higher unemployment which in turn can increase income inequality. Concerning globalization through foreign direct investment, the basic theory suggests a similar effect to trade openness in the Stolper-Samuelson theorem. A particular challenge has been to explain the increase in skill premium between skilled and unskilled labor. Alternative literature has emerged arguing that the

Stolper-Samuelson theorem is inconsistent with recent income inequality experiences related to the increased income inequality in developing countries. Difficulties in explaining observed increases in income inequality gave rise to parallel and competing literature showing evidence of other non-trade factors, such as skill-biased technological change. Alternative explanations for increasing skill premiums are based on the notion that technological change is inherently skill-biased to exogenous technology shocks. Another explanation of how the spread of technology might affect income inequality is that technology might increase capital intensity in the production process, thereby increasing the returns to capital and the relative income of capital owners. Based on the Stolper-Samuelson theorem, labor and capital are mobile within a country but not internationally. One channel through which globalization can affect income inequality is facilitating the movement of capital across borders. Foreign direct investment typically occurs from low-skill sectors in developed countries to relatively high-skill sectors in developing countries. Therefore, an increase in foreign direct investment from developed to developing countries can increase the relative demand for skilled labor in both countries, increasing income inequality in both developed and developing countries (Jaumotte, Lall et al. 2013). Trade globalization is associated with a reduction in income inequality, whereas financial globalization and foreign direct investment are associated with an increase in income inequality (Jaumotte, Lall et al. 2013). Trade

and various financial globalization-related channels must be considered in any empirical analysis of the distributional effects of globalization.

H4. Trade openness has a negative effect on income inequality

H5. Foreign direct investment has a positive effect on income inequality

2.2.4 Unemployment and income inequality

The level of unemployment can also affect income distribution. In particular, high levels of unemployment can lead to higher income inequality by directly affecting the share of labor income. Higher unemployment rates increase income inequality in OECD countries (Checchi and García□Peñalosa 2010, Maestri and Roventini 2012). Unemployment increases income inequality in developed countries (Monnin 2014). In addition, an increase in unemployment results in rising income inequality (Claus, Martinez-Vazquez et al. 2012, Dincer and Gunalp 2012).

H6. Unemployment has a positive effect on income inequality

2.2.5 Population growth and income inequality

Not simply economic factors alone, but several demographic factors have also been identified as crucial determinants of income inequality. The literature is filled with descriptions of various channels through which population growth affects income inequality. One is the fertility rate. Decreasing fertility enhances female labor market participation, increasing women's income and reducing gender inequality (Bloom, Canning et al. 2009). When institutional barriers constraining women's participation in the labor market are addressed, fertility further decreases, and

household income increases. Another channel is an increase in the share of the working-age population, which indicates demographic transition. The income per capita is essential if an increasing labor force is gainfully employed. This not only increases household income but also increases national output (Headwinds 2015). In addition, population growth affects income inequality through the dependency ratio. A rapid increase in population is linked with a higher young-age dependency ratio. As a result, countries with high population growth often lag economically behind those with lower population growth (Rougoor, van Marrewijk et al. 2014). Similarly, countries with low population growth are often associated with a higher old-age dependency ratio. Decreases in population growth redistribute the population towards older people in more unequal cohorts, thereby increasing income inequality (Deaton and Paxson 1997). An increase in labor productivity is another channel. An increase in savings rates associated with the demographic transition could boost investments and economic growth and facilitate a rapid reduction in poverty and income inequality (Hassan, Sanchez et al. 2011). A similar channel has been proposed through the group of people contributing additional population (National Research Council 1986). Whether a change in fertility leads to income inequality depends on the group of people adding to the net fertility. If a substantial change in population is seen among the poor, this could lead to income inequality. The converse holds for the rich. A rapid increase in the population of the poor will lead to an increase in unskilled labor supply relative to demand, thereby depressing

relative wages for unskilled labor, creating a wide gap between the income of skilled and unskilled labor. Population growth increases labor supply which lowers wages (Claus, Martinez-Vazquez et al. 2012).

In contrast, lower population growth will decrease income inequality by increasing the rate of labor return relative to other production factors, such as capital. The distribution of income among factors of production constitutes another channel. For example, rapid population growth could lead to increased income inequality by altering the distribution of income among labor income, profit, rent, and interest (Boulier 1975). Since income from profit and rent is less evenly distributed among individuals than labor income, rapid population growth will lead to less equal distribution of income. As a result, income tends to be skewed in favor of profit, rent, and interest. Population size also directly affects income inequality. As population grows faster than another, the relative weight of that country increases. Income inequality will increase in countries with rapid population growth, even if income per capita remains the same in other countries (Rougoor, van Marrewijk et al. 2014). Another study show that populous countries tend to be less unequal (Campante and Do 2006). This is based on different 'derived' distribution channels, as in the benefits and opportunities that citizens might receive under a newly elected government or that are the basis of calls for revolution or rebellion against the ruling elite. When the proportion of people that can demand a change in

government is significant, for example, youth, relative to the total population, distribution will be equal.

H7. Population growth has a positive effect on income inequality

2.2.6 Urbanization and income inequality

Empirical literature indicates that the effect of urbanization on income inequality is still a debatable issue. Urbanization positively affects income inequality (Adams and Klobodu 2019, Sulemana, Nketiah-Amponsah et al. 2019). A basic concept commonly used to determine the level of urbanization is the proportion of the population living in urban areas (Bloom, Canning et al. 2010). Urbanization implies the movement of workers from rural to urban areas. If they join high-paid jobs, the degree of income inequality will decrease. Indeed, workers must have sufficient skills to join these high-paid jobs, and it depends on the level of education they have had. The negative effect of urbanization on income inequality depends on the level of human capital. Much literature has examined the relationship between urbanization and income inequality (Liddle and Messinis 2015, Chen, Glasmeier et al. 2016, Gollin, Jedwab et al. 2016, Adams and Klobodu 2019, Sulemana, Nketiah-Amponsah et al. 2019). The main theoretical framework for explaining the relationship between urbanization and income inequality is the Kuznets hypothesis. Simon Kuznets observed an inverted U-shaped relationship between economic development and income inequality. He further noted that the nature of income distribution in developed countries was due to industrialization and urbanization as

economies transitioned from the agricultural to the industrial sector. This also meant that rural people would move from the low-productivity agricultural sector to the high-productivity non-agricultural sector in urban areas. Since income per capita is higher for urban dwellers than rural people, he argued that urbanization would lead to higher income inequality as countries urbanize. The high income of urban dwellers allows them to save and invest in productive ventures, while the working class and rural people are oriented toward consumption because of their low income. The income distribution is altered in favor of the saving class, usually the industrialists who reinvest their profit productively. Therefore, income inequality is expected to increase when countries start developing and decrease once a certain level of development is reached as long as spillovers are resilient enough to diffuse economic growth across regions. Initial development benefits a few people, but the benefits are spread to all in the long run. Urbanization is associated with income inequality in the earlier stages of development, but more development reduces income inequality in the long run (Zhou and Qin 2012). Some researchers have also argued that the relationship between urbanization and income inequality could be positive or negative (Kawsar 2012, Siddique, Wibowo et al. 2014, Oyvat 2016), or even non-linear (Sagala, Akita et al. 2014, Liddle 2017, Wu and Rao 2017)(Kuznets, 1955). For example, suppose rural people move to urban areas with low or even no education and skills that match the demands of the industries. In that case, such individuals either might be unemployed or have to engage in menial jobs that pay

them significantly lower wages, thereby worsening income inequality (Siddique, Wibowo et al. 2014). However, urbanization could decrease income inequality if rural people can secure employment in the formal sector in urban areas (Siddique, Wibowo et al. 2014). While urbanization increases income inequality in the Philippines, Indonesia, and India, it decreases income inequality in China (Kanbur and Zhuang 2013). Furthermore, urbanization would continue to decrease income inequality in China, arguing that China might have already passed the "turning point." Yet, other studies have found evidence to support the inverted U-shaped relationship between urbanization and income inequality proposed by Kuznets (Sagala, Akita et al. 2014, Liddle 2017, Wu and Rao 2017). On the one hand, workers would sort themselves into rural or urban areas according to their skills and abilities (Lagakos and Waugh 2013). Hence, we could expect that urbanization reflects the difference in living standards across rural and urban people, implying income inequality since the mean income in urban areas is higher than in rural areas. But on the other hand, urbanization would also not correlate significantly with the gap in living standards between rural and urban people due to the informal sector in developing countries (Young 2013). Therefore, it is probable that the relationship between urbanization and income inequality is not a one-size-fits-all because different countries or regions have different developmental trajectories and different economic structures. Even though there are many studies have tried to find out the drivers of income inequality (Bašná 2019, Nie and Xing 2019, Gunasinghe,

