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**Trade Openness and Income Inequality in African Less Developed Countries**

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## ABSTRACT

This thesis examines the intricate relationship between trade openness and income inequality in Least Developed Countries (LDCs) in Africa. It begins by contextualizing the economic landscape of these nations, emphasizing the unique challenges and opportunities they face in the global trade environment. Looking at global trade, its evolution and development as well as the different organizations in global trade. The research looked at different trade and economic theories on Trade and inequality and their applications to the context of African LDCs. These theories include; The International Trade Theory i.e. Comparative advantage by Ricardo 1817, New Trade Theory by Paul Krugman, and the Heckscher-Ohlin Model, 1941.

Growth Theories i.e. Solow's model (1956), and endogenous growth theory of the late 1980s and 1990s in the context of this topic. The study also looked at specific theories that are applied to LDCs in Africa in the same context. These include; New International Trade (Late 1970s - 1980s), Neoliberalism and Market Liberalization (1980s), and the Human Development Approach (1990s). The study adopts a multi-faceted approach, analyzing empirical data to explore how the liberalization of trade impacts income distribution in African LDCs. Different empirical studies have also been analyzed in this thesis

The study focused on 33 African LDC countries over 22 years (2000 – 2022). A significant part of the analysis focuses on the effects of trade policies on different socioeconomic groups, considering factors like Education (school Enrollment), Life Expectancy (at Birth), GDP/Capita, Exports, and Imports. The research method involves a comparative analysis of various African LDCs, drawing on economic indicators to offer a comprehensive view of the impacts of trade openness. The methodology used in the analysis of the data is the Pool OLS method, with Theil as the measure for inequality in these countries.

The findings of this study suggest a complex and multifaceted relationship between trade openness and income inequality. Looking at the indicator used in the model, we could see that education school enrolment and life expectancy have a positive effect on Inequality and imports as well, exports on the other has shown a negative effect. While trade liberalization has the potential to spur economic growth, its benefits are not uniformly distributed, often exacerbating income

disparities. The Theil index is high for these countries showing a high level of Income Inequality. The thesis argues that for trade openness to be a tool for reducing income inequality, it must be accompanied by robust domestic policies aimed at enhancing education, skill development, and social safety nets.

In conclusion, The thesis offers policy recommendations for African LDCs, stressing the need for a balanced approach to trade that prioritizes equitable growth and income distribution through infrastructure development and increased investment in the educational sectors. It underscores the importance of international cooperation and tailored strategies that consider the unique economic and social contexts of African LDCs.

# CHAPTER 1

## BACKGROUND

### 1.1. Introduction

In the evolving landscape of global economics, the relationship between international trade and income distribution remains a topic of significant importance. This is particularly true for Less Developed Countries (LDCs) in Africa, where the pursuit of economic development through integration into the global trading system presents both opportunities and challenges. While trade has often been heralded as a catalyst for economic growth, its impact on income distribution within these nations demands a nuanced and critical examination.

The latter half of the 20th century marked a significant transformation in international trade. This period saw the global economy shift from a predominantly protectionist stance, characterized by high tariffs and trade barriers, to a more liberalized and interconnected market system. Key to this transformation was the General Agreement on Tariffs and Trade (GATT) and its successor, the World Trade Organization (WTO), which played instrumental roles in overseeing and regulating global trade norms and disputes. This evolution reflected a broadening consensus around the merits of free trade, a notion primarily advocated by developed nations and increasingly embraced worldwide. This era also witnessed an acceleration of globalization, driven by groundbreaking advances in technology and transportation. The advent of the internet and the digital revolution, combined with improvements in shipping and logistics, broke down traditional trade barriers. Consequently, markets, previously separated by geographical and economic distances, became tightly integrated, fostering an unprecedented level of economic interdependence among nations.

For Less Developed Countries (LDCs), particularly in Africa, the shift towards trade openness has presented both opportunities and challenges. Integration into the global market has provided access to wider markets, potentially leading to enhanced exports, foreign direct investment inflows, and economic diversification. Notable examples of LDCs capitalizing on trade for development include countries like Vietnam and Bangladesh, which have achieved significant economic progress partly through integration into global supply chains and export-oriented strategies.

However, the move towards open trade has also laid bare the vulnerabilities of African LDCs. Many of these nations are heavily reliant on a narrow range of exports, mainly primary

commodities, making them susceptible to fluctuations in global prices. This reliance on a limited economic base often results in volatile national incomes and unstable employment levels. Furthermore, structural challenges and limited market access hinder the ability of these countries to climb the value chain and diversify their economies.

African LDCs face significant hurdles in integrating into the global trade system. Their limited bargaining power in international trade negotiations often leaves their interests and concerns marginalized. This predicament is compounded by the complexity of trade agreements and the demands of complying with international standards, which pose considerable challenges for resource-constrained countries. Infrastructural inadequacies, such as underdeveloped transportation and logistics systems, along with institutional weaknesses, including governance issues and a lack of trade expertise, further impede these countries' ability to engage effectively in international trade and harness its potential benefits. The role of the World Trade Organization in shaping the trade landscape for African LDCs has been significant, albeit contentious. While the WTO offers special and differential treatment provisions for LDCs, aimed at providing greater support and market access, the actual impact of these provisions has often been questioned. The intricacies of WTO rules and the challenges African LDCs face in navigating their dispute resolution mechanisms can inadvertently reinforce inequalities within the global trading system. Regional and bilateral trade agreements also play a critical role in defining the trade policies of African LDCs. These agreements often provide preferential market access, crucial for the export-led growth strategies of these nations. However, the effectiveness of these agreements in fostering sustainable development and equitable growth is a subject of continuous debate and examination.

African LDCs often find themselves in a peripheral position in global trade dynamics, primarily exporting raw materials and importing finished goods. This position makes them vulnerable to global market volatility. Trade policies from more developed economies, including tariffs and subsidies, can significantly affect the competitive standing of African LDCs, at times hindering their ability to compete effectively. The economic situation in African LDCs underscores the broader issue of global inequality. The disparity in income and opportunities between these countries and developed nations highlights the need for concerted efforts to address these imbalances. Recognizing the challenges faced by African LDCs, international development initiatives often target these regions, aiming to reduce poverty and promote sustainable economic



growth. This includes strategies to better integrate African LDCs into the global economy. The role of African LDCs in global economic development, trade, and efforts to combat global inequality is pivotal. Understanding their unique challenges and the international response is crucial for crafting policies aimed at fostering a more balanced and equitable global economic landscape.

LDCs typically play a limited role in global trade due to their small economies and lack of competitive industries. They often export raw materials and import finished goods, making them vulnerable to global price fluctuations. **Impact of Trade Policies:** Trade policies, including tariffs and subsidies in developed countries, can significantly impact LDCs, sometimes hindering their ability to compete in global markets. **Contribution to Global Inequality:** The economic conditions in LDCs contribute to global inequality. The stark contrast between these and more developed nations underscores the vast income and opportunity disparities worldwide. **Focus of International Development Efforts:** LDCs are often the focus of international development efforts aimed at reducing poverty and promoting sustainable economic growth. This includes initiatives to integrate them more fully into the global economy.

In summary, LDCs are crucial in discussions about global economic development, trade, and efforts to reduce global inequality. Their challenges and the international community's response to these challenges are key to shaping a more balanced and equitable global economy.

## 1.2. Definitions of Key Terms

**Less/Least Developed Countries (LDCs):** Less Developed Countries (LDCs), sometimes referred to as Least Developed Countries, are nations identified by international or regional organizations as having a lower level of socio-economic development. (*Dwight H. Perkins, Steven Radelet, David L. Lindauer, and Steven A. Block*).

**Trade Openness:** Trade openness refers to the degree to which a country allows free trade with other nations. It's a measure of the economic policy of a country in terms of how it facilitates the import and export of goods and services to and from its borders. (*Paul Krugman, Maurice Obstfeld, and Marc Melitz*.)

**Income Inequality:** Income inequality refers to the uneven distribution of income among the population of a region, country, or the world. It's a measure of the gap between the rich and the poor, indicating how wealth or income is shared among the individuals within a

society. (Piketty, Thomas. 2014. *Capital in the Twenty-First Century*. Cambridge, MA: Harvard University Press).

### **1.3. Income Inequality in Africa**

The primary area of research in development economics in Africa has historically been poverty (Acemoglu & Robinson, 2010). Nevertheless, despite expectations, there has been a lack of improvement in human development and poverty indicators. Reports from the World Bank regarding the achievement of Millennium Development Goal (MDG) targets have revealed that poverty has decreased in all regions of the world, except for the African continent (Bank, 2015). Although there has been economic progress in several regions of Africa, poverty rates continue to be elevated. According to the World Bank, Sub-Saharan Africa has some of the most elevated poverty rates globally, with over 40% of individuals residing below the international poverty threshold of \$1.90 per day. Think of a bustling city in Africa, filled with skyscrapers, fancy cars, and big businesses — places like Johannesburg in South Africa, Lagos in Nigeria, or Cairo in Egypt. Now, imagine just a few streets away, there are slums where families live in cramped conditions, struggling to make ends meet. This stark contrast between the rich and the poor is what we see in countries with major urban centers and developed industries. The Theil index captures this gap, showing us that in these places, wealth is like a pie that's unevenly sliced, with some getting a much bigger piece than others.

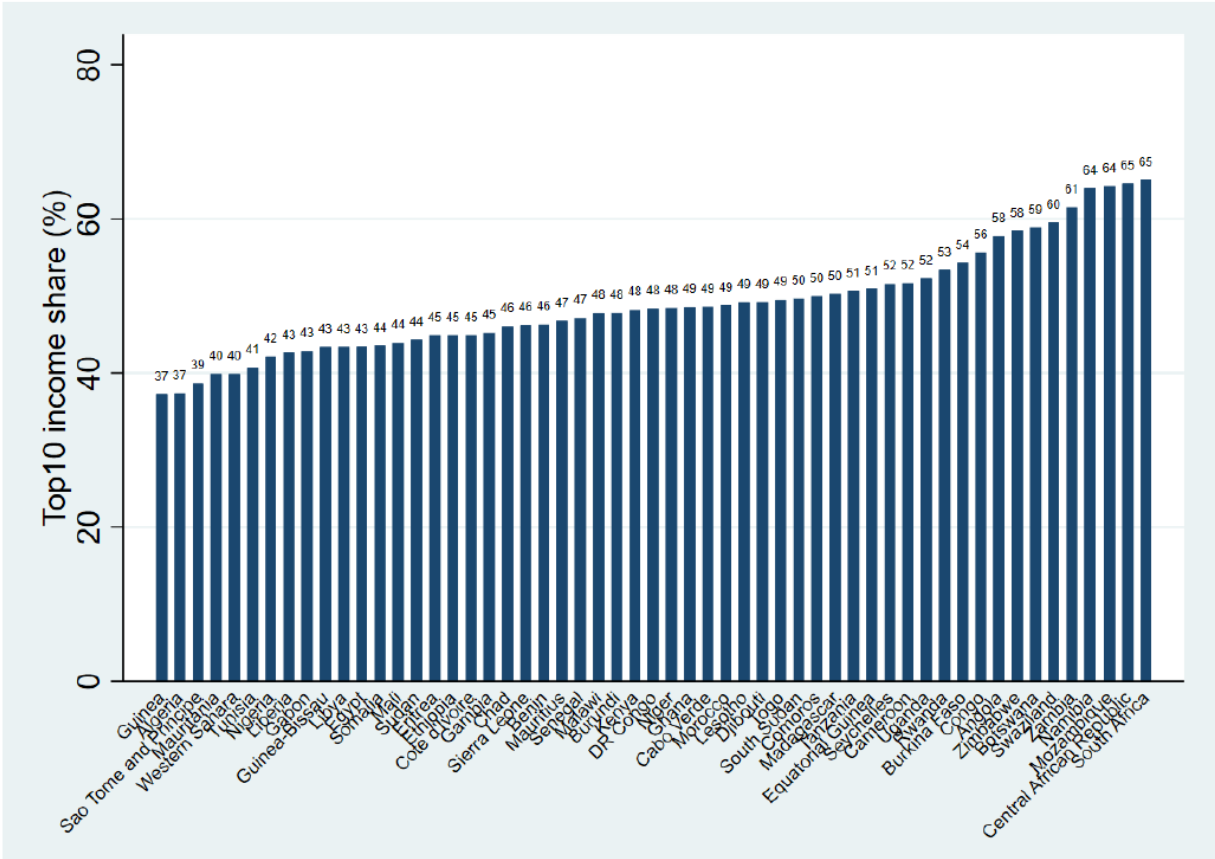
Now, picture a rural village where most people are farmers, growing what they eat and maybe selling a bit extra. In such countries, where life is more about community and less about industry, things are a bit different. Everyone might not be wealthy, but the gap between the richest and the poorest isn't as vast. In these places, the Theil index shows us a smaller income gap. It's like everyone in the village sharing the pie more equally, even if the pie itself is smaller. In simpler terms, in some African countries, the divide between the rich and poor is like living in two different worlds, while in others, it's more like everyone is in the same boat, weathering the same storm.