Selvanathan et al. 2020, Thornton and Di Tommaso 2020), studies that focused on the impact of urbanization and industrialization together as two independent variables representing structural change are limited and sporadic (Su, Liu et al. 2015, Oyvat 2016, Zhu, Xia et al. 2018, Adams and Klobodu 2019, Sulemana, Nketiah-Amponsah et al. 2019). Perhaps, it is assumed that industrialization usually leads to urbanization, and therefore it would be inappropriate to incorporate them together as two independent variables in the same model. Yet, some researchers argue that this claim does not necessarily happen as many developing countries achieved high levels of urbanization but did not achieve high levels of industrialization (Gollin, Jedwab et al. 2016). This means that urbanization is not always associated with industrialization, and thus it will be appropriate to consider both industrialization and urbanization as two independent variables to capture their potential effects on income inequality. In a nutshell, the existing literature is inconclusive on the nature of the relationship between urbanization and income inequality.

H8. Urbanization has a positive effect on income inequality

2.2.7 Population structure and income inequality

The age dependency ratio is the ratio of young and older dependents to the working-age population. This variable reflects the effect of population structure on income inequality. Higher young-age dependency, which is defined as the ratio of the number of people ages 0-15 to the number of people ages 16-64, is hypothesized to lead to greater income inequality, principally because higher young-age dependency

suggests a higher average number of children per household and lower income per capita. Higher old-age dependency, which is defined as the ratio of the number of people ages 65 or over to the number of people ages 16-64, is expected to be associated with relatively lower income inequality, given the flatter income profile of this age group. However, these two age groups, particularly in developing countries, are dependents of the working-age population and therefore determine the dependency burden of a country. A higher dependency burden would translate into lower income per capita or higher income inequality. Indeed, dependency affects income inequality since population aging might increase disparities within older people characterized by substantial income dispersion (Dong, Tang et al. 2018). For example, higher income inequality in older people might result from differences in skills, non-labor income, and physical capital accumulated during working life. Compared with a young worker who has just begun a career, an experienced worker tends to have a larger income dispersion. Even though the dispersion of human capital is relatively small at the early stage, it increases as the career is developed and experience is accumulated at different levels by different individuals. High-income inequality in older people might be generated by different quantities and qualities of accumulated human capital and different output values and rewards of a competent job.

In addition, the accumulation of physical capital often increases with age. The positive relationship between physical capital and non-labor income results in an

increase in non-labor income with age. Thus, even if older workers lose their labor income after leaving the labor market, income inequality in older people might remain high because of sizeable non-labor income dispersion. Income inequality increases with age and accelerates after 30 in China (Wei, Dong et al. 2012). In addition, population aging is mainly responsible for a sharp increase in income inequality in rural China (Zhong 2011). This fact implies that population aging would intensify income inequality. Several studies have shown that an increase in older people causes income inequality because the elderly have income that is lower than the average, or income varies more among the elderly than among other age groups in the population.

Regarding the impact of population aging on income inequality, it can be assumed that income inequality is more prominent among the elderly than among the young and middle-aged groups. Thus, an increase in the proportion of the elderly (population aging) might widen income inequality (Shirahase 2015). The transition in the life course from a young age to old age is a series of processes, such as a gradual exit from the labor market and a change in the primary source of income from labor income to pension benefits or an intra-household transfer of income from other family members to the elderly. It is argued that population aging might widen income inequality because the replacement rate of pension benefits to labor income is low, which might widen income inequality between retirement and non-retirement groups (Fang and Feng 2018), large differences exist in pension benefits between

different employment groups (government organization, state-owned enterprises, private-owned enterprises, and self-employment sector) which might widen income inequality among older people (Li et al., 2013), and the level of social security is significantly lower for rural people than for urban dwellers who might widen income inequality between urban and rural areas (Lei, Zhang et al. 2013, Cheng, Liu et al. 2018, Fang and Feng 2018, Ma 2020, Ma and Oshio 2020, Sicular, Li et al. 2020).

H9. Young-age dependency ratio has a positive effect on income inequality

H10. Old-age dependency ratio has a positive effect on income inequality

2.2.8 Human capital and income inequality

The human capital model suggests that the level of schooling determines income distribution. It is generally believed that a higher level of education, representing the diffusion of education or "skills deepening," is expected to increase household and individual income and hence should reduce income inequality. The educational expansion has an ambiguous effect on income distribution (Knight and Sabot 1983). They show that educational expansion has two offsetting effects on income distribution, including the composition effect, where income inequality initially increases when educational expansion leads to an increase in the proportion of educated workers, and the compression effect, implying that when the supply of educated workers exceeds the demand, the premium for educated workers will eventually decrease and thereby income inequality will decrease. Thus, the effect of educational expansion on income inequality depends on these two effects (Dincer

and Gunalp 2012). Human capital positively affects labor productivity for poor households and therefore benefits income equity in Asia (Abrigo, Lee et al. 2018). However, some researchers also argue that the average years of schooling might have either positive or negative effects on income inequality due to differences in the rate of return on education (Lee and Lee 2018). In recent decades, the premium for higher education and skills has increased in many developed countries, contributing substantially to rising income inequality (Autor 2014).

Interestingly, some literature also emphasizes the negative relationship between human capital and income inequality. Income inequality decreases with the average years of schooling (Jaumotte, Lall et al. 2013). Another study found an insignificant effect of human capital on income inequality (Földvári and van Leeuwen 2011). Improvements in education might improve living standards, but it might not be a sufficient solution to solve income inequality (Castelló-Climent and Doménech 2014). An inverted U-shaped relationship between human capital and income inequality would imply that an increase in human capital would increase income inequality due to a specialization of production, favoring skilled labor. Such a situation could lead to income inequality between skilled and non-skilled labor (Afonso and Gil 2013).

In contrast, a more diversified human capital accumulation can help reduce income inequality between skilled and non-skilled labor. Reduction in income inequality is associated with higher education and, consequently, with an equal

distribution of education (Lustig, Lopez-Calva et al. 2016). Education can contribute to reducing income inequality, but this aspect also depends on the extent to which the government offers an appropriate environment in which educated workers can be involved in economic activities. Given theoretical ambiguities, the relevance of population aging and upskilling is likely to differ across countries, highlighting the importance of empirical work (OECD 2014).

H11. Human capital has a negative effect on income inequality

2.2.9 Female population and income inequality

The increased tendency of women to work outside the home is another family-related social change with possible implications for income inequality. In the past, most families adhered to the male breadwinner model in which the father worked full-time outside the home and the mother engaged in unpaid domestic work. However, this type of family has slowly decreased over recent decades as more women have taken jobs outside the home. Even though this trend is widespread, its effect on income inequality is still debated. According to several studies, increased female labor market participation has contributed to rising income inequality in the United States (Schwartz 2010). The main reason for this claim is 'spousal or partner homogamy,' the tendency for spouses and partners to resemble one another regarding their educational attainment, class background, and career accomplishment. This phenomenon is worsened income inequality by combining two high-income earners or two low-income earners into one household. However,

another study found no relationship between female labor market participation and income inequality in the United Kingdom (Breen and Salazar 2010). Even though there is no consensus, most evidence supports the idea that increased female labor market participation reduces income inequality. Numerous studies on income inequality reach this conclusion, although noting that the equalizing effect of female labor market participation can vary from decade to decade, depending on the types of women drawn into the workforce (Western, Bloome et al. 2008). While the theoretical reasons for these empirical findings are not always clear, the disequalizing effect of female labor market participation (homogamy between wealthy couples) is usually less than its equalizing effect (low-income households gaining additional sources of income). Increased female labor market participation reduces income inequality because it represents either (i) married or partnered women entering the workforce to provide additional sources of income for their families or (ii) single women without children obtaining income for themselves. In the first scenario, as long as women from low-income families and households continue to work in large numbers, increasing female labor market participation should moderate income inequality. Widespread labor market participation (either by males or females) distributes income equally (Kenworthy 2008).

H12. Female population has a negative effect on income inequality

2.3 Conceptual framework

Many countries face a critical challenge in dealing with high levels of income inequality. Public concern about rising income inequality has pushed the issue to the forefront even in countries with relatively low levels of income inequality. Reduced income inequality promotes both social cohesion and long-term economic growth. There is a space for additional research because the existing literature on the empirical validation of the Kuznets curve is inconclusive. Southeast Asia and Latin America have experienced rapid economic growth. However, only a small number of people have benefited from this unprecedented economic growth. One of the regions with the highest levels of income inequality is even Latin America. It raises a concern that Southeast Asia and Latin America have experienced rapid economic growth without significant reductions in income inequality. Although theory suggests several potential factors contribute to income inequality, the most relevant ones are not universally accepted. Therefore, this study empirically examines how economic factors, including income, industrialization, foreign direct investment, trade openness, and unemployment affect income inequality. As population size and composition change dynamically, this study also highlights the role of demographic factors, including population growth, urban population, population structure, human capital, and female population. Finally, environmental factors proxied by emission are considered to provide more precise and appropriate practical implications, as indicated in Figure 3.

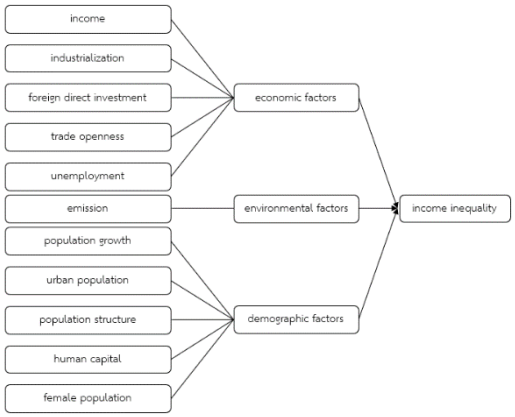

Figure 3. Research framework

Table 1. Previous studies

Author (Year)	Title	Objectives of study	Types of data and sources of data	Methodology	Main findings
Abdulrahman Taresh A., Dyah Wulan Sari, and Rudi Purwono (2021)	Analysis of the relationship between income inequality and social variables: Evidence from Indonesia	This study examines the relationship between social variables and income inequality	Panel data Statistics Indonesia and Bank Indonesia	Dependent variable Gini index Independent variables Population growth, the population having health complaints, net enrollment rate for secondary school, human development index, urban population growth, regional gross domestic product per capita, minimum wage, and the unemployment rate Method Panel cointegration and structural vector autoregressive	This study finds that income inequality is associated with higher population growth, poor health, and unemployment. Income inequality is also associated with lower education, human development, and urbanization. But, then, population growth, poor health, urbanization, and unemployment contribute positively to income inequality. Meanwhile, education and human development contribute negatively to income inequality. Increasing the minimum wage could be another way to reduce income inequality. Furthermore, there is a long-term relationship between per capita income and income inequality.

Author (Year)	Title	Objectives of study	Types of data and sources of data	Methodology	Main findings
Hugues Kouassi Kouadio, and Lewis-Landry Gakpa (2021)	Do economic growth, and institutional quality reduce poverty and income inequality in West Africa?	This study investigates the effect of economic growth and institutional variables on poverty and income inequality	Panel data World Development Indicators, International Country Risk Guide, and Standardized World Income Inequality Database	Dependent variables Final consumption expenditure of households Gini index Independent variables Democracy, bureaucratic quality, legal compliance, government stability, corruption, domestic investment, population growth, and domestic credit to the private sector Gross domestic product per capita, democracy, bureaucratic quality, legal compliance, government stability, corruption, foreign direct investment, and the enrollment rate for primary school Method Pooled mean group	This study finds that economic growth is an effective way to eradicate poverty. Then, institutional quality has a negative effect on poverty and income inequality in the long term, either directly or indirectly through economic growth.

Author (Year)	Title	Objectives of study	Types of data and sources of data	Methodology	Main findings
Giorgio d'Agostino, Luca Pieroni, and Margherita Scarlato (2020)	Social transfers and income inequality in OECD countries	This study examines the impact of social transfers on income inequality	Panel data UNU-WIDER World Income Inequality Database, OECD Social Expenditure Database, Database of Political Institutions 2015, OECD Data, and International Country Risk Guide	Dependent variable Gini index Independent variables Social transfers, electoral system and political orientation, gross domestic product per capita growth, government expenditure, health expenditure, corruption, population growth, the proportion of older people, the proportion of the female population, employees with tertiary education, employees becoming union members, and the unemployment rate Method Ordinary least squares, generalized panel-IV, and IV	This study finds that social transfers contribute negatively to income inequality depending on the level of corruption.

Author (Year)	Title	Objectives of study	Types of data and sources of data	Methodology	Main findings
Nguyen Phuc Canh, Christophe Schinckus, Su Dinh Thanh, and Felicia Chong Hui Ling (2020)	Effects of the internet, mobile, and land phones on income inequality and The Kuznets curve: Cross-country analysis	This study investigates the effect of technological variables on income inequality	Panel data Standardized World Income Inequality Database, Penn World Table, World Development Indicators, and Worldwide Governance Indicators	Dependent variable Gini index Independent variables Gross domestic product per capita, the proportion of the industry, urban population, human capital index, trade openness, foreign direct investment, control of corruption, government effectiveness, political stability and absence of violence/terrorism, regulatory quality, the rule of law, voice and accountability, individuals using the internet, mobile cellular subscriptions, and fixed telephone subscriptions Method Generalized method of moments	Technological advancements, illustrated by the internet and mobile, are associated with lower income inequality in the short and long term. This study also finds an inverted U-shaped relationship between human capital and institutional quality with income inequality that supports the Kuznets curve.

Author (Year)	Title	Objectives of study	Types of data and sources of data	Methodology	Main findings
Davide Furceri and Jonathan D. Ostry (2019)	Robust determinants of income inequality	This study examines the determinants of income inequality	Panel data Standardized World Income Inequality Database, Penn World Table, World Development Indicators, Alesina, et al. (2003), International Country Risk Guide, Polity IV, KOF Globalisation Index, and International Monetary Fund	Dependent variable Gini index Independent variables Gross domestic product per capita, squared gross domestic product per capita, the proportion of agriculture, the proportion of the industry, urban population, attainment in primary, lower secondary, and upper secondary education, domestic credit to the private sector, mortality rate, total fertility rate, net migration, age dependency ratio, corruption, trade and financial globalization index, democracy, unemployment, gross domestic product growth, inflation, government consumption expenditure, and access to electricity Method Weighted-average least squares	Several factors, including economic development, demographics, unemployment, and globalization, are the main determinants of income inequality. Trade globalization contributes negatively to income inequality, while financial globalization contributes positively to income inequality. Financial deregulation and technological advancements are the main determinants of income inequality in developed countries.