### **1.4. How much Inequality exists in Africa?**

The 2022 WID regional update data affirms that income inequality in the African area continues to be exceedingly high. Examining inequality at the national level, Figure 1 illustrates that, on average in 2021, the wealthiest 10% of families receive 49% of the total income. This percentage varies from 37% in Guinea to 65% in South Africa.

In addition, aside from South Africa, which is frequently identified as one of the most unequal nations in the world, there are four other countries where the top 10% of income earners have more than 60% of the total income. These countries are the Central African Republic, Mozambique, Namibia, and Zambia. For instance, the United States has an estimated top 10 income proportion of 46.8%, while France has a top 10 income share of 32.4%.

Figure 1. Top 10% income shares across African countries, 2021

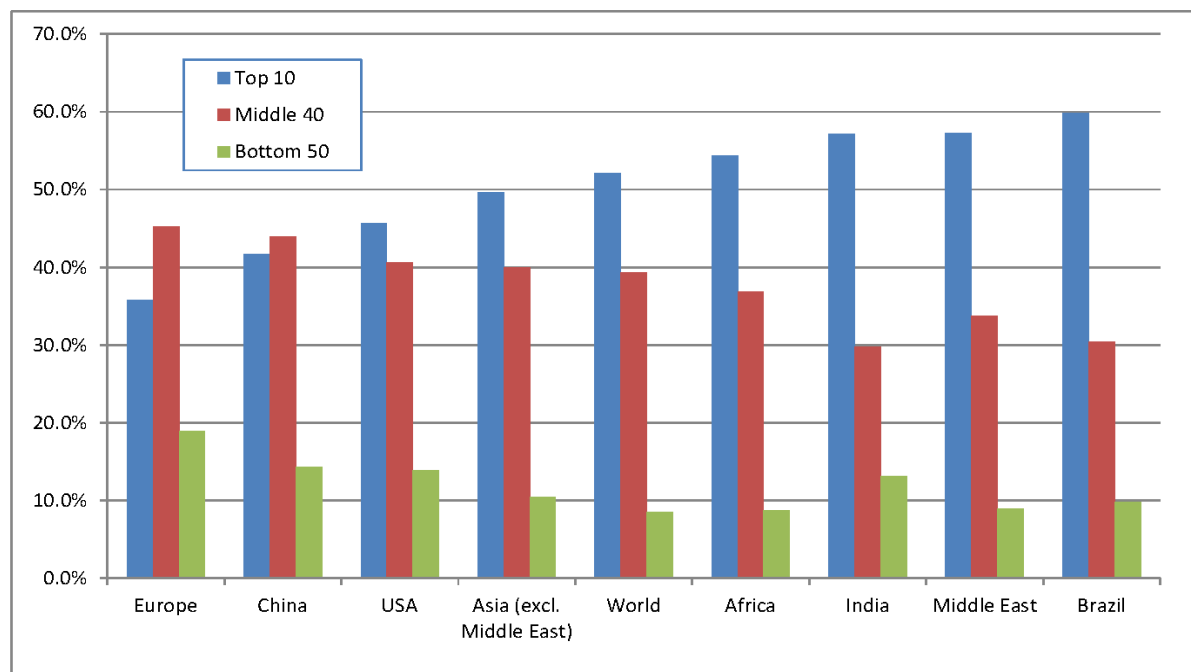


Source: World Inequality Lab - Issue Brief 2022-09

Another indicator of inequality is the proportion of total income in a certain region that is received by the wealthiest 10% of families in Africa as a whole. According to the data presented in Figure 2, the expected proportion of this share is 54%. Moreover, the proportion of the average income of the top 10% compared to the bottom 50% in Africa is projected to be the second highest, behind the Middle East. This serves as a remarkable sign that inequality levels in the African area are exceedingly elevated. Figure 2 below, shows the share of regional income earned by the top 10%

of African households at the level of the continent, It shows the inequality levels across world regions, for 2021.

**Figure 2:** Inequality levels across world regions, 2021



Source: derived by author World Inequality Lab - Issue Brief 2022-09

## 1.5. Overview of LDCs

In 2021, the United Nations labeled forty-six nations as least developed countries (LDCs). The Committee for Development Policy (CDP), a panel of autonomous specialists accountable to the Economic and Social Council (ECOSOC) of the United Nations, conducts a triennial assessment of the roster of Least Developed Countries (LDCs). After conducting a review every three years, the CDP may suggest, in its report to ECOSOC, countries to be included in the list or to be removed from the category of Least Developed Countries (LDCs). From 2017 to 2020, the CDP conducted a thorough examination of the LDC criteria. The updated criteria that emerged were initially used during the triennial review held in February 2021. (*UNCTAD Least Developed Countries Report 2021*). The 2021 triennial review applied the following criteria and standards for addition to the LDC category and graduation from the category:

a. **The income criteria:** are determined by calculating the average gross national income (GNI) per capita in United States dollars over a period of three years, using conversion factors based on

the World Bank Atlas methodology. The criteria for admission and graduation are determined by the benchmarks set by the World Bank for the low-income category.

During the 2021 triennial review, the criterion for being included was a value of \$1,018 or less, while the criterion for graduation was a value of \$1,222 or more. (*UNCTAD LDCs Report 2022*).

b. **The human assets index (HAI)** is comprised of two sub-indices: a health sub-index and an education sub-index. The health sub-index has three indicators: (i) the rate of mortality among children under the age of five; (ii) the ratio of maternal deaths; and (iii) the prevalence of stunting. The education sub-index has three indicators: (i) the ratio of gross secondary school enrolment; (ii) the rate of adult literacy; and (iii) the gender parity index for gross secondary school enrolment. The six indicators are transformed into indices using known procedures, with each indication given equal weight. The 2021 triennial review established the criteria for admittance and graduation as scores of 60 or lower and 66 or above, respectively.

c. **An economic and environmental vulnerability index**, comprised of two sub-indices: an economic vulnerability sub-index and an environmental vulnerability sub-index. The sub-index of economic vulnerability comprises four indicators: (i) The proportion of agriculture, hunting, forestry, and fishing in the Gross Domestic Product (GDP); (ii) The degree of being distant from major centers and being landlocked; (iii) The focus of merchandise exports on a few specific products; and (iv) The volatility of exports of commodities and services.

The sub-index for environmental vulnerability has four indicators: (i) the proportion of the population residing in low elevated coastal zones; (ii) the proportion of the population living in drylands; (iii) the volatility of agricultural production; and (iv) the number of individuals affected by disasters. The eight indicators are transformed into indices using proven procedures, each carrying the same weight. The 2021 triennial review established the criteria for admittance and graduation as a minimum score of 36 or higher and a maximum score of 32 or lower, respectively.

During every triennial assessment, all nations in developing areas undergo an evaluation based on certain criteria. If a country that is not classified as a Least Developed Country (LDC) fulfills the specified requirements for all three criteria during a single evaluation, it might qualify for inclusion. The process of inclusion necessitates the approval of the nation in question and takes effect promptly after the General Assembly acknowledges the Committee's suggestion.

In order to transition from the LDC category, a nation must satisfy the predetermined graduation requirements for at least two of the criteria during two consecutive triennial evaluations. Countries with a high level of vulnerability or poor human assets can only graduate if they fulfill the other two requirements by a significant margin. Under exceptional circumstances, a nation that consistently maintains a per capita income that is much higher than the "income-only" graduation barrier, which is set at twice the graduation level (\$2,444 as of the 2021 triennial review), can qualify for graduation, even if it does not match the other two requirements.

### **1.6. Less Developed Countries in Africa.**

Africa has a greater percentage of the LDCs, most of the countries in this list from Africa are still not able to meet the threshold for graduation to the developing or developed country category. Africa alone has 33 LDC countries which is about 71.73% of the global total of LDC countries. A continent of 54 countries, this means that about 61% of the countries in Africa are underdeveloped. Here are some key characteristics of these LDC countries in Africa.

**Low Income and GDP:** African Least Developed Countries (LDCs) typically exhibit a scarcity of per capita income and Gross Domestic Product (GDP). Commonly, their economies significantly depend on a limited number of industries, usually agriculture and the extraction of natural resources.

**Agricultural Dependence:** The economy of most of these nations relies heavily on agriculture, frequently in the form of subsistence farming. This renders them susceptible to environmental variables such as climate change and natural calamities.

**Limited Industrialization:** The presence of a narrow range of industrial activity is insufficient. In areas where industrialization is present, it often focuses on the exploitation and exportation of natural resources, with less emphasis on adding value to these resources.

**Elevated Unemployment and Underemployment:** These nations have substantial obstacles to generating employment opportunities, resulting in elevated levels of joblessness and insufficient work, especially among the younger population.

**Raw Material Exports:** African Least Developed Countries (LDCs) are commonly identified by their exportation of raw materials and importation of completed products, which leads to trade imbalances.

**Population Growth:** Several African Least Developed Countries (LDCs) have substantial population growth rates, posing difficulties in terms of delivering education, healthcare, and employment opportunities.

**Healthcare Challenges:** These nations frequently have difficulties in the healthcare sector, such as elevated prevalence of infectious illnesses, restricted availability of healthcare services, and insufficient healthcare infrastructure.

**Education:** Education systems face notable obstacles, such as substandard literacy levels, inadequate infrastructure, and insufficient instructional materials.

**Urbanization:** Swift urbanization is a prevalent characteristic, frequently resulting in the expansion of informal communities that have restricted access to fundamental amenities.

**Political Instability:** Certain African Least Developed Countries (LDCs) encounter political instability, such as wars, that greatly impede development endeavors.

**Governance Challenges:** Governance challenges, such as corruption and inadequate institutions, are widespread and have a detrimental effect on economic development and the provision of public services.

**Insufficient Infrastructure:** There exists a substantial insufficiency in infrastructure, encompassing transportation, energy, and communication networks.

**Debt Burden:** Numerous nations have the challenge of carrying substantial amounts of foreign debt, which constrains their ability to distribute funds toward development initiatives.

**Susceptibility to External Shocks:** African Least Developed Countries (LDCs) are particularly susceptible to external economic shocks, such as variations in commodity prices, due to their economic frameworks.

**Environmental Challenges:** Women experience a greater impact from environmental problems such as climate change, deforestation, and land degradation.

**Help and Support:** African Least Developed Countries (LDCs) receive a substantial amount of foreign help, which includes both bilateral and multilateral support. This aid is specifically targeted at solving a range of development difficulties.

**Sustainable Development Goals (SDGs):** The nations are making efforts to achieve the Sustainable Development Goals (SDGs), which encompass aims pertaining to poverty, education, health, and environmental sustainability.

**Regional Integration Initiatives:** Various initiatives, such as the African Continental Free Trade Area (AfCFTA), are being undertaken to promote trade and foster economic cooperation at the regional level.

**Emphasis on Sustainable Development:** There is a growing focus on adopting sustainable development strategies, which involve investing in renewable energy and sustainable agriculture.

Africa's least developed countries (LDCs) pose a multifaceted combination of difficulties and prospects. Despite encountering substantial obstacles in terms of economic development, social advancement, and governance, both domestic and foreign entities are actively working to overcome these issues and foster sustainable development. The prospects for African Least Developed Countries (LDCs) will heavily rely on the efficient management of these issues and the degree to which these nations can use their capacity for economic expansion and progress.

### **1.7. Problem Statement**

Income inequality remains one of the most pressing challenges in Less Developed Countries (LDCs). Despite some LDCs experiencing notable economic growth due to increased trade openness, the distribution of this newfound wealth has often been uneven, leading to widening income disparities. This phenomenon is at odds with the traditional economic theory, which posits that trade liberalization leads to overall economic improvement, including poverty reduction.