Author (Year)	Title	Objectives of study	Types of data and sources of data	Methodology	Main findings
Yiwen Yang and Theresa M. Greaney (2017)	Economic growth and income inequality in the Asia-Pacific region: A comparative study of China, Japan, South Korea, and the United States	This study examines the relationship between economic growth and income inequality	Time-series data Standardized World Income Inequality Database and World Development Indicators	Dependent variable Gross domestic product per capita Gini index Independent variables Redistribution, the proportion of exports, trade openness, government consumption expenditure, gross fixed capital formation, total fertility rate, the proportion of the population aged 15-64, and gross enrollment ratio for primary school Method Error-correction model	This study finds an S-shaped curve between gross domestic product per capita and income inequality. Then, income inequality promotes economic growth in China, Japan, and the United States. While trade openness has a negative effect on income inequality in Japan and the United States, it also positively affects income inequality in China. Furthermore, exports increase economic growth in Japan. While fiscal redistribution contributes negatively to income inequality in Japan, it also contributes negatively to gross domestic product per capita in all countries except China.

Author (Year)	Title	Objectives of study	Types of data and sources of data	Methodology	Main findings
N. P. Ravindra Deyshappriya (2017)	Impact of macroeconomic factors on income inequality and income distribution in Asian countries	This study investigates the effect of macroeconomic variables on income inequality	Panel data UNU-WIDER World Income Inequality Database, World Development Indicators, Transparency International, and International Country Risk Guide	Dependent variable Gini index Income shares by quintiles Independent variables Gross domestic product, capital formation, inflation, unemployment, trade openness, government debt, corruption perceptions index, political risk index, net official development assistance received, gross enrollment ratio for secondary school, total labor force participation rate, and population growth Method Generalized method of moments	This study finds an inverted U-shaped relationship between gross domestic product and income inequality that supports the Kuznets curve. While official development assistance, education, and labor force participation are associated with lower income inequality, inflation, unemployment, trade openness, and political risk are associated with higher income inequality.

CHAPTER 3

DATA AND METHODOLOGY

3.1 Data

This study uses the Gini index of household pre-tax and pre-transfer income from the Standardized World Income Inequality Database as a proxy for inequality. This study also uses the human capital index from the Penn World Table as a proxy for human capital. In addition, other economic factors from the World Development Indicators are used, including GDP per capita as a proxy for income, proportion of value-added from industry to GDP as a proxy for industrialization, proportion of net inflows from foreign direct investment to GDP as a proxy for foreign direct investment, the proportion of trade to GDP as a proxy for trade openness, and proportion of unemployment to the total labor force as a proxy for unemployment. Since this study specifically examines the impact of demographic factors on income inequality, other variables from the World Development Indicators are also used. These include annual population growth rate as a proxy for population growth, proportion of the urban population to the total population as a proxy for urbanization, proportion of age dependency ratio, both young-age dependency ratio and old-age dependency ratio, to the working-age population as a proxy for population structure, and proportion of female to the total population as a proxy for the female population. Finally, this study applies GDP per capita squared to determine whether there is an inverted U-shaped relationship between economic

growth and income inequality and incorporates environmental factors to produce a more accurate estimation. The sample of this study is a balanced panel data consisting of 21 countries and two sub-samples, including 6 Southeast Asian countries and 15 Latin American countries, from 1996 to 2017.

Table 2. Description of variables

Category	Variable	Definition	Source
Income inequality	Gini	Gini index of inequality in equivalized household pre-tax and pre-transfer income	SWIID
Environmental factors	ln(emission)	CO_2 emissions (metric tons per capita)	WDI
Economic factors	ln(income)	GDP per capita (constant 2015 US$)	WDI
	Industrialization	Industry (including construction), value added (% of GDP)	WDI
	FDI	Foreign direct investment, net inflows (% of GDP)	WDI
	Trade openness	Trade (% of GDP)	WDI
	Unemployment	Unemployment, total (% of the total labor force)	WDI
Demographic factors	Population growth	Population growth (annual %)	WDI
	Urban population	Urban population (% of the total population)	WDI
	Youth	The age dependency ratio, young (% of working-age population)	WDI
	Elderly	The age dependency ratio, old (% of working-age population)	WDI
	Human capital	Human capital index	PWT
	Female population	Population, female (% of the total population)	WDI
	Fertility	Fertility rate, total (births per woman)	WDI
	Infant mortality	Mortality rate, infant (per 1,000 live births)	WDI

3.2 Descriptive statistics

Table 3 summarizes the descriptive statistics of all variables for the full sample. The mean income inequality is 0.4755, its standard deviation is 0.0549, its minimum is 0.3714, and its maximum is 0.6294. Thus, the Gini index does not show much variation in the sample. For trade openness, the mean is 90.5361, the standard

deviation is 73.4458, the minimum is 15.6356, and the maximum is 437.3267. There was a significant variation in trade openness among countries during the study period.

Table 3. Descriptive statistics (full sample)

Variable	N	Mean	SD	Min	Max
Gini	504	0.4754754	0.0548665	0.3713952	0.629417
ln(emission)	504	0.7163538	0.6650368	-1.012806	2.440335
ln(income)	504	8.611903	0.7863283	6.518243	10.98988
Industrialization	504	30.46676	6.802187	16.9863	48.53032
FDI	504	4.412605	4.156628	-2.75744	29.35487
Trade openness	504	90.53611	73.44583	15.63559	437.3267
Unemployment	504	5.953246	3.73557	0.25	20.52
Population growth	504	1.43485	0.6466716	-1.474533	5.321517
Urban population	504	66.03723	18.75484	21.774	100
Youth	504	47.22995	12.69848	15.76712	86.33269
Elderly	504	10.20119	3.508332	5.408392	22.78303
Human capital	504	2.506484	0.298488	1.791704	3.974208
Female population	504	50.15219	0.8077252	47.65075	51.80844
Fertility	504	2.509	0.6726432	1.15	4.826
Infant mortality	504	20.13671	11.23467	2.2	72.9

The descriptive statistics of all variables for Southeast Asian countries are compiled in Table 4. The mean income inequality is 0.4281, its standard deviation is 0.0289, its minimum is 0.3742, and its maximum is 0.4717. Thus, the Gini index shows low variation in the sample. For trade openness, the mean is 152.7253, the standard deviation is 104.6162, the minimum is 37.4213, and the maximum is 437.3267. It illustrates a significant variation in trade openness among countries during the study period.

Table 4. Descriptive statistics (Southeast Asian countries)

Variable	N	Mean	SD	Min	Max
Gini	144	0.4281149	0.0288601	0.3742284	0.4716935
ln(emission)	144	0.925241	0.9109667	-1.012806	2.440335
ln(income)	144	8.429088	1.159857	6.518243	10.98988
Industrialization	144	36.78704	6.097821	23.30158	48.53032
FDI	144	5.522151	6.369001	-2.75744	29.35487
Trade openness	144	152.7253	104.6162	37.42134	437.3267
Unemployment	144	3.315	1.636616	0.25	8.06
Population growth	144	1.540495	0.8279103	-1.474533	5.321517
Urban population	144	54.10258	24.08425	21.774	100
Youth	144	41.49409	14.073	15.76712	70.3507
Elderly	144	8.587994	2.171589	5.408392	16.06107
Human capital	144	2.517497	0.3590811	1.791704	3.974208
Female population	144	49.64953	0.8716628	47.65075	51.2326
Fertility	144	2.247313	0.7380715	1.15	4.056
Infant mortality	144	18.12986	11.90376	2.2	52.6

The descriptive statistics of all variables for Latin American countries are summarized in Table 5. The mean income inequality is 0.4944, its standard deviation is 0.0513, its minimum is 0.3714, and its maximum is 0.6294. Thus, the sample has low variation in the Gini index. For trade openness, the mean is 65.6604, the standard deviation is 32.0414, the minimum is 15.6356, and the maximum is 166.6981.

Table 5. Descriptive statistics (Latin American countries)

Variable	N	Mean	SD	Min	Max
Gini	360	0.4944196	0.0512491	0.3713952	0.629417
ln(emission)	360	0.6327989	0.5144085	-0.5288222	1.554286
ln(income)	360	8.68503	0.5583001	7.430978	9.681617
Industrialization	360	27.93864	5.252231	16.9863	42.17103
FDI	360	3.968786	2.712677	-2.49888	16.22949
Trade openness	360	65.66041	32.04142	15.63559	166.6981
Unemployment	360	7.008544	3.817886	2.02	20.52
Population growth	360	1.392591	0.5537396	-0.0717325	2.867354
Urban population	360	70.81109	13.48319	42.441	95.24
Youth	360	49.52429	11.33877	29.11174	86.33269
Elderly	360	10.84647	3.729024	6.720653	22.78303
Human capital	360	2.502079	0.2709318	1.812593	3.107867
Female population	360	50.35325	0.6852573	49.10981	51.80844
Fertility	360	2.613675	0.6152132	1.678	4.826
Infant mortality	360	20.93944	10.86927	6.4	72.9

Latin American countries have higher income inequality, income per capita, unemployment, urban population, young-age dependency ratio, old-age dependency ratio, and female population than Southeast Asian countries. Meanwhile, Southeast Asian countries have higher emissions per capita, industrialization, foreign direct investment, trade openness, and population growth than Latin American countries. Latin American and Southeast Asian countries do not have significantly different levels of human capital.

3.3 Method of analysis

This study applies fixed-effects estimation because the fixed-effects model is considered more convincing than the random-effects model for estimating *ceteris paribus* effects and policy analysis using aggregated data (Wooldridge 2015). In addition, this study addresses the endogeneity problem using a dynamic panel model with lagged independent variables (Leszczensky and Wolbring 2022). The dynamic panel model with lagged independent variables used to examine the impact of economic and demographic factors on income inequality is shown as follows:

$$\begin{aligned}\square\square\square\square\square\square\square\square\square\square_{\square\square} = {} & \square_0 + \square_1\square\square\square\square\square\square\square\square\square\square_{\square\square-1} \\ & + \square_2\square\square(\square\square\square\square\square\square\square\square)_{\square\square-1} + \square_3\square\square(\square\square\square\square\square\square)_{\square\square-1} \\ & + \square_4\square\square(\square\square\square\square\square\square)^2_{\square\square-1} + \square_5\square\square\square\square\square\square\square\square\square\square\square\square\square\square\square\square\square\square_{\square\square-1} + \square_6\square\square\square_{\square\square-1} \\ & + \square_7\square\square\square\square\square\_\square\square\square\square\square\square\square\square\square_{\square\square-1} + \square_8\square\square\square\square\square\square\square\square\square\square\square\square\square_{\square\square-1} \\ & + \square_9\square\square\square\square\square\square\square\square\square\square\_\square\square\square\square\square\square\square_{\square\square-1} + \square_{10}\square\square\square\square\square\_\square\square\square\square\square\square\square\square\square\square\square_{\square\square-1} \\ & + \square_{11}\square\square\square\square\square_{\square\square-1} + \square_{12}\square\square\square\square\square\square\square\square_{\square\square-1} + \square_{13}\square\square\square\square\square\_\square\square\square\square\square\square\square\square_{\square\square-1} \\ & + \square_{14}\square\square\square\square\square\square\_\square\square\square\square\square\square\square\square\square\square\square\square_{\square\square-1} + \square_{15}\square\square\square\square\square\square\_\square\square\square\square\square_{\square} + \square_{\square\square}\end{aligned} \quad (1)$$

where $\square_0$ is the intercept; $\square_\square$ are coefficients to be estimated; $\square_{\square\square}$ is the stochastic error term; $\square$ and $\square$ stand for countries and years, respectively. The endogeneity problem can also be solved using fixed-effects estimation with endogenous covariates because the young-age dependency ratio can be affected by fertility and infant mortality rates (Bloom, Canning et al. 2010). Fixed-effects estimation with endogenous covariates used to examine the impact of economic and demographic factors on income inequality is shown as follows:

$$\begin{aligned}\square\square\square\square\square\square\square\square\square\square_{\square\square} = {} & \square_0 + \square_1\square\square(\square\square\square\square\square\square\square\square)_{\square\square-1} + \square_2\square\square(\square\square\square\square\square\square)_{\square\square-1} \\ & + \square_3\square\square(\square\square\square\square\square\square)^2_{\square\square-1} + \square_4\square_{\square\square-1} + \square_5\square\square\square_{\square\square-1} \\ & + \square_6\square\square\square\square\square\_\square\square\square\square\square\square\square\square\square_{\square\square-1} + \square_7\square\square\square\square\square\square\square\square\square\square\square\square\square\square_{\square\square-1} \\ & + \square_8\square\square\square\square\square\square\square\square\square\square\_\square\square\square\square\square\square\square_{\square\square-1} + \square_9\square\square\square\square\square\_\square\square\square\square\square\square\square\square\square\square\square_{\square\square-1} \\ & + \square_{10}\square\square\square\square\square_{\square\square-1} + \square_{11}\square\square\square\square\square\square\square_{\square\square-1} + \square_{12}\square\square\square\square\square\_\square\square\square\square\square\square\square_{\square\square-1} \\ & + \square_{13}\square\square\square\square\square\square\_\square\square\square\square\square\square\square\square\square\square_{\square\square-1} + \square_{14}\square\square\square\square\square\square\_\square\square\square\square\square_{\square} + \square_{\square\square}\end{aligned} \quad (2)$$

$$\square\square\square\square\square_{\square\square} = \square_0 + \square_1\square\square\square\square\square\square\square\square\square\square_{\square\square-1} + \square_2\square\square\square\square\square\square\_\square\square\square\square\square\square\square\square\square_{\square\square-1} + \square_{\square\square} \quad (3)$$

CHAPTER 4

EMPIRICAL RESULTS

This section summarizes the empirical results for the estimated parameters and elaborates the main findings for the total sample and sub-samples. This study differentiates Southeast Asian and Latin American countries to facilitate comparison. After examining the total sample, the econometric analysis is then replicated for two regional categories: Southeast Asian and Latin American countries. This study applies the dynamic panel model with lagged independent variables and estimation with endogenous covariates to avoid biased estimates caused by the reverse causality from income inequality to economic and demographic factors. The fixed-effects model is appropriate for determining how economic and demographic factors affect income inequality because the Hausman tests reject the null hypothesis, as shown in Tables 6-8.

4.1 Full sample

This section presents and discusses the main findings of the full sample. This study finds a positive relationship between income inequality in the previous and current year. Thus, a significant degree of inertia that prevents rapid and drastic changes is characteristic of income inequality in Southeast Asia and Latin America. Higher-income inequality in the current year is related to higher income inequality in the previous year (Dincer and Gunalp 2012, Mahmood and Noor 2014, Anyanwu, Erhijakpor et al. 2016). According to the empirical results in Table 6, income increases

income inequality, whereas income squared decreases income inequality, implying an inverted U-shaped relationship between economic growth and income inequality. This result provides strong evidence for the existence of a Kuznets curve. This finding suggests that while economic growth initially contributes to increased income inequality, it eventually helps to reduce income inequality. This finding is consistent with previous studies that support the Kuznets curve (Sagala, Akita et al. 2014, Anyanwu, Erhijakpor et al. 2016, Meniago and Asongu 2018). Because most economic activities are centralized in urban areas during the early and middle stages of economic development, initial increases in economic growth widen the spatial income gap. However, further increases in economic growth allow for a more equitable redistribution of economic activities, and thus income inequality decreases. The empirical results in Table 6 also illustrate that emissions reduce income inequality. The estimation sign of the coefficient on emissions does not support the hypothesis. Because of the production effect, pollution may increase income (Yang and Sheng 2012). Increased pollution generally implies increased production, which means more jobs. In addition, people with lower levels of education benefit more from the production effect because of their relatively high participation in pollution-intensive industries. Thus, there is less income inequality between people with high and low levels of education (Krueger and Lindahl 2001). Industrialization also reduces income inequality. The development of industries benefits the poor in several ways, including new job opportunities. Therefore, rapid industrialization can reduce income