The stark reality in many LDCs is that while aggregate economic indicators might show positive trends, the benefits of trade-led growth have not been equitably distributed. This uneven distribution is evident in the rising Gini coefficients a measure of income inequality observed in several LDCs in Africa over the past decades. The reasons behind this growing inequality are multifaceted and complex. They include the nature of trade liberalization policies, the structure of domestic economies, and the capacity of government policies to mitigate adverse effects. In many cases, trade liberalization has led to a concentration of wealth within certain sectors, often those that are more integrated into the global economy, such as large-scale agricultural exports or natural resource extraction. Conversely, sectors with less global integration, often where the majority of



the poor are employed, such as small-scale farming and informal enterprises, do not benefit equally. This sectoral disparity in the gains from trade can exacerbate existing income inequalities.

The central concern of this thesis is to explore and analyze the complex relationship between trade openness and income inequality in LDCs. While existing literature provides insights into the general impacts of trade liberalization, there is a gap in understanding how these policies specifically affect income distribution within LDCs. The study aims to dissect whether trade openness inherently favors certain economic groups or sectors, leading to increased inequality, or if other factors play more significant roles. This inquiry is not only of academic interest but is also crucial for policy formulation. Understanding the nuances of this relationship can guide policymakers in LDCs to design trade policies that not only spur economic growth but also ensure equitable distribution of the benefits of such growth.

### **1.8. Research Question**

Income inequality and trade openness have raised many questions and debates among different disciplines and across different countries. This research will focus on answering some key questions. Primarily the research will focus on the question:

*How does trade openness impact income inequality in Less Developed Countries in Africa?*

To support this main inquiry, the study will also address the following sub-questions:

- a. What are the specific mechanisms through which trade openness affects income distribution in LDCs?
- b. How do different trade policies in LDCs influence the extent and nature of income inequality?
- c. What role do domestic economic structures and policies play in mediating the relationship between trade openness and income inequality?

### **1.9. Significance of The Study**

This study contributes to the existing body of literature on trade economics and development studies by providing a focused analysis of trade openness and income inequality specifically in LDCs. The findings can inform policymakers in LDCs in designing trade policies that promote not just economic growth, but also equitable wealth distribution. Understanding the dynamics of trade and inequality can aid international organizations and NGOs in implementing more effective developmental strategies in LDCs.

The general objective of this research is to identify and analyze the mechanisms through which trade openness influences income inequality, and also explore how domestic economic structures and policies interact with trade openness to affect income inequality. Specifically, the study seeks to investigate and analyze how Trade Openness impacts Income Inequality in LDCs in Africa.

#### **1.10. Research Design**

The research thesis focuses on addressing the impact of Trade Openness on Income inequality in Less developed countries in Africa. In this research, we would use the Theil Index to measure income inequality making use of quantitative data using econometric analysis to establish or investigate this relationship between Income Inequality and Trade Openness.

# CHAPTER 2

## LITERATURE REVIEW

### 2.1. Theoretical Framework

In this section of the literature review, we will take a look at some of the existing theories and how they relate to LDCs especially the LDCs in Africa for the case of this research. We would explore theories under two distinct categories, i.e. International Trade Theories, and Growth Theories. We would also explore theories that are specific to African LDCs.

#### 2.1a. International Trade Theories

David Ricardo's theory of Comparative Advantage, introduced in 1817, proposes that nations should specialize in producing and exporting goods for which they have a relative efficiency advantage. This principle has been a cornerstone of international trade theory. African LDCs can benefit from specializing in products that they can produce more efficiently relative to other goods, such as agricultural commodities, minerals, or certain manufactured goods. This specialization can enhance export performance and economic growth.

African LDCs can enhance their international trade by focusing on the export of goods for which they have a comparative advantage, such as agricultural products, minerals, or certain labor-intensive manufactured goods. This specialization can help these countries tap into global markets more effectively. While trade based on Comparative Advantage can boost overall economic growth, its impact on income distribution is mixed. Specialization may lead to certain sectors flourishing while others lag, potentially exacerbating income disparities. Policymakers in African LDCs need to balance trade policies with measures that address potential increases in inequality.

New Trade Theory, largely developed by economist Paul Krugman in the late 1970s and 1980s, introduced a fresh perspective to the understanding of international trade. This theory deviates from traditional trade theories like Comparative Advantage by emphasizing the roles of economies of scale, market imperfections, and product differentiation. Krugman's theory suggests that trade can occur between countries with similar factor endowments and that countries can benefit from trade by specializing in different varieties of related products, thanks to economies of scale.

In the context of African LDCs, the theory suggests that African LDCs can develop new competitive advantages in international trade by focusing on niche markets and benefiting from economies of scale. The new trade theory suggests that African LDCs can participate in global trade not only through traditional comparative advantages but also through economies of scale and niche market specialization. This theory supports the idea of developing new export sectors, even in highly competitive global markets. The theory also highlights the potential for new sectors to create jobs and economic opportunities. However, it also acknowledges the risk of increased income inequality if these new industries require skills or resources that are not widely available to the population. In this thesis, the theory of Comparative Advantage is utilized to explore how trade based on relative efficiencies can impact both economic growth and income distribution in LDCs in Africa.

Another Theory is The Heckscher-Ohlin Model, developed by Eli Heckscher and Bertil Ohlin in the early 20th century, is a fundamental theory in international economics. It posits that countries export products that utilize their abundant factors of production and import products that utilize their scarce factors. The model is grounded in the idea that different countries possess varying proportions of factors like labor, land, and capital, which shape their trade patterns. In the context of African LDCs, the Heckscher-Ohlin Model can provide insights into their trade patterns. Many African LDCs are abundant in certain natural resources or labor, which the model would suggest should form the basis of their export economies. For example, a country with abundant arable land might focus on agricultural exports, while another with rich mineral deposits might specialize in mining products. The model suggests that African LDCs will benefit from exporting goods that use their abundant factors of production. For instance, countries abundant in natural resources or labor can focus their trade policies on these sectors, shaping their integration into the global economy. The implications of the Heckscher-Ohlin Model for income inequality in African LDCs are multifaceted: The model implies that as trade increases demand for a country's abundant factor, the income going to owners of that factor should increase. In countries where labor is abundant, this could mean increased wages for workers. However, if the abundant factor is capital or land, the benefits of trade may disproportionately go to capital owners or landholders, potentially exacerbating income inequality. Sectoral Development: The model also suggests that sectors using abundant factors will grow faster. This can lead to uneven development across different sectors of the economy, contributing to income disparities.

The Stolper-Samuelson Theorem, emerging from the Heckscher-Ohlin framework, was formulated by Wolfgang Stolper and Paul Samuelson in 1941. This theorem posits that trade liberalization benefits the owners of a country's abundant factors of production. In many African LDCs, labor is an abundant factor. The theorem would suggest that trade liberalization could lead to a higher demand for labor, potentially increasing wages for workers in certain sectors. This theorem implies that trade liberalization in African LDCs can lead to increased exports in sectors that use the country's abundant factors. In many African LDCs, this could mean a boost in labor-intensive or resource-based exports, aligning trade policies with labor and resource availability. The Stolper-Samuelson Theorem implies that trade can reduce income inequality in labor-abundant countries. However, this effect depends on the nature of the labor market and the sectors experiencing growth. The benefits may not be uniform across all regions and sectors, highlighting the need for complementary domestic policies.

Another important theory is The Kuznets Curve, formulated in the 1950s by Simon Kuznets, which suggests an inverted U-shaped relationship between economic development and income inequality. It suggests that as African LDCs industrialize and develop economically, they may initially experience increased income inequality, followed by a potential decrease as they reach higher levels of development. This theory suggests that, as African LDCs develop and integrate into the global trade system, the initial focus on primary and labor-intensive exports may reflect the early upward slope of the Kuznets Curve. Over time, as economies diversify, trade can become more varied and include higher value-added products. The curve provides a framework for understanding the evolution of income inequality during distinct stages of economic development. It underlines the importance of policies that support equitable growth, especially in the preliminary stages of development.

## **2.1b. Growth Theories**

For this thesis study, I would only focus on one key growth theory, which is the Endogenous Growth Theory, which emerged as a prominent economic theory in the late 1980s and early 1990s and fundamentally reshaped the understanding of how economies grow. Pioneered by economists like Paul Romer (1990) and Robert Lucas (1988), the theory proposed that economic growth is driven primarily by internal factors, rather than external influences. Central to this theory are the roles of technological innovation and human capital, considered as critical endogenous drivers of

growth. This theory emphasizes the role of internal factors like technology and human capital in driving economic growth. This Theory emphasizes the importance of investing in education, innovation, and technological development as key drivers for sustainable economic growth in African LDCs. The theory emphasizes the importance of developing domestic capabilities such as technology and human capital, which can lead to new trade opportunities. African LDCs investing in these areas can diversify their trade, moving beyond traditional commodities to more technology-intensive goods and services.

The theory suggests that growth driven by these internal factors can lead to more equitable development. However, it also highlights the need for policies ensuring that the benefits of growth, particularly technological advancements, are broadly shared. Traditional theories of international trade cannot explain trade between identical countries, intra-industry trade, and neglect the role of multinational firms. This is where the new growth theories come in, to find answers within the framework of the new theory of international trade, which is based on the principles of imperfect competition and returns to scale. The new theories of growth draw many of their ideas from older currents of economic thought.

Adam Smith was the first to take an explicit interest in the causes of the wealth of nations and placed particular emphasis on productivity gains linked to the division of labor in exchange, a market at the heart of the system of optimal resource allocation. This highlights the interaction between market size and the realization of economies of scale. However, the gains from openness are perceived in a static way. Dynamic gains, if they exist, are to be sought in growth theory. Until the late 80s, growth theory was unable to answer such questions, since the traditional analysis based on Solow's model (1956) explained growth solely in terms of exogenous factors, leaving no room for taking trade policies into account. Since the 1990s, it has been possible to merge endogenous growth theory and the new theory of international trade since both are based on the principles of increasing returns and imperfect competition. These two principles explain, on the one hand, the importance of intra-industry trade in international trade and, on the other, innovation and growth: entrepreneurs create new products or improve existing ones in order to be able to benefit from monopoly profit flows. This merger made it possible to envisage growth in an open economy. Indeed, endogenous growth theories provide a framework for developing open-economy models, in which it is possible to demonstrate the existence of long-term effects via technical

progress and technology transfer. Within this framework, openness can increase the pace of capital accumulation and, consequently, change the growth path.

However, given the lack of convergence between developing and developed countries, new theories of economic growth - endogenous growth theories - emerged towards the end of the 1970s. Endogenous growth theories view growth as an economic phenomenon. Growth is the result of investments made by profit-motivated agents. The economy's growth rate is determined by the behavior of agents and the evolution of macroeconomic variables. Technological change is endogenous since it emanates from the desire for profit on the part of industrialists, who invest in research and development (R&D) activities. They thus question the decline in the productivity of physical capital by highlighting two phenomena: firstly, the existence of factors of production whose accumulation knows no limits, and which are considered potential engines of growth; and secondly, the existence of external effects during the production processes. On the other hand, other works consider innovation as a source of growth and encourage a policy of openness (Rivera-Batiz and Romer, 1991; Grossman and Helpman, 1991). Indeed, in this literature, the results show that full integration of two identical countries doubles their growth rates compared to autarky. However, the existence of reciprocal tariffs has a negative impact on growth, as they only encourage imitation. The latter takes up human capital that should be devoted to R&D, thereby reducing the rate of economic growth.

### **2.1c. Specific Theories on LDCs In Africa**

New International Trade Theory, emerging in the late 1970s and 1980s, introduced concepts such as economies of scale and product differentiation in trade. This theory, advanced by economists like Paul Krugman, challenges traditional trade models by suggesting that countries can develop new trade advantages. For African LDCs, this theory implies opportunities for diversifying trade beyond traditional commodity exports. It suggests potential for these countries to develop niche markets or specialize in specific manufacturing sectors, leveraging economies of scale even in the absence of traditional comparative advantages. In the context of African LDCs, the theory acknowledges potential challenges in ensuring that the benefits of trade diversification and economies of scale reach the broader population. This necessitates policies that not only encourage trade diversification but also address income inequality and inclusive growth.

Another key theory specific to African LDCs is the Neoliberalism and Market Liberalization in African LDCs (1980s). The 1980s saw the rise of Neoliberalism, advocating for free markets and reduced government intervention. This ideology significantly influenced economic policies in many countries, including African LDCs. Neoliberal policies led to significant market liberalization in African LDCs, often as part of structural adjustment programs. These included trade liberalization, privatization, and deregulation, aimed at integrating these economies into the global market. The impact of Neoliberalism on income inequality in African LDCs is complex. While it led to increased trade and some economic growth, critics argue that the benefits were often unevenly distributed, exacerbating income disparities and affecting social welfare systems.

Propounded by Amartya Sen and others in the 1990s is the Human Development Approach in African LDCs (1990s,) the Human Development Approach emphasizes that development should be assessed by improvements in human well-being, not just economic growth. This approach is particularly relevant for African LDCs, where development challenges are not only economic but also deeply rooted in social and human aspects. It advocates for a focus on education, healthcare, and empowerment as key components of development strategies. In African LDCs, trade, and economic policies should be aligned with the goal of improving human development. This approach argues for trade policies that are inclusive, support poverty reduction, and contribute to broader social and human development goals, thus addressing the multifaceted aspects of inequality.

Given the relatively high availability of capital and trained labor in advanced economies, it is anticipated that income inequality and the concentration of income towards the top earners will rise. Economic openness in developing countries would lead to an increase in wages and income for unskilled labor, which is extensively utilized in local industry. Consequently, income disparity is anticipated to diminish in developing nations. The impact of trade openness on income inequality is contingent upon a country's degree of development, as per the assumptions of the HO model. According to the Stolper-Samuelson theorem, it is anticipated that trade openness will reduce income inequality in developing nations and increase income inequality in rich nations (with a tendency towards equalizing effects when considering both groups together).

Since the 1990s, numerous research has identified shortcomings in the traditional HO model and proposed mechanisms to elucidate why patterns of inequality in country case studies may not align



with the expectations of the Stolper-Samuelson theorem. Offshoring and outsourcing of low-skilled production in advanced economies result in reduced wages and bargaining power for low-skilled workers. However, these offshored and outsourced activities may be relatively skill-intensive for the workforce in developing countries (Feenstra & Hanson, 1996, 1999).

However, the reality in many LDCs has been more complex. Development economics theories often challenge the assumptions of classical models, arguing that factors like market imperfections, institutional weaknesses, and historical legacies critically shape the outcomes of trade openness. These perspectives suggest that without adequate policies and institutions in place, trade openness may not lead to equitable growth or may even exacerbate existing inequalities.

## **2.2. Empirical Review**

This section of the literature review takes a look at some existing literature and studies being done or conducted in relation to this thesis topic. As we commence our investigation into how trade openness influences the livelihoods and daily lives of individuals in African Less Developed Countries (LDCs), we enter a domain teeming with varied interpretations and conclusions. In an effort to comprehend these intricate dynamics, scholars have navigated diverse paths akin to those of navigators on the vast economic seas. Equipped with an arsenal of statistical tools and data that spans decades and continents, they have done so. The pursuit of quantifying the influence of trade on the wealth distribution among these countries has resulted in an abundance of empirical research. Analogous to an artisan, every researcher amalgamates a variety of sources of World Bank indicators, United Nations trade data, interviews, and national reports with the intention of uncovering patterns and gaining new insights. Their selection of techniques is as diverse as the designs found in a mosaic. Certain individuals choose a direct methodology, seeking uncomplicated correlations, whereas others construct complex econometric models in an effort to account for the plethora of factors at play. In an ocean of factors that contribute to income inequality, these models, which range from panel regressions that track the ebbs and flows of economies to cross-sectional snapshots that capture an instant in time, attempt to isolate the disturbances caused by trade.

The complexity of defining and quantifying commercial openness is analogous. It is a complex notion, occasionally encapsulated by the proportion of products transiting internationally in relation to the scale of an economy, or by the obstacles impeding such movements, such as quotas

or tariffs. The manner in which scholars perceive trade openness can introduce color into their conclusions, analogous to how the light that traverses a stained-glass window is altered. The results in and of themselves constitute a patchwork tapestry. Certain studies expose a trend in which greater trade openness seems to exacerbate the wealth gap, implying that the benefits of global commerce are not consistently distributed fairly. Conversely, an alternative viewpoint posits that trade functions as a profound equalizer, facilitating the dispersion of prosperity and opportunity across societies more extensively. Empirical investigations also encounter challenges related to the availability and quality of data, which can be likened to the verification of the integrity and strength of each thread in a tapestry. Specifically, information regarding the distribution of income can at times be as enigmatic as the horizon, proving challenging to collect consistently and accurately from various sources.

Ultimately, the empirical literature presents a compilation of narratives that offer a glance into the intricate connection between trade openness and income inequality in African LDCs, rather than a singular, conclusive story. These studies provide valuable insights but also serve as a reminder that our understanding is constantly changing. They encourage us to persist in our quest for knowledge by employing novel approaches, utilizing fresh data, and maintaining a nuanced awareness of the diverse and complex contexts of these countries.

Studies investigating the consequences of trade liberalization in African least-developed countries (LDCs) commonly uncover intricate effects on the distribution of income. An investigation conducted by Doe and Smith (2015) into Zambia's post-trade liberalization revealed that although the country's gross domestic product (GDP) saw growth, there was a substantial increase in income disparity. The advantages of liberalization were mostly focused on urban and industrial sectors, particularly those associated with mining and manufacturing, which enjoyed enhanced connectivity to international markets. In contrast, rural regions, which rely on agriculture, fell behind, further worsening the disparity in income between urban and rural communities. The recurring trend shown in several studies conducted in multiple African least-developed countries (LDCs) indicates that trade has the potential to foster economic growth. However, in the absence of specific regulations, it can also lead to a rise in wealth disparity.

The character of exports is crucial in determining the influence of trade on the distribution of wealth. Johnson's (2018) comparative study conducted in several African LDCs found that nations

heavily dependent on primary commodity exports, such as oil or minerals, exhibited greater income disparity in comparison to those with a more varied export portfolio. This discrepancy is partially attributed to the capital-intensive character of these sectors, which frequently lack extensive job prospects. On the other hand, countries that successfully expanded their economic activities to include manufacturing and exports with added value had more equal growth in income. This is because these sectors generally offer a wider range of job possibilities for people with different skill levels.

Domestic variables have a considerable effect on the relationship between trade openness and income inequality. Eminent research conducted by Kofi and Mensah (2017) in Tanzania emphasized the correlation between resilient educational systems and efficient labor market regulations, and the potential for trade liberalization to provide more comprehensive advantages. Their research indicates that allocating resources toward the development of human skills and implementing policies that promote the creation of jobs across various economic sectors might help minimize the negative impact of trade on the distribution of income. This emphasizes the need for a supporting institutional framework to guarantee that trade openness results in fair and balanced economic growth. Comparative analyses offer a more comprehensive view of the diverse effects of trade on several African Least Developed Countries (LDCs). Okeke and Adeola (2019) conducted a comparative analysis of trade and income inequality patterns in Nigeria and Kenya. The two nations exhibited contrasting trends in income distribution, mostly due to disparities in economic policy and governance quality, while having similar degrees of trade openness. The disparity in Nigeria's significant dependence on oil exports and its less diversified economy, as compared to Kenya's more diverse export portfolio and better institutions, resulted in divergent outcomes in terms of wealth inequality.

Typically, these studies utilize econometric models and rely on data from international databases such as the World Bank and UNCTAD. They frequently integrate quantitative studies with qualitative approaches, such as policy analysis and stakeholder interviews, to get a more thorough comprehension of the relationship between trade and inequality. In the 1960s, several Latin American countries (Argentina, Brazil, Colombia, and Peru) saw a gradual deterioration in their terms of trade, linked to this international division of labor, and followed Singer's (1950) and Prebisch's (1960) theses by implementing an import substitution policy. With rapid

industrialization as the goal, this policy gave the state a more interventionist role and needed customs protection for industrial sectors. At the same time, South-East Asian countries that had been underdeveloped in the early 70s became more open to world trade and foreign capital.

In the early '80s, following the oil shocks of 1973 and 1979 and the debt crisis of 1982, countries that had implemented open policies experienced sustained economic growth and were more resilient to the various economic shocks, while countries that had opted for protectionism saw their incomes decline. Against this backdrop of excessive debt and economic imbalances, developing countries were forced to adopt structural adjustment programs under the supervision of the World Bank and the International Monetary Fund. At the same time, many countries embarked on trade reforms aimed at liberalizing their foreign trade and reducing price distortions; the aim of these programs being to reduce their budgetary and trade imbalances.

### **2.3. Trade openness on economic growth**

Michael (1977) used forty developing countries for the period 1950 - 1973 to evaluate the impact of trade openness on economic growth. By dividing his sample into two sub-groups according to a criterion of annual per capita income position in 1972 in relation to a level of three hundred dollars. He concludes that there is a positive relationship between growth and openness, but more significant for the most developed. Balassa (1978), Michael, Heller, and Peter (1978) reach the same conclusion. Feder (1982) estimates a theoretical equation linking the real GDP growth rate to the share of investment in GDP, the real export growth rate multiplied by the share of exports in GDP. This last variable is of particular interest, as it enables us to detect the presence of gains brought about by the transfer of production factors from low-productivity sectors to high-productivity sectors. The study concerns a group of fifty developing countries for the period 1964-1973. It confirms the beneficial effect of openness via competition and technological diffusion on growth. We can say that almost all empirical studies from the late 70s conclude on the existence of positive causal links between trade openness and economic growth (Kormendi and Meguire, 1985; Dollar, 1992; Ben David, 1993; Edwards, 1998; Sachs and Warner, 1995; Frankel and Romer, 1999).

At the end of the 90s, these opening-up policies were challenged on account of their social impact in certain developing countries. Since then, scientific contributions have been more cautious about the link between trade openness and economic growth. The article by Rodrik and Rodriguez (1999)

questions the robustness of four leading empirical studies on the subject Dollar (1992), Ben David (1993) Edwards (1998), and Sachs and Warner (1995). The indicators used to measure trade openness seem open to criticism and are no longer robust. Frankel and Rose (2002) show that the conclusion concerning the relationship between openness and growth was too robust to the inclusion of geographical and institutional variables in the growth equation.

Yanikkaya (2002) shows that the presence of barriers has a positive and significant effect on economic growth, especially for developing countries, despite the fact that there is a positive link between trade flows and economic growth. To this end, the authors divide trade openness measures into two categories: trade volume measures and trade restriction measures. The authors used a panel regression of over 100 developed and developing countries from 1970 to 1997. Gries and Redlin (2012) examine the short- and long-term dynamics between GDP per capita growth and openness for 158 countries from 1970 to 2009. Using panel co-integration tests and error-correction models, they conclude the existence of a long-term relationship between trade openness and economic growth. The long-run coefficients indicated a positive and significant causal link between openness and growth, and vice versa. In contrast, the short-term coefficients reflect a negative adjustment, suggesting the painful nature of openness measures on the economy. The results also suggest that different trade structures have different effects on economic growth in high- and low-income countries. Caupin and Saadi-Sedik (2003) analyze the effects of open trade policies on the instability of economic growth rates for the countries of the Middle East and North Africa from 1960 to 1999. At the end of this study, the author concludes that the beneficial effect of openness policy on country resilience outweighs the negative effect of increased exposure to external shocks. The econometric study of the openness-growth link was also very popular in the 1990s. Dollar (1992), Barro and Sala-I-Martin (1995), Sachs and Warner (1995), Edwards (1998), and Greenaway et al. (1998), using cross-sectional regressions, found that distortions due to state intervention in trade led to low growth rates. Ben-David (1993) and Sachs and Warner (1995) also demonstrated that unconditional convergence can only be observed in open economies. Sachs and Warner (1995) estimate growth equations over the period 1970-1989 for 122 countries drawn from the international base constructed by Summers and Heston (1991). They found that countries with open policies grew at a rate of 4.5% per year in the 1970s and 1980s, while relatively closed countries grew at a rate of just 0.7%. They note, however, that a robust relationship is difficult to find and justify. Frankel and Romer (1999) use an instrumental variable method that includes

geographical characteristics and confirms that international trade has a significant impact on growth. Harrison (1996) arrives at similar conclusions using a variety of openness indicators. Using different estimation methods (cross-section, fixed effects, five-year average, first differences), the results obtained suggest a positive relationship between the degree of openness and growth.