inequality as low-wage workers can shift from the agricultural to the industrial sector. Similarly, population growth reduces income inequality. Economic growth will increase if an increasing labor force is gainfully employed (Headwinds 2015). In addition, whether fertility rates lead to income inequality depends on who contributes to net fertility (National Research Council 1986). Significant changes in population among the poor can result in income inequality and vice versa. Increases in the number of the rich will increase the supply of skilled labor, reducing the relative wages of skilled labor and the income gap between skilled and unskilled labor. Population growth increases labor supply, lowering wages (Claus, Martinez-Vazquez et al. 2012). Densely populated countries typically have low-income inequality (Campante and Do 2006). Income distribution will be equal when the number of people who can demand change in government is large, such as young people. Human capital also reduces income inequality. This finding supports previous studies indicating a negative relationship between human capital and income inequality (Knight and Sabot 1983, Dincer and Gunalp 2012, Anyanwu, Erhijakpor et al. 2016). In Southeast Asia and Latin America, the compression effect outweighs the composition effect. Therefore, as education becomes more widespread in society, there is more skilled labor, narrowing the wage gap between skilled and unskilled labor. Better job opportunities are accessible to those with higher educational attainment. The gap between lower and higher-income groups can be closed by providing lower-income groups more access to education. Then, the female

population reduces income inequality. Increased female labor market participation reduces income inequality because it represents married women entering the labor market to support their families with additional income or single women without children earning income for themselves. Increased female labor market participation should reduce income inequality as long as women from lower-income households continue to work. Income distribution is more even when men and women actively participate in the labor market (Kenworthy 2008). These findings emphasize how crucial human capital and the female population are to reduce income inequality. In addition, the coefficients for human capital and the female population are higher than those for other variables, suggesting the significance of these demographic factors. In contrast, foreign direct investment exacerbates income inequality. Foreign direct investment generally flows from low-skill sectors in developed countries to relatively high-skill sectors in developing countries. Therefore, an increase in foreign direct investment could result in a greater relative need for skilled labor in both countries, thereby increasing income inequality in both developed and developing countries (Jaumotte, Lall et al. 2013). Unemployment also worsens income inequality. Low-skilled workers are the first to be laid off because of rapid technological advances, causing unemployment and widening income inequality. Then, the young-age dependency ratio widens income inequality. A higher young-age dependency ratio causes greater income inequality because it indicates a higher

average number of children per household and a lower income per capita. These findings suggest that reducing income inequality is a multifaceted process.

Table 6. The empirical results (full sample)

Income inequality	Fixed-effects estimates		Fixed-effects estimates with endogenous covariates	
	Coef.	Std. Err.	Coef.	Std. Err.
Lagged Gini	0.9816901***	(0.0130625)		
Emission	0.0023754	(0.0015962)	-0.0261575***	(0.0057677)
Income	0.0198743	(0.0131240)	0.2526357***	(0.0482167)
Income squared	-0.0011933	(0.0007568)	-0.0144626***	(0.0027663)
Industrialization	-0.0001063	(0.0000669)	-0.0010421***	(0.0002429)
Foreign direct investment	0.0000624	(0.0000783)	0.0016525***	(0.0002786)
Trade openness	-0.0000319***	(0.0000121)	0.0001715***	(0.0000437)
Unemployment	0.0004657***	(0.0001044)	0.0020681***	(0.0003773)
Population growth	0.0007726	(0.0004984)	-0.0039495**	(0.0018534)
Urban population	-0.0002282***	(0.0000835)	0.0020074***	(0.0003011)
Youth	0.0001504**	(0.0000599)	0.0018093***	(0.0002609)
Elderly	0.0003993	(0.0004099)	-0.0019311	(0.0015101)
Human capital	0.0003332	(0.0022884)	-0.0320944***	(0.0085441)
Female population	-0.0004244	(0.0013896)	-0.0302319***	(0.0049177)
Constant	-0.0500717	(0.0783598)	0.7993676***	(0.2935117)
Regional dummies	Yes		Yes	
Instrumented: Youth				
Instruments: Fertility rate and infant mortality rate				
R-squared	0.9716		0.6122	
F-statistics	1096.65***		710802.95***	
F-statistics (all $\square_{\square} = 0$)	4.08***		115.32***	
Hausman test	35.84***		39.57***	
Number of obs	483		483	
Number of groups	21		21	

Note(s): * indicates 1% level of significance, ** indicates 5% level of significance, *** indicates 10% level of significance

Standard errors are in parentheses

Source(s): Author's estimates

4.2 Southeast Asian countries

This section presents and discusses the main findings of Southeast Asian countries. According to the empirical results in Table 7, income increases income inequality, whereas income squared decreases income inequality, confirming an inverted U-shaped relationship between economic growth and income inequality.

This finding supports the Kuznets curve, indicating that sustained economic growth could lead to reduced income inequality in the long run. Southeast Asian countries are still in the process of transitioning from an agricultural to an industrial economy. This transition supports the Kuznets curve (Fosu 2017, Aiyar and Ebeke 2020). As the economy grows and more people shift from the agricultural to the industrial sector, the income of those making the transition increases, thereby increasing income inequality. Therefore, economic growth and income inequality have a positive relationship during the early stages of development. As more workers transition from the agricultural to the industrial sector, the declining labor supply in the agricultural sector leads to higher wages. In addition, those who transition to the industrial sector work harder to earn the same amount of money as the rich. There is a negative correlation between economic growth and income inequality when income inequality decreases as development advances (Barro 2000). The empirical results in Table 7 also illustrate how emissions can reduce income inequality. Trade openness also helps to reduce income inequality. According to the Stolper-Samuelson theorem, trade openness can affect income inequality. In a developing country with abundant low-skilled workers, increased trade openness, through tariff reduction, will lead to higher wages for low-skilled workers and lower wages for high-skilled workers, thus reducing income inequality (Stolper and Samuelson 1941). Prices of high-skill intensive products and wages of high-skilled workers decrease after tariffs on imports are reduced, whereas prices of low-skill intensive products and wages of low-skilled

workers increase. Then, the old-age dependency ratio reduces income inequality. A higher old-age dependency ratio is associated with lower income inequality because this age group has a flatter income distribution. In addition, previous studies indicate that countries with adequate public assistance programs, particularly those for the elderly, will reduce income inequality (Smeeding 2001, Wu 2005). Older people who live independently and have sufficient access to family and public resources will reduce the income gap between higher and lower-income households. Income inequality is also decreased by human capital. This finding supports previous studies indicating a negative relationship between human capital and income inequality (Jaumotte, Lall et al. 2013, Abrigo, Lee et al. 2018). Education can increase the poor's human capital and earning capacity by enhancing their skills and knowledge, thereby reducing income inequality. Higher education and more equitable distribution of educational opportunities are associated with lower income inequality (Lustig, Lopez-Calva et al. 2016). Similarly, the female population reduces income inequality. In other words, these phenomena, including emissions, trade openness, old-age dependency ratio, human capital, and female population, can contribute to reducing income inequality. In contrast, industrialization exacerbates income inequality. Unemployment also worsens income inequality. This finding supports previous studies indicating a positive relationship between unemployment and income inequality (Checchi and García□Peñalosa 2010, Claus, Martinez-Vazquez et al. 2012, Dincer and Gunalp 2012, Maestri and Roventini 2012, Monnin 2014). In particular, high

unemployment rates can increase income inequality by reducing labor income. Similarly, income inequality increases as more people live in urban areas. This finding is consistent with previous studies that found a positive relationship between urbanization and income inequality (Chen, Glasmeier et al. 2016, Oyvat 2016, Beladi, Chao et al. 2017, Adams and Klobodu 2019, Sulemana, Nketiah-Amponsah et al. 2019). There are some reasons why urbanization and income inequality are positively correlated. The Kuznets hypothesis explains how urbanization affects income inequality. Simon Kuznets argues that urbanization will aggravate income inequality because urban people have higher income per capita than rural people. While rural people are consumption-oriented because of their low income, urban people have the ability to save and invest in productive sectors. Income distribution benefits those who wisely reinvest their profits. Therefore, income inequality will worsen as countries develop. Second, rural people are typically less educated and unskilled than urban people, trapping them in a cycle of poverty because of a lack of economic opportunities (Liu, Wu et al. 2008, Chen, Glasmeier et al. 2016). If rural people with low levels of education move to urban areas, they may find themselves unemployed or forced to work in low-wage jobs, exacerbating income inequality (Siddique, Wibowo et al. 2014). Third, urban people are more productive than rural people because of advances in technology and healthcare in urban areas and, as a result, earn higher wages (Kamoche 2011, Chen, Glasmeier et al. 2016). Finally, urban-biased economic and social policies that offer more economic opportunities for

urban people than for rural people worse the urban-rural income disparity (Demont 2013, Demont, Rutsaert et al. 2013). Young-age dependency ratio also widens income inequality. The following section addresses the same issues for Latin American countries.