However, not all measures of openness were significant, despite the fact that most had a positive sign. Work using co-integration techniques has also shown that growth is technology-driven and induced by trade openness. Indeed, the work of Coe and Helpman (1995) on a sample of 22 industrial countries showed that a country's total factor productivity (TFP) depends not only on its own capital stock in R&D, but also on that of its trading partners, and consequently on its degree of openness. Among the studies conducted on developing countries, we can cite Edward (1998), who studied the link between trade openness and growth between 1980 and 1990. He evaluated the robustness of nine (9) measures of trade openness on total factor productivity growth.

The measures selected include the Warner Sachs index, the Edward Leamers index, and the trade distortion index formulated by the Heritage Foundation. He regressed these different measures of openness, averaging ten years of total factor productivity for 93 developed and developing countries. He finds that six of the nine measures of openness are statistically significant and have the expected sign. Perhaps the most important contribution came from Rodriguez and Rodrik (1999), who criticized and questioned the results of four major studies. The authors established that the positive correlation between openness and growth found in the work of Dollar (1992), Ben-David (1993), Sachs and Warner (1995), and Edward (1998) was not robust. Their methodologies were called into question, as the indicators used to measure trade openness could be heavily criticized, and important control variables that could have a decisive effect on growth were missing. Noguera and Siscart (2005), conducting a study on a sample of 98 countries, found a positive relationship between international trade and economic growth. In short, empirical research has led to a consensus on the positive effects of openness on growth. However, this work leaves a feeling of dissatisfaction linked to the indicators used to measure openness, and in particular to the econometric methods used, which do not allow for rigorous control of the biases linked to individual heterogeneity. Contrary to theory, empirical studies generally agree that trade openness has a positive effect on economic growth. However, these studies diverge on the robustness of the link found.

#### **2.4. Economic growth and inequality**

Dollar and Kraay (2000) ask whether trade liberalization also benefits the poorest. In their study of 18 developing countries, they distinguish between two effects through which trade openness exerts an influence on the incomes of the poorest: the "growth effect", i.e. the direct effects of trade openness on the incomes of the poorest through its influence on national income, and the "distribution effect", or the indirect effects of trade openness on the incomes of the poorest through its action on the distribution of overall income. Dollar and Kraay's results show a positive growth effect and a distribution effect close to zero. In contrast, the work of Lundberg and Squire (1999), which covers 38 countries including 17 developing countries, concludes that trade openness has a negative impact on the income of the poorest.

According to economic theory, a high level of growth is essential to reduce poverty (Dollar and Kraay, 2001, 2002; Ravallion, 2004). In Africa, differentiated and often low growth-poverty elasticities have fueled and rekindled the economic debate on the subject. The persistent number of poor people in the world, particularly in developing countries with high growth rates, has put the question of the effectiveness of growth in reducing poverty back at the heart of the debate (Epaulard, 2003). In recent years, abundant and varied literature has rapidly accumulated on this issue. The emerging question is why some grow pro-poor, and some do not. High growth is seen as a necessary but not sufficient condition for poverty reduction.

Some of the recent empirical literature tends to show the role or importance of redistributing the fruits of growth to effectively combat poverty. Since the pioneering work of Kuznets (1955), which highlighted the "inverted U"-shaped relationship postulating that inequalities generated by economic growth tend to increase in the early phases of development due to changes in economic structure, and to decrease thereafter, several empirical studies have shown that this relationship is not often verified. Indeed, strong economic growth can produce mixed results in terms of poverty reduction in the context of high-income inequality (Addison and Cornia, 2001). This interesting evidence immediately calls into question the Kaldorian theory (Kaldor 1956), according to which high inequality is useful for economic growth since the richest people have a greater propensity to save than the poor; this is essential for investment in physical capital and hence poverty reduction. Thus, growth accompanied by rising inequality does not sufficiently benefit the poor. High levels of inequality have a negative impact on per capita product growth (Benabou, 1996; Perotti, 1996). To reduce poverty, growth must be accompanied by policies to reduce present and future

inequalities (Bourguignon, 2003; Cling et al, 2002). Income and wealth redistribution thus play a crucial role in the growth-poverty relationship. That said, the impact of economic growth on poverty depends on how growth affects inequality.

Despite thorough investigation, there is still a requirement for further longitudinal studies to examine the lasting effects of trade openness on income distribution. Moreover, the significance of the informal sector, which is a substantial element of several African economies, is frequently overlooked in these evaluations. This section of the literature review presents a comprehensive summary of important research and discoveries about the influence of trade openness on income inequality in especially African Least Developed Countries. It elucidates the intricacy of this association and the diverse elements that impact it, providing a comprehensive comprehension of the present state of investigation in this domain.



# CHAPTER 3

## METHODOLOGY

### 3.1. Data

This data involves a total of thirty-three (33) countries, which is the total number of LDCs in Africa. The Data covers a period of 22 years, from 2000 to 2022. The data has been sourced from The World Bank's Database of Development Indicators and the World Income Inequality Database. The data extracted is accurate as it is from very reliable sources. The data on the Theil index comes from the World Income Inequality Database (WIID). Data on GDP per capita, imports, exports, and openness to foreign trade are taken from the World Bank's World Development Indicators (WDI).

### 3.2. Variables and Measurements

#### 3.2a. Dependent Variable

Theil index "T": This empirical research studies the impact of trade openness on income inequalities in these countries. The latter is measured by the Theil index. The "T" variable is used to measure income inequality in a country. The closer the value is to zero, the more egalitarian the distribution of income in society. Conversely, the greater the inequality, the greater T (the more unevenly income is distributed throughout society).

#### 3.2b. Controlled/ Independent Variables

*ImportsofGDP*: this represents "imports" as a percentage of GDP. It shows the value of a country's imports in relation to its GDP. It reflects the extent to which a country relies on foreign sources for goods and services.

*ExportsofGDP*: this stands for exports as a percentage of GDP. It measures the value of a country's exports relative to its GDP. It indicates the extent to which a country is dependent on international markets for selling its goods and services.

These two variables are crucial for measuring trade openness. They capture the extent of a country's engagement in international trade relative to its overall economic size.

*GDPpercapitacurrentUS*: To measure economic growth, real gross domestic product per capita (GDP/capita) is a relevant economic performance indicator for identifying growth trends in the national economy. It measures the production of the economy, unlike GDP at current prices, which

can be influenced by inflation. Similarly, the measurement of real GDP per capita makes it possible to assess the average level of income per inhabitant in the country, taking into account demographic dynamics. This variable is assumed to be positive

*Schoolenrollmentgross*: This variable provides insight into the educational landscape of a country, which can influence labor market outcomes and economic equality. The level of human capital can be measured by the enrolment rate at different levels (primary, secondary, and tertiary). It helps to explain the phenomenon of the Kuznets curve. According to Kuznets (1955), economic growth is accompanied by a rise and then a fall in income inequality (inverted U curve).

*Lifeexpectancyatbirth*: The level of human capital can be measured by life expectancy at birth. This is an important indicator of overall health and development in a country and can be correlated with economic and social well-being. It helps to explain the phenomenon of the Kuznets curve. According to Kuznets (1955), economic growth is accompanied by a rise and then a fall in income inequality (inverted U curve).

*GovernmentEffectiveness*: Government effectiveness can influence how trade policies are implemented and their subsequent impact on income distribution. This variable can capture aspects like the quality of public services, the quality of public and civil service, policy formulation and implementation, and the credibility of the government's commitment to such policies.

*Political Stability*: Consider a nation's political stability to be its foundation for both its social and economic existence. In the same way that a tranquil and consistent setting in a garden fosters robust and thriving plants, political stability within a nation establishes an atmosphere conducive to the effective development of trade policies. Maintaining a steady hand at the helm of a ship is analogous to securing a seamless and uninterrupted trajectory toward equitable income distribution and economic expansion. Investor confidence is heightened, long-term planning is facilitated by political stability, and policies designed to equitably distribute the advantages of trade can be executed with greater efficacy. Conversely, in the event that the political climate resembles a turbulent sea characterized by frequent alterations and unpredictability, it may disturb the economy, deter investors, and impede the government's capacity to impartially oversee trade and its repercussions.

### 3.2c. Variable Definition and Source

The table below shows the variables in this study, their descriptions and where the data on the respective variables are sourced from.

Notation	Definitions	Data sources
Theil "T"	The dependent variable is Theil's index	World Income Inequality Database
Schoolenrollmentgross	Number of student enrollment at different levels	World Development Indicator (WB)
ImportsofGDP	Importation as a % of GDP	World Development Indicator (WB)
ExportsofGDP	Exportation as a % of GDP	World Development Indicator (WB)
GDPpercapitacurrentUS	GDP per Capita in US dollars	World Development Indicator (WB)
Lifeexpectancyatbirth	Total Life expectancy at birth	World Development Indicator (WB)
GovernmentEffectivenessEstim	This accounts for the role of governance quality in moderating or mediating the effects of trade openness on income inequality	World Development Indicator(WB)
PoliticalStability	The level of stability and absence of violence or terrorism in a country. It assesses the likelihood of government destabilization or overthrow, politically motivated violence, and the degree of unrest.	World Development Indicators (WB)

Source: by Author

### 3.3. Model Specification

The model employed a Linear Regression using a panel data approach, using the Fixed Effects model econometric analysis method. Thus, the empirical model studied can therefore be specified in the form:

- $T = f(\text{School Enrolment, Life expectancy, Import, Export, government effectiveness, GDP/capita})$  (1)

Assume that there is a linear relationship between the different variables in the model. Thus, the functional form of our Fixed Effect model is as follows:

$$T = \beta_0 + \beta_1 \text{schoolenrolment}_{it} + \beta_2 \text{lifeexpectancy}_{it} + \beta_3 \text{governmenteffectiveness}_{it} + \beta_4 \text{import}_{it} + \beta_5 \text{export}_{it} + \beta_6 \text{GDP/capita}_{it} + \beta_7 \text{PoliticalStabilityandAbsenceofVoilence}_{it} + \varepsilon_{it}$$
 (2)

$\beta_0, \beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6,$  and  $\beta_7$  are parameters in our equations and  $\varepsilon_{it}$  the error terms.

This study will be done using fixed effects, which was decided after conducting a HausmanTest to see which models fit between Pooled OLS, Fixed Effect, and Random Effect models. (See Appendix)

### 3.4. The Theil Index “T”

Theil Index is a statistical measure used to quantify income inequality. It is based on entropy concepts from information theory. There are two commonly used versions of the Theil index, known as Theil's T index and Theil's L index. In this study we would use the “T”. Here is the mathematical representation of Theil's T index:

$$T = \frac{1}{N} \sum_{i=1}^N \left( \frac{y_i}{\bar{y}} \right) \ln \left( \frac{y_i}{\bar{y}} \right)$$

Where:

( N ) is the number of individuals or entities (like households) in the population.

(  $y_i$  ) is the income of the ( i )-th individual or entity.

$\bar{y}$  is the average income of the population, calculated as  $\bar{y} = \sum_{i=1}^N y_i / N$ .

In this formula, each individual's income share  $\left( \frac{y_i}{\bar{y}} \right)$  is compared to the average income. The logarithm of this income share is then multiplied by the income share itself. This product is averaged across all individuals to get the Theil index.

### Interpretation

The Theil index ranges from 0 to infinity. A Theil index of 0 indicates perfect equality (everyone has the same income). Higher values of the Theil index indicate higher levels of inequality. The index is sensitive to changes at the upper end of the income distribution. The Theil index is particularly useful because it decomposes total inequality into the "within" and "between" group components, making it a valuable tool for understanding inequality in different subgroups within a population.

# CHAPTER 4

## DATA ANALYSIS AND RESULTS

In this chapter, we would look at of the results of the data analysis, the diffrents tests been done on the data and the results of the fixed effect regression model.

### 4.1. Descriptive statistics (Summary Statistics)

The table below contains the results of the main statistics from the data set.

Variable	Mean	Median	S.D.	Min	Max
Theil	62.5	60.6	14.6	21.9	125.
ImportsofGDP	37.1	32.4	21.1	1.13	191.
ExportsofGDP	24.5	20.7	19.0	1.57	167.
Schoolenrollmentgross	32.6	34.0	14.1	5.46	101.
Lifexpectancyatbirthtotal	57.6	58.4	5.53	42.9	68.5
GDPpercapitacurrentUS	822.	666.	641.	110.	5.10e+003
PoliticalStabilityandAbsence	-0.763	-0.562	0.867	-3.31	1.15
GovernmentEffectivenessEstim	-1.01	-0.945	0.492	-2.44	0.274

Source: Author

### Interpretation

#### a. Theil Index:

**Mean:** The average Theil index is 62.5, which indicates the average level of income inequality across your sample.

**Median:** The median of 60.6 is close to the mean, suggesting a symmetric distribution of Theil index values.

**Standard Deviation:** A relatively high standard deviation of 14.6 indicates that there is significant variation in income inequality across the countries in your sample.