Table 7. The empirical results (Southeast Asian countries)

Income inequality	Fixed-effects estimates		Fixed-effects estimates with endogenous covariates	
	Coef.	Std. Err.	Coef.	Std. Err.
Lagged Gini	0.9997351***	(0.0212527)		
Emission	0.0006900	(0.0020270)	-0.0312978***	(0.0085734)
Income	-0.0000523	(0.0113479)	0.1963688***	(0.0482168)
Income squared	0.0005696	(0.0006730)	-0.0062280**	(0.0029455)
Industrialization	0.0001682**	(0.0000725)	0.0011208***	(0.0003114)
Foreign direct investment	-0.0000165	(0.0000579)	0.0003434	(0.0002589)
Trade openness	-0.0000304***	(9.04e-06)	-0.0000274	(0.0000405)
Unemployment	0.0011375***	(0.0002289)	0.0033215***	(0.0010692)
Population growth	0.0003901	(0.0002592)	0.0005062	(0.0011591)
Urban population	0.0000507	(0.0000731)	0.0006646**	(0.0003219)
Youth	0.0002101***	(0.0000756)	0.0020434***	(0.0003948)
Elderly	-0.0003908	(0.0004374)	-0.0067326***	(0.0018605)
Human capital	-0.0021023	(0.0024148)	-0.0196168*	(0.0106776)
Female population	0.0011260	(0.0012940)	-0.0141266**	(0.0056310)
Constant	-0.1065026*	(0.0599317)	-0.1108936	(0.2716358)
Regional dummies	Yes		Yes	
Instrumented: Youth				
Instruments: Fertility rate and infant mortality rate				
R-squared	0.9853		0.7031	
F-statistics	563.91***		572269.68***	
F-statistics (all $\square_{\square} = 0$)	5.89***		59.31***	
Hausman test	29.64***		484.95***	
Number of obs	138		138	
Number of groups	6		6	

Note(s): * indicates 1% level of significance, ** indicates 5% level of significance, *** indicates 10% level of significance

Standard errors are in parentheses

Source(s): Author's estimates

4.3 Latin American countries

This section presents and discusses the main findings of Latin American countries. According to the empirical results in Table 8, income decreases income

inequality, whereas income squared increases income inequality, indicating a U-shaped relationship between economic growth and income inequality. Increased economic growth improves income distribution in the early stages of economic development while worsening income distribution in the later stages. This finding is consistent with previous studies demonstrating that the correlation between economic growth and income inequality typically illustrates a U-shaped curve (Blanco and Ram 2019, Sulemana, Nketiah-Amponsah et al. 2019). The structural change that occurs at the time determines the shape of the curve in the relationship between economic growth and income inequality. This U-shaped curve corresponds to increasing income inequality in recent years, a phenomenon associated with the structural change from the industrial to the service sector over the past few decades. This study finds a non-linear relationship between economic growth and income inequality in Southeast Asia and Latin America. It implies that each region has the potential for positive and negative relationships throughout the development process. The empirical results in Table 8 also illustrate that industrialization reduces income inequality. Most Latin American countries have reached a substantial level of urbanization where most people live in urban areas, the industrial sector is essential to the economy, and thus structural changes have occurred. Income inequality is also decreased by trade openness. This finding supports previous studies indicating a negative relationship between trade openness and income inequality (Jaumotte, Lall et al. 2013). According to the Stolper-Samuelson theorem, trade openness increases

income inequality in developed countries while reducing income inequality in developing countries. The Heckscher-Ohlin model denotes that income inequality will decrease when developing countries with a surplus of low-skilled workers open up to trade as the relative wages of these workers increase. Then, population growth lowers income inequality. Human capital also helps to reduce income inequality. This finding demonstrates the importance of human capital in addressing income inequality in Southeast Asia and Latin America. In other words, these phenomena, including industrialization, trade openness, population growth, and human capital, can contribute to reducing income inequality.

In contrast, foreign direct investment exacerbates income inequality. Foreign direct investment has unsurprisingly increased the gap between the rich and the poor. The dependency theory, which considers foreign direct investment as an instrument of dependency that harms the recipient country, is consistent with this finding. If industrialized multinational companies engaged in capital-intensive production drive the development process, income inequality will increase (Girling 1973). Foreign direct investment is more common in higher-skilled industries. Therefore, although foreign direct investment boosts employment and income, it mainly benefits people with higher education and skills. The relative demand for higher-skilled workers rises due to foreign direct investment. Unemployment also worsens income inequality, implying that labor market conditions determine income distribution.

Lower-income groups have less wealth accumulated than higher-income groups and have limited access to income sources because of unemployment. Unemployment consequently increases the income gap (Jäntti and Jenkins 2001). Then, the young-age dependency ratio contributes to income inequality. Old-age dependency ratio also aggravates income inequality. This finding supports previous studies indicating a positive correlation between the old-age dependency ratio and income inequality (Zhong 2011, Shirahase 2015). Previous studies have demonstrated that an increase in older people leads to income inequality because their income is typically lower or more varied than other age groups. Because of significant income disparities, population aging can widen the income gap among older people (Dong, Tang et al. 2018). Differences in non-labor income, physical capital, and skills accumulated over working life may contribute to greater income inequality among older people. These findings suggest that economic development is a component of a more comprehensive strategy that includes demographic aspects.

Table 8. The empirical results (Latin American countries)

Income inequality	Fixed-effects estimates		Fixed-effects estimates with endogenous covariates	
	Coef.	Std. Err.	Coef.	Std. Err.
Lagged Gini	0.9330701***	(0.0203411)		
Emission	0.0013478	(0.0022805)	-0.0030504	(0.0063538)
Income	-0.0230978	(0.0285154)	-0.3431164***	(0.0775922)
Income squared	0.0007620	(0.0015645)	0.0141431***	(0.0043044)
Industrialization	-0.0002338***	(0.0000893)	-0.0011205***	(0.0002425)
Foreign direct investment	0.0001992*	(0.0001105)	0.0016654***	(0.0002938)
Trade openness	-0.0000842***	(0.0000213)	0.0000197	(0.0000590)
Unemployment	0.0003800***	(0.0001286)	0.0004029	(0.0003590)
Population growth	-0.0008226	(0.0017469)	-0.0292801***	(0.0047327)
Urban population	-0.0004105**	(0.0001583)	0.0025211***	(0.0004044)
Youth	0.0001346	(0.0000999)	0.0015843***	(0.0003281)
Elderly	0.0017131***	(0.0006369)	0.0081041***	(0.0017356)
Human capital	-0.0046719	(0.0035749)	-0.0856369***	(0.0093464)
Female population	0.0000691	(0.0034101)	-0.0055123	(0.0096818)
Constant	0.1951403	(0.2376309)	2.6117070***	(0.6444866)
Regional dummies	Yes		Yes	
Instrumented: Youth				
Instruments: Fertility rate and infant mortality rate				
R-squared	0.9749		0.8049	
F-statistics	875.50***		856070.50***	
F-statistics (all $\square_{\square} = 0$)	5.58***		187.90***	
Hausman test	65.20***		580.89***	
Number of obs	345		345	
Number of groups	15		15	

Note(s): * indicates 1% level of significance, ** indicates 5% level of significance, *** indicates 10% level of significance