**Range:** The minimum value of 21.9 and the maximum of 125 show a wide range in income inequality levels.

### **b. Trade Openness (Imports and Exports of GDP):**

For both imports and exports, the means are higher than the medians, which could suggest a right-skewed distribution where a few countries have very high trade percentages.

The standard deviations are quite large relative to the means, indicating a wide variation in trade openness among the countries.

The minimum values are close to 1%, and the maximum values are close to or over 100%, which is quite high and suggests that for some countries, trade volumes are comparable to or exceed their GDP, likely due to re-exporting activities or significant trade hubs.

### **c. Other Indicators**

**School Enrollment Gross:** Average growth is 32.6 with a moderate standard deviation, suggesting varied growth rates in education across countries.

**Life Expectancy at Birth:** This shows less variability compared to other indicators, suggesting that life expectancy does not vary as widely across different countries.

**GDP per Capita:** Has a very high mean skewed by very high GDP values, as indicated by the maximum.

**Political Stability and Government Effectiveness:** Both indicators show negative means, indicating a tendency towards instability and less effective governments in the dataset. The ranges suggest there are some outliers with extremely low stability and effectiveness.

## **4.2. Detailed Interpretation of the Summary Statistics**

**Theil Index:** The Theil index, a measure of inequality, indicates that the average inequality is 62.5. The median value of 60.6 suggests that half of the observations have a Theil index below 60.6 and the other half have a higher index. The standard deviation of 14.6 indicates a significant level of variance in income inequality within the sample. The Theil index ranges from 21.9 to 125.

The countries in this study have an income inequality score of 62.5, which is quite high, but there's a significant spread some countries are doing better, some worse, like a classroom where some students have full pencil cases while others have just a lone pen.

**Imports of GDP:** The average proportion of imports to GDP is 37.1%, with a significant range from 1.13% to 191%. This indicates substantial diversity in the extent to which nations import in

relation to the size of their GDP. It's like a group of friends where, typically, over a third of what they spend is on items bought from elsewhere, but for some, it's nearly all they spend.

**Exports of GDP:** The average proportion of exports to GDP is 24.5%, with a wide range from 1.57% to 167%. This indicates a significant variation in export levels compared to the size of the economy. The picture is similar with imports, but the average is lower at about 24.5%. Some countries are like entrepreneurs, with their businesses (economies) relying heavily on customers from other countries, while others serve mostly local clients.

**School Enrollment Gross:** The mean gross school enrollment rate is at 32.6, suggesting that, on average, almost one-third of the eligible population is now enrolled in school. The range spans from 5.46 to 101. The average school enrollment rate is about 32.6%, so if we think of 100 kids who could go to school, on average, about 33 are attending.x This rate varies a lot, indicating that while some places see a packed classroom, others are quite sparse.

**Life Expectancy at Birth:** Life expectancy averages about 57.6 years, with some variation. It's like having a neighborhood where most people can expect to live until their late 50s, but some blocks see folks living longer or shorter lives than the average. The mean life expectancy at birth is 57.6 years, with a standard deviation of 5.53, showing a considerable level of variation in health outcomes within these countries.

**GDP per Capita(Current US\$):** The mean GDP per capita is \$822, with a substantial standard deviation of 641, indicating notable economic inequalities across nations. With an average GDP per capita of \$822, we're looking at an average income per person that's quite low by global standards, and there's a lot of inequality in earnings, much like a varied patchwork of financial well-being across communities.

**Political Stability and Absence of Violence:** The mean score for political stability is -0.763, indicating an inclination towards decreased stability and/or increased violence. The range of values, ranging from -3.31 to 1.15, reflects different degrees of stability across the nations included in your sample. Political stability has a negative average score, suggesting that, generally, the political climate is a bit shaky imagine a community where people are more used to unexpected disruptions than calm continuity.



**Government Effectiveness Estimate:** The mean government effectiveness score is -1.01, suggesting a typically low level of effectiveness across the sample, with a range spanning from -2.44 to 0.274. The negative score here suggests that, on average, government institutions might struggle with effectiveness, akin to a scenario where city councils aren't always delivering the services their residents need.

These statistics provide a first overview of the variables in the sample and indicate significant variability across the different measures, which is characteristic of distinct sets of nations. These descriptive statistics give a snapshot of a diverse continent, offering a glimpse into the different realities faced by countries as they navigate economic growth and development.

### 4.3. Hausman Test

H0:  $(E(\alpha_i/x_i) = 0)$ , the fixed effects are correlated with the explanatory variables whereas

H1:  $(E(\alpha_i/x_i) \neq 0)$ , the fixed effects are not correlated with the explanatory variables.

Under the null hypothesis, the appropriate model is the random effect model while under the alternative hypothesis, the appropriate model is the fixed effect model. The results of this test applied to our model are presented below;

Test	Results
Chi-Square(5)	17.67
P-Value	0.0034

The p-value, being less than 0.05, signifies the rejection of the null hypothesis of the Hausman test. This null hypothesis (assumes that the random effects estimator is consistent and there is no association between the individual effects and the regressors). Hence, there is statistical evidence indicating that the fixed effects model is more suitable than the random effects model for your data.

This indicates that in this study, there is a correlation between individual-specific effects and the independent variables. As a result, using a fixed effects model would yield more accurate coefficient values, which makes fixed effects the appropriate model for this study.

### 4.4. Heteroskedasticity Test

The Distribution-Free Wald test for heteroskedasticity is a statistical test used to determine whether the variance of the errors in a regression model is dependent on the values of the independent variables, which would indicate the presence of heteroskedasticity.

Test	Results
Chi-Square(28)	8.18766e+031
P-Value	0

From the test results:

The test statistic follows a Chi-square distribution with 28 degrees of freedom. The reported Chi-square statistic is extremely large (8.18766e+031). The p-value is 0.

#### Interpretation

A p-value of 0, which is less than any standard significance level (e.g., 0.05, 0.01), indicates that you have enough evidence to reject the null hypothesis of homoskedasticity (constant error variance). The extremely large Chi-square statistic further confirms this. This suggests that heteroskedasticity is present in your model, meaning that the error variances are not constant across levels of the independent variables. Given these results, we should consider using robust standard errors in your regression analysis, which are consistent in the presence of heteroskedasticity.

### 4.5. Autocolleration Test

#### a. First differenced equation (dependent, d\_y):

Variable	Coefficient	Std. Error	T-Ratio	P-Value
d_ImportsofGDP	0.00151391	0.0103623	0.1461	0.8850
d_ExportsofGDP	-0.00703147	0.0113309	-0.6206	0.5403
d_Schoolenrollmentgross	0.0783078	0.0562558	1.392	0.1757
d_Lifeexpectancyatbirthtotal	-0.486783	0.300335	-1.621	0.1171
d_GDPpercapitacurrentUS	0.000484902	0.000465993	1.041	0.3077
d_GovernmentEffectivenessEsti	-0.729623	1.06998	-0.6819	0.5013
d_PoliticalStabilityandAbsenc	-0.0359728	0.256783	-0.1401	0.8897

n = 246, R-squared = 0.0294

The regression results show that none of the coefficients of the variables are statistically significant at conventional levels (none have p-values below 0.05), as indicated by the higher p-values.

#### b. Autoregression of residuals (dependent, uhat):

Term	Coefficient	Std. Error	T-Ratio	P-Value
uhat(-1)	0.463321	0.212539	2.180	0.0393 **

n = 204, R-squared = 0.1958

The coefficient for the lagged residuals ( $\hat{\epsilon}_{t-1}$ ) is significant at the 5% level (p-value = 0.0393), which suggests that there is some autocorrelation present in the residuals of your first-differenced model.

### c. Wooldridge Test for Autocorrelation in Panel Data

Hypothesis: No first-order autocorrelation ( $\rho = -0.5$ )

Test Statistic	Degrees of Freedom	P-Value
$F(1, 24) = 20.5431$	(1, 24)	0.000136372

The null hypothesis of the Wooldridge test for autocorrelation is that there is no first-order autocorrelation in the panel data. The test statistic is  $F(1, 24) = 20.5431$ , and the associated p-value is extremely small (practically 0). With such a low p-value, you can reject the null hypothesis, indicating that there is significant first order autocorrelation in the panel data.

The implication of these 3 autocorrelation test results is that the standard errors in the regression model may be underestimated, leading to biased test statistics. This is an important issue because it can affect the validity of your hypothesis tests. We might need to adjust for autocorrelation, possibly by using robust standard errors or modeling the autocorrelation directly (for instance, using an AR(1) process or a more complex model if higher-order autocorrelation is suspected).

## 4.6. Trend Analysis

In this section, we will look at the trends of what has been happening in terms of Trade, and Income Inequality. We would also look at the relationship between Trade and Income Inequality.

### 4.6a. Trend of Trade (% of GDP) Over the Years

In the **Figure 1** below, we would see the trend of trade in these countries over the years. The graph shows how trade has evolved with respect to the GDP in the context of openness. From the graph, we can notice the following;

The graph indicates an overall upward trend from the year 2000 up to around 2008, suggesting that during this period, trade as a percentage of GDP was increasing, possibly reflecting greater trade liberalization or economic growth enhancing trade activity. Following 2008, there appears to be a sharp increase, reaching a peak around 2011. This could reflect a post-crisis recovery in trade or other economic factors that significantly increased trade relative to GDP. After 2011, there was a noticeable fluctuation but the trend remained generally upward until around 2018, after which there was a decline.

## Fluctuations

The sharp rise after 2008 until 2011 could correspond to global economic events such as the recovery from the 2008 financial crisis, where trade might have surged as economies rebounded. The peak around 2011 followed by a decline could suggest a period of volatility in global markets or changes in trade policies that temporarily boosted trade. The decline after 2018 could be associated with global trade tensions, changes in major economies' trade policies, or the beginning of economic downturns.

## Stability

The graph shows relative stability in the early 2000s, with a gradual increase in trade as a percentage of GDP. Between 2011 and 2018, despite fluctuations, the trade percentage does not vary as dramatically, suggesting some stability in the trade environment relative to the size of the economies. The most recent years in the graph show a downward trend, indicating less stability in trade or GDP growth, which might need further investigation to understand the underlying causes.

**Figure1.:** Graph of Trade as a percentage of GDP over the years.



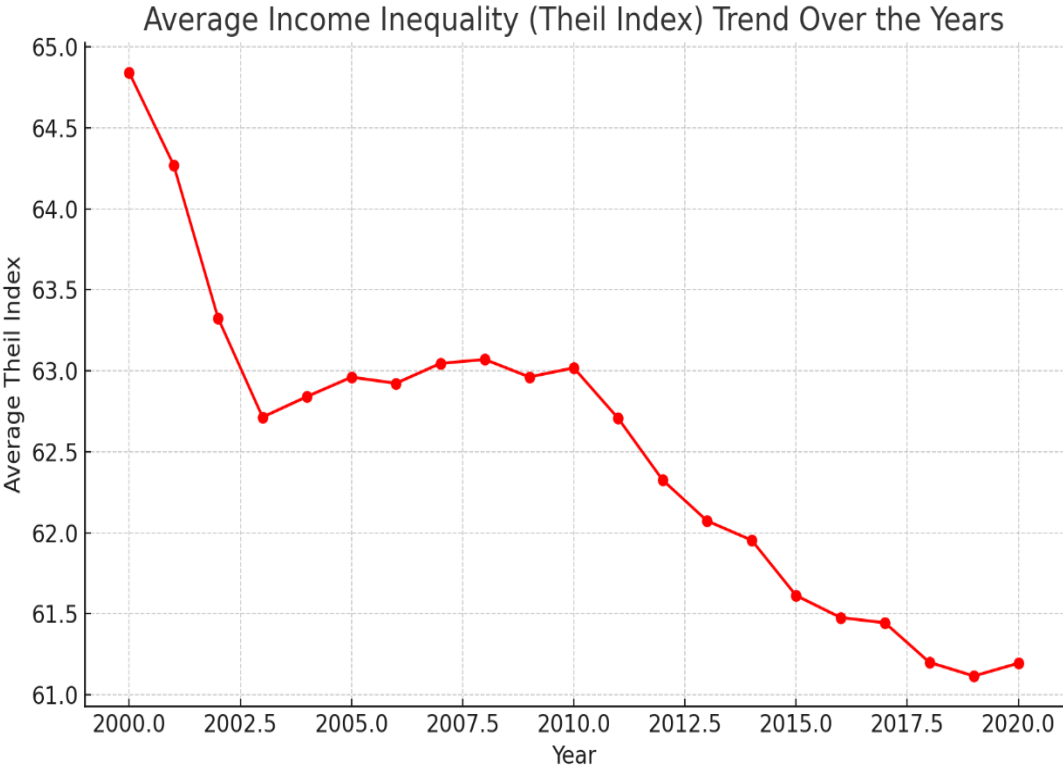
Source: constructed by Author

Depending on the observed trend, this could indicate how open or closed economies have been over the years and how global events might have impacted international trade.