Standard errors are in parentheses

Source(s): Author's estimates

Table 9. A summary of the empirical results derived from Tables 6-8

Dependent variable: income inequality	Fixed-effects estimates			Fixed-effects estimates with endogenous covariates		
Independent variables	(1)	(2)	(3)	(1)	(2)	(3)
Emission	+	+	+	−***	−***	−
Income	+	−	−	+***	+***	−***
Income squared	−	+	+	−***	−**	+***
Industrialization	−	+**	−***	−***	+***	−***
Foreign direct investment	+	−	+*	+***	+	+***
Trade openness	−***	−***	−***	+***	−	+
Unemployment	+***	+***	+***	+***	+***	+
Population growth	+	+	−	−**	+	−***
Urban population	−***	+	−**	+***	+**	+***
Youth	+**	+***	+	+***	+***	+***
Elderly	+	−	+***	−	−***	+***
Human capital	+	−	−	−***	−*	−***
Female population	−	+	+	−***	−**	−
Regional dummies (ref: Southeast Asia)	Yes	No	No	Yes	No	No

Note(s): * indicates 1% level of significance, ** indicates 5% level of significance, *** indicates 10% level of significance

Source(s): Author's estimates

Income inequality between Southeast Asian and Latin American countries is impacted differently by economic and demographic factors, indicated by significant but not identical independent variables. Although most countries in these two regions have similar characteristics to developing countries, Southeast Asian and Latin American countries are at different stages of development. In other words, the impact of economic and demographic factors on income inequality varies significantly across Southeast Asian and Latin American countries because of geographical differences.

CHAPTER 5

CONCLUSION

5.1 Conclusion and practical implication

There is no agreement on the factors that contribute to income inequality. Previous studies have produced varied results due to different methodologies. This study empirically examines the impact of economic and demographic factors on income inequality in Southeast Asian and Latin American countries. This study applies the dynamic panel model with lagged independent variables and estimation with endogenous covariates to control for the potential endogeneity problem using a total sample of 21 countries and two sub-samples, including 6 Southeast Asian countries and 15 Latin American countries, from 1994 to 2017. Most studies have focused on how economic factors affect income inequality but neglected other factors. This study demonstrates that determining income inequality involves more than just one factor. In addition, this study provides a more comprehensive theoretical framework to investigate income inequality from a demographic perspective where essential components include population growth, urban population, population structure, human capital, and female population. Empirical results are statistically robust, provide compelling findings, and indicate that multiple factors affect income inequality.

Empirical evidence supports the importance of considering regional differences in income levels. The impact of economic growth on income inequality varies

depending on income levels. This study finds an inverted U-shaped relationship between economic growth and income inequality in Southeast Asia, while these two variables have an opposite relationship in Latin America. Promoting higher economic growth will result in equal income distribution for Southeast Asian countries because it is consistent with the Kuznets hypothesis. Industrialization increases income inequality in Southeast Asia, whereas industrialization decreases income inequality in Latin America. It indicates Southeast Asia is industrializing at the expense of equity which could reduce long-term economic growth. Therefore, implementing redistribution policies that promote equal income distribution is imperative. As long as industrialization is necessary to spur economic growth, its negative impact on income distribution should be mitigated by refocusing on labor-intensive industries. In addition, the most effective way to achieve a more egalitarian society is by improving access to education. Human capital has a negative effect on income inequality in Southeast Asia and Latin America. Therefore, it is crucial to increase public spending on education and training, particularly for groups that are most vulnerable to unemployment. How human capital spending is converted into productive labor determines how human capital improves income distribution. Thus, other government policies also have a role. A more flexible labor market will facilitate the transformation of human capital into productive labor. Increases in efficiency, universal increases, and targeted increases are three types of government intervention in human capital. Because these approaches are not mutually exclusive,

there is plenty of space for combining them to develop more precise plans. Then, it is clear that addressing unemployment is essential for creating a more inclusive economy, given that unemployment increases income inequality in Southeast Asia and Latin America.

This study recommends policymakers implement a comprehensive strategy that integrates economic and demographic factors to reduce income inequality. Young-age dependency ratio exacerbates income inequality in Southeast Asia and Latin America. It implies that the government should strengthen family planning programs to increase knowledge, acceptance, and practice of family planning. Early child marriage has a significant impact on fertility rates. Initiatives to increase the number of girls enrolled in school and reduce infant mortality rates are critical for promoting demographic transition. The government can reduce income inequality by supporting women to work outside the home, as the female population reduces income inequality in Southeast Asia. Emission also reduces income inequality in Southeast Asia because of the production effect of pollution. It is possible to build an equitable society by protecting the environment. Due to their lower ability to deal with environmental risks and insufficient access to infrastructure or preventive services to protect themselves from pollution-related damage, vulnerable groups are disproportionately affected by environmental degradation. Pollution disproportionately endangers their health, livelihoods, and general well-being, contributing to income inequality. Then, in Southeast Asia, income inequality

increases as more people live in urban areas. It implies that the government should initiate industrialization that accommodates low-skilled workers who migrate to urban areas (Wu and Rao 2017). In addition, the government should provide education, health, and other social services in rural areas to reduce incentives for rural people to migrate to urban areas (Harris and Todaro 1970). Finally, the old-age dependency ratio decreases income inequality in Southeast Asia, whereas the old-age dependency ratio increases income inequality in Latin America. It implies that the government should carefully design population policies to create a society with a more balanced population age structure (Cai 2016). In addition, the government should create adequate social security, such as public pensions and health insurance, to address the positive effect of population aging on income inequality. Generally, policies that transfer income from the highest to the lowest income groups can help to reduce income inequality. Appropriate fiscal incentives that redistribute wealth will help to reduce income inequality, as progressive income taxes and a well-functioning social welfare system narrow the income gap between higher and lower-income households.

5.2 Limitation and future research

This study did not include several Southeast Asian and Latin American countries as samples due to a lack of data. Then, this study applied data on the proportion of females to the total population to explain the indirect effect of female labor market participation on income inequality due to data availability. Because

economic and demographic factors change rapidly, this study requires periodic updates, which may result in changes in the nature of the relationship between these factors and income inequality. Finally, this study could be improved by considering how other factors affect income inequality when more data is available.

APPENDIX

Correlation matrix

	Gini	Emission	Income	Industry	FDI	Trade openness	Unemployment	Population growth	Urban population	Young-age dependency ratio	Old-age dependency ratio	Human capital	Female population
Gini	1.0000												
Emission	-0.1956	1.0000											
Income	0.1817	0.7568	1.0000										
Industry	-0.3116	0.0348	-0.3026	1.0000									
FDI	-0.0236	0.3966	0.4722	-0.2512	1.0000								
Trade openness	-0.2864	0.4904	0.3818	0.1068	0.6813	1.0000							
Unemployment	0.2172	0.0833	0.2355	-0.3908	-0.1112	-0.3324	1.0000						
Population growth	0.0483	-0.1057	-0.1026	0.1221	0.1101	0.3495	-0.3411	1.0000					
Urban population	0.3577	0.5178	0.8308	-0.3590	0.3112	0.0654	0.3955	-0.1157	1.0000				
Young-age dependency ratio	0.1540	-0.6384	-0.6530	0.0618	-0.4055	-0.3535	-0.0914	0.4732	-0.4247	1.0000			
Old-age dependency ratio	-0.0581	0.2520	0.4438	-0.4065	0.0603	-0.1809	0.4406	-0.6319	0.4819	-0.4861	1.0000		
Human capital	-0.1518	0.6180	0.6430	-0.1379	0.3633	0.2535	0.0038	-0.2371	0.5409	-0.5928	0.3954	1.0000	
Female population	0.1515	-0.0697	-0.0203	-0.2402	-0.3179	-0.5841	0.4406	-0.5379	0.1697	-0.1005	0.6261	-0.1479	1.0000

List of countries

Southeast Asia	Latin America
Indonesia	Argentina
	Bolivia
Malaysia	Brazil
	Colombia
Philippines	Chile
	Costa Rica
	Dominican Republic
Singapore	Ecuador
	Honduras
	Jamaica
Thailand	Mexico
	Panama
	Paraguay
Vietnam	Peru
	Uruguay

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