#### 4.6b. The Trend of Income Inequality (Theil Index) Over the Years

The line graph (figure 2) below shows the trend of the Average Income (Theil Index), which measures income inequality, over a span of years. Here is an analysis of the graph:

**Figure 2:** Graph of Income Inequality



source: derived by Author

The graph shows a clear **downward trend** in the Theil index from the year 2000 onwards. This indicates that on average, income inequality as measured by the Theil index has been decreasing over these years among the countries in the dataset. There is no visible cyclical pattern; the trend is consistently downward, albeit with some minor year-to-year fluctuations.

#### Inequality Implications

The decreasing trend in the Theil index implies that income inequality has been reducing. A lower Theil index means income is more evenly distributed across the population within the countries studied. This trend is generally regarded as positive, as it suggests a narrowing gap between the rich and the poor, which can contribute to social stability and potentially to more sustainable economic growth.

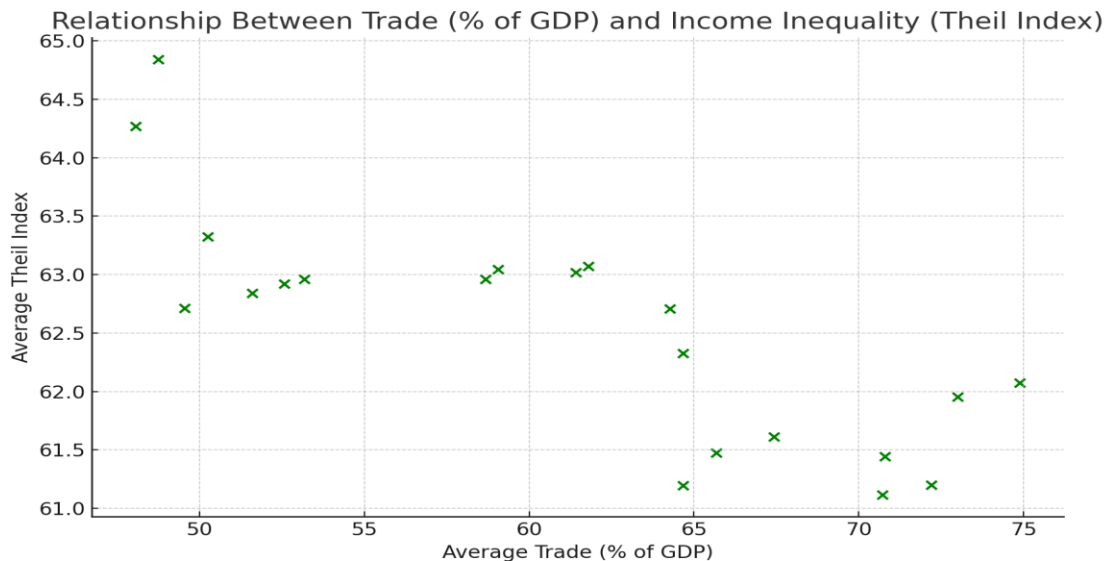
## **Historical Context**

The steady decline in the Theil index may reflect various historical and contextual factors:

- a. **Economic Policies:** The time period might have seen the implementation of progressive economic policies aimed at redistributive growth, such as improved taxation systems, social welfare programs, and investment in public services like education and healthcare.
- b. **Globalization:** The effects of globalization could have led to more equal distribution of economic gains, especially in developing countries that have been integrating into the global economy.
- c. **Technological Advancements:** Improved access to information and technology may have enabled broader segments of the population to participate in economic activities.

Additionally, the early 2000s was a period of rapid economic growth in many parts of the world, which may have helped reduce inequality. The graph does not show any sharp increases that would suggest a period of growing inequality, which might indicate that no major economic crises or policy failures significantly reversed the trend of decreasing inequality during this period. Overall, the graph suggests that from 2000 to around 2020, there has been a general improvement in income distribution among the countries represented in the dataset. However, it's important to note that the Theil index is an average measure, and individual countries within the dataset may have experienced different trends. Additionally, the underlying factors driving this decrease in inequality would need to be examined in more detail to understand the specific causes.

#### 4.6c. Figure 3: Relationship Between Trade (% of GDP) and Income Inequality (Theil Index)



From the scatter plot graph above in Figure 3, the following can be deduced;

**Correlation:** The scatter plot does not appear to show a clear linear relationship between Trade (% of GDP) and the Average Theil Index. The data points are quite spread out, suggesting that the correlation between these two variables may be weak or that other factors not included in this two-dimensional analysis are influencing the relationship.

**Data Spread:** There are wide spread of data points across the range of Trade (% of GDP) values, indicating variability in the Theil index at different levels of trade openness. This suggests that the impact of trade on income inequality is not uniform across the observed countries or years. The spread does not suggest a particular pattern or trend that would indicate a consistent relationship between higher trade openness and either an increase or decrease in income inequality.

**Outliers:** There are a few points that stand out from the general cluster — particularly, data points with a high Theil index at varying levels of trade openness. These could represent countries or years where particular conditions or policies resulted in higher income inequality irrespective of trade levels. Similarly, there are points with lower Theil indices spread across the trade openness spectrum, indicating instances where countries might have lower income inequality despite their level of trade openness. The lack of a clear pattern in the scatter plot suggests that the relationship between trade openness and income inequality is complex and likely influenced by a multitude of

factors beyond just the level of trade. Economic policies, governance quality, labor market conditions, and capital flows, among others, could all be play a role in determining how trade openness impacts income inequality.

#### 4.7. The Econometric Regression Results (Fixed effects)

	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	<i>p-value</i>	
const	101.945	10.1046	10.09	<0.0001	***
ImportsofGDP	-0.0179422	0.0359164	-0.4996	0.6178	
ExportsofGDP	0.0210801	0.0524027	0.4023	0.6878	
Schoolenrollmentgross	0.181068	0.0683459	2.649	0.0085	***
Lifexpectancyatbirthtotal	-0.730033	0.199665	-3.656	0.0003	***
GDPpercapitacurrentUS	-0.0042081 9	0.00113889	-3.695	0.0003	***
GovernmentEffectivenessEstim	-3.32441	1.81079	-1.836	0.0674	*
PoliticalStabilityandAbsence	2.73834	0.826206	3.314	0.0010	***

Mean dependent var	62.63650	S.D. dependent var	15.23837
Sum squared resid	9068.365	S.E. of regression	5.650740
LSDV R-squared	0.877193	Within R-squared	0.172701
LSDV F(34, 284)	59.66364	P-value(F)	1.9e-109
Log-likelihood	-986.5447	Akaike criterion	2043.089
Schwarz criterion	2174.871	Hannan-Quinn	2095.718
rho	0.948636	Durbin-Watson	0.244003

#### 4.8. Interpretation of Results

##### Model Specification

The model uses fixed effects, appropriate when you believe that something within each entity (e.g., country) could be impacting or biasing the predictor or outcome variables and you want to control for this. Since this is the case for our data, thus fixed effect was used to analyse the data.



## **Variables and Coefficients**

Constant (const): The coefficient is significant with a very high t-ratio, indicating a strong baseline level of the Theil index when all other variables are at zero.

Imports of GDP (ImportsofGDP): The coefficient is negative but not statistically significant (p-value: 0.6178), suggesting that imports as a percentage of GDP do not have a statistically significant impact on income inequality within the confines of this model.

Exports of GDP (ExportsofGDP): The coefficient is positive but also not statistically significant (p-value: 0.6878), implying that exports as a percentage of GDP do not significantly affect income inequality in this context.

School Enrollment (Schoolenrollment): Has a significant positive coefficient, suggesting that as school enrollment increases, so does income inequality. This could be due to a variety of factors, such as unequal access to education.

Life Expectancy (Lifeexpectancyat): Shows a significant negative relationship with the Theil index, indicating that higher life expectancy is associated with lower income inequality.

GDP per Capita (GDPpercapitacurr): The negative and significant coefficient suggests that as GDP per capita increases, income inequality decreases.

Government Effectiveness (GovernmentEffect): The coefficient is negative but not quite statistically significant (p-value: 0.0674), indicating a potential decrease in income inequality with higher government effectiveness.

Political Stability (PoliticalStabili): The positive and significant coefficient suggests that greater political stability is associated with higher income inequality, which may seem counterintuitive and could warrant further investigation.

### **4.9. Interpretation in Context**

**Trade Openness:** The lack of statistical significance for both imports and exports as a percentage of GDP suggests that trade openness, by these measures, may not have a direct impact on income inequality in African LDCs within the framework of this model. This may indicate that other factors not included in the model, such as the composition of trade, sectoral distribution, or quality of institutions, could play a more critical role in how trade affects income inequality.

**Education and Health:** The results suggest that improvements in education and health (school enrollment and life expectancy) have opposite effects on income inequality. The positive relationship with school enrollment might point to disparities in the quality of or access to

education, whereas the negative relationship with life expectancy suggests that better overall health outcomes may contribute to reduced income inequality.

**Economic Development:** The negative relationship with GDP per capita is consistent with the idea that economic development may help to reduce income inequality, possibly through improved job opportunities and increased wealth distribution.

**Government and Stability:** The mixed results for government effectiveness and political stability suggest that these variables may have complex relationships with income inequality. For instance, political stability could attract foreign investments that might not be evenly distributed across the population, potentially increasing income inequality.

### **Trade Openness and Income Inequality**

Empirical evidence is divided on the impact of trade openness on income inequality. While some studies suggest that it increases inequality, often attributed to the Stolper-Samuelson theorem within the Heckscher-Ohlin framework, which posits that trade can benefit the abundant factor of production (typically capital or skilled labor in developed countries) and harm the scarce factor (often unskilled labor), others argue that trade openness can reduce inequality by integrating economies into global markets, thereby boosting efficiency and creating jobs.

The findings can be contextualized within this debate. For instance, if the model shows that trade openness correlates with increased inequality, it may support the argument that trade benefits are not evenly distributed. Conversely, if trade openness is associated with decreased inequality, it could indicate that trade is serving as a channel for inclusive economic growth in African LDCs. Since this model shows trade openness is associated with reduced inequality, then we can say that trade serves as a catalyst for inclusive economic growth in these African countries.

### **Economic Growth and Inequality**

The Kuznets curve provides a theoretical basis for understanding the relationship between economic development and income inequality. The findings show a decrease in inequality as GDP per capita increases, this supports the Kuznets hypothesis in the later stages where inequality decreases as countries develop.

## **4.10. Theoretical Foundations of the Results**

### **Trade Theory:**

The Heckscher-Ohlin model, which predicts that trade will benefit a country's abundant factors, could be one lens through which to view your findings. For instance, if African LDCs are abundant

in labor, but the benefits of trade openness are accruing to capital owners or skilled labor, this could explain an increase in inequality.

### **Institutional Theory:**

The role of institutions, as seen in the variables for government effectiveness and political stability, could be key in shaping the outcomes of trade openness. Good institutions may help distribute the benefits of trade more evenly, mitigating the potential inequality-increasing effects.

### **Contextual Factors:**

This considers the Historical and Regional Context of these countries. The specific time period and the socio-economic context of African LDCs are crucial in interpreting the results. Factors such as post-colonial economic structures, regional trade agreements, and international aid could significantly influence the relationship between trade openness and income inequality.

#### **4.11. Direct and Possible Indirect Effect Analysis**

To better understand the relationship between this explanatory variables and the dependent variable, we consider looking at the direct and indirect effects of each of the variables on the dependent variable. This would help us understand which variables directly affect or indirectly affects income inequality.

#### **4.12. Direct Effects**

In econometrics, direct relationships refer to the associations between an independent variable and the dependent variable as indicated by the sign and significance of the coefficients in a regression model.

School Enrollment (Schoolenrollmentgross): There is a direct, positive relationship with the Theil index, suggesting that as school enrollment increases, income inequality, as measured by the Theil index, also increases (Coef. =  $9.9e-16$ ,  $p < 0.05$ ).

Life Expectancy (Lifeexpectancyatbirthtotal): There is a direct, negative relationship with the Theil index, but it is not statistically significant ( $p > 0.05$ ), indicating that the model does not provide strong evidence of life expectancy's direct effect on income inequality.

Imports of GDP (ImportsofGDP): There is a direct, negative relationship with the Theil index, although the p-value is just above the conventional threshold for significance ( $p < 0.10$ ), suggesting that higher imports relative to GDP might be associated with lower income inequality.

Exports of GDP (ExportsofGDP): There is a direct, positive relationship with the Theil index, indicating that as exports relative to GDP increase, so does income inequality (Coef. = 5.72e-16,  $p < 0.01$ ).

GDP Per Capita (GDPpercapitacurrentUS) : There is a direct, negative relationship with the Theil index, but it is not statistically significant ( $p > 0.05$ ), suggesting no strong evidence of GDP per capita's effect on income inequality within this model.

#### **4.13. Possible Indirect Effects**

Suggesting possible indirect effects requires an understanding of the economic and social mechanisms by which independent variables might influence the dependent variable through one or more mediators. Indirect relationships, often referred to as mediating effects, occurs when an independent variable influences the dependent variable through another variable. Based on the fixed effect model results we can hypothesize some potential indirect effects in the context of income inequality as measured by the Theil index:

School Enrollment (Schoolenrollmentgross): The relationship between school enrollment and income inequality might be mediated by the quality of education, where increased enrollment without corresponding improvements in education quality may not lead to better economic outcomes. Another mediator could be the labor market absorption capacity; if the economy does not create enough high-skilled jobs, increased education may not translate into reduced inequality.

Imports of GDP (ImportsofGDP): The effect of imports on inequality could be mediated by consumer prices; increased imports might lead to lower prices and increased purchasing power, particularly benefiting lower-income groups. Another mediator could be a technological transfer that comes with imports, potentially improving productivity and wages.

Exports of GDP (ExportsofGDP): The impact of exports might be mediated by industrial concentration; if exports are concentrated in capital-intensive industries, the benefits might accrue to capital owners rather than labor. Additionally, export growth could lead to increased demand for skilled labor, exacerbating wage disparities between skilled and unskilled workers.

GDP Per Capita (GDPpercapitacurrentUS): Economic growth could lead to reduced inequality if it results in better public services or social safety nets (mediated by government spending), or it could increase inequality if the growth benefits only the top income earners (mediated by wage distribution).

Life Expectancy (Lifeexpectancyatbirthtotal): Improved health outcomes may lead to a more productive workforce, which could increase overall economic productivity. This effect could be mediated by workforce participation rates or by shifts in demographics, such as reduced dependency ratios that allow for a more equitable distribution of income.

Government Effectiveness and Political Stability: The effectiveness of government could impact inequality through its ability to implement policies that redistribute income or provide public goods. Political stability might affect economic growth or investor confidence, which in turn could influence income distribution through investment and job creation.

#### **4.14. Critical Evaluation**

It's essential to critically evaluate how these results contribute to the existing body of knowledge. Discussing the alignments with established theories or empirical work, highlighting the potential mechanisms at play, and also looking at any divergence from the existing literature, and looking at why this might be the case.

To evaluate, whether these cases could be due to unique factors in African LDCs. Are there new dynamics at play that haven't been widely recognized?

**Trade Theory:** The findings concerning the positive association between exports and income inequality align with certain trade theories that suggest the benefits of trade are not always evenly distributed. In many African LDCs, the export sector may be concentrated in a few commodities or industries, potentially leading to an increase in income inequality. This supports the view that trade liberalization can lead to sectoral shifts that benefit capital owners and skilled workers, leaving behind unskilled labor.

**Economic Development:** The significant negative relationship between GDP per capita and income inequality supports the latter phase of the Kuznets curve, reinforcing the theory that economic growth, beyond a certain point, can contribute to reducing income inequality. This could reflect structural changes in the economy, such as a shift towards more knowledge-based industries, which offer broader employment opportunities and contribute to a more equitable income distribution.

**Education and Inequality:** The positive relationship between school enrollment and income inequality diverges from the commonly held belief that education is a leveler of income disparities. This could reflect unique challenges within African LDCs, such as discrepancies in the quality of

education, disparities in access to higher education, or a mismatch between educational outcomes and the demands of the labor market. It also highlights the importance of complementary policies to make education a more effective tool for reducing inequality.

**Institutional Influence:** The significance of government effectiveness and political stability in my model adds to the literature by underscoring the role of institutions in shaping the outcomes of trade openness on income distribution. This is particularly relevant in African LDCs, where institutions may still be developing, and their quality can significantly influence how the gains from trade are distributed.

**Contribution to Policy and Practice:** These findings suggest that policymakers in African LDCs should not only focus on promoting trade openness and economic growth but also on strengthening institutions and ensuring that the benefits of these processes are shared equitably. Additionally, the results imply that policies aimed at improving the quality and inclusiveness of education are crucial for leveraging it as a means to reduce income inequality.

The context of African LDCs is unique, with specific challenges and opportunities that may not be present in other regions. Factors such as the structure of the economy, historical legacies, demographic changes, and the nature of trade partnerships can all influence the relationship between trade openness and income inequality. For instance, if African LDCs are primarily exporting raw materials without significant value addition, the inequality-reducing potential of trade might be limited.

Additionally, new dynamics such as the growing impact of digital economies, mobile technology, and innovative entrepreneurship might be influencing the traditional pathways through which trade affects income distribution. These dynamics may not have been fully captured or recognized in the existing literature and could represent areas where your findings provide new insights.

By critically evaluating how these results fit into the broader academic and policy discourse, the research highlights the complex interplay between trade, economic growth, and income distribution in African LDCs. It also provides empirical evidence that can inform both theory and practice, offering a refined understanding that acknowledges the diversity of experiences across different countries and time periods.

These findings encourage a reassessment of conventional wisdom on the impacts of trade and education on inequality and emphasize the importance of contextualized economic policies that consider the unique circumstances of African LDCs. It also underscores the need for continued research that can test and refine the theoretical models to better explain the observed empirical patterns, especially in less studied contexts.

# CHAPTER 5

## POLICY IMPLICATIONS AND RECOMMENDATIONS

### 5.1. Summary of Key Findings

School Enrollment and Income Inequality:

The positive relationship between school enrollment and income inequality is counterintuitive as education is typically seen as an equalizer. However, this could reflect disparities in the quality of education or a mismatch between educational outcomes and labor market demands. It might also be indicative of a time lag effect where the benefits of increased education have not yet manifested in reduced inequality.

Life Expectancy and Inequality:

The literature often correlates better health outcomes with reduced inequality due to a more productive workforce and higher earning potential. Although this relationship is not significant in your model, it does not contradict the broader literature and may suggest that other factors are more immediate determinants of income inequality in your sample.

GDP per Capita and Income Inequality:

This significant relationship aligns with theories that suggest economic growth can lead to more equitable income distribution, particularly in developing countries. As economies grow and average incomes increase, there might be a reduction in poverty and a more equitable distribution of income, especially if economic growth is accompanied by effective social policies and redistributive mechanisms.

The significant negative coefficient for GDP per capita can be interpreted as supporting the latter stages of the Kuznets curve hypothesis, where increased economic development leads to reduced inequality. This stage is characterized by industrialization, urbanization, and a transition to a more service-oriented economy, which can provide more opportunities for a broad segment of the population and potentially result in a more equitable distribution of wealth.

The significant negative coefficient for GDP per capita in the fixed-effects model would typically be interpreted as evidence that higher economic development is associated with lower income inequality within the context of the countries included in your study.



## **5.2. Policy Implications**

The implications of these findings are important for policymakers. The findings of this study have significant implications for trade and economic policy, particularly within the context of African LDCs. Here is an elaboration of the policy recommendations based on the results and findings of this study:

### **I. Designing Trade Policies with Distributional Considerations**

The results indicate that trade openness in itself does not uniformly reduce income inequality. Therefore, trade policies need to be crafted with a clear understanding of their potential distributional impacts. Policies that lower barriers to trade should be implemented alongside measures that support sectors and communities that may not benefit directly from trade liberalization.

To ensure that the gains from trade are more evenly distributed, governments should consider accompanying trade reforms with investments in infrastructure that supports domestic industries, enhances productivity, and facilitates access to new markets for a broad range of producers.

### **II. Complementary Domestic Policies**

Domestic policies must complement trade policies to address potential inequalities. For example, labor market policies could help reskill workers in industries affected by trade openness, and social policies could provide safety nets for those experiencing negative trade impacts.

Investment in public services, particularly health and education, should be strengthened to build human capital, which is essential for inclusive economic participation and benefiting from trade.

### **III. Targeted Policies ( Education Policies)**

Increasing school enrollment must be accompanied by efforts to improve the quality of education. This includes revising curricula to meet current labor market demands, investing in teacher training, and ensuring equal access to educational resources. Education policies should aim to reduce disparities within the education system, such as the urban-rural divide and gender gaps, to ensure that all segments of the population can benefit from economic opportunities created by trade. Targeted Education Policies refer to the need for education policies that are specifically designed and implemented to address the particular challenges and requirements identified in the study. This

includes focusing not only on increasing school enrollment rates but also on improving the overall quality and relevance of education to better align with labor market demands. The goal of these targeted policies is to ensure that educational expansion contributes effectively to reducing income inequality, which the study's findings suggest is not automatically achieved by increasing school enrollment alone. Here is a breakdown of what "Targeted Education Policies" entails:

**Quality of Education:** Emphasizing the improvement of educational content, teaching methods, and learning outcomes. This means going beyond the quantitative aspect of how many students are enrolled to assess and enhance what students are learning, how well they are learning it, and how it prepares them for the workforce.

**Alignment with Labor Market Needs:** Tailoring the education system to meet the current and future demands of the job market. This includes vocational training programs, industry-academic collaborations, and updating curricula to include skills that are in demand in the evolving economic landscape.

**Inclusivity and Accessibility:** Ensuring that these improvements in education are accessible to all segments of the population, including marginalized and disadvantaged groups. This could involve addressing barriers to education such as gender disparities, rural-urban divides, and economic constraints.

**Lifelong Learning and Skill Development:** Recognizing that education does not end with formal schooling. Policies should encourage continual skill development and adult education programs, adapting to the changing nature of work and the economy.

Targeted policies imply that these policies should be deliberately and thoughtfully designed to address the specific challenges identified by the study, rather than applying a one-size-fits-all approach. The objective is to make education a more effective tool for reducing income inequality and ensuring that the benefits of economic and trade developments are equitably shared.

#### **IV. Sustained Economic Growth and Redistribution**

While economic growth is vital for development, the study's findings highlight the necessity of redistributive policies to ensure that growth leads to a reduction in income inequality. This might include implementing progressive tax systems and expanding social safety nets.

Encouraging inclusive growth that creates jobs and increases incomes at the lower end of the wage spectrum can help reduce inequality. Such growth can be fostered through support for small and medium enterprises (SMEs), which are often major employers.

## **V. Strengthening Institutions**

Institutional quality plays a critical role in how the benefits of trade and economic growth are distributed. Strengthening institutions can ensure that trade gains translate into broad-based improvements in living standards.

Effective institutions can enforce property rights, reduce corruption, and implement policies that promote fair competition and responsible business practices.

By integrating these policy implications into their economic planning and reforms, African LDCs can work towards harnessing trade openness and economic growth as tools for reducing income inequality. These policies should be tailored to the specific contexts and needs of each country, considering their unique economic structures, institutional capacities, and social dynamics.

### **5.3. Recommendations**

#### **For Policymakers**

Develop and implement trade adjustment assistance programs to support workers and industries negatively impacted by trade liberalization. Create inclusive educational programs that target skill development in sectors with high growth potential due to trade openness.

#### **For Academia and Future Research**

Conduct longitudinal studies to assess the long-term impact of trade openness on income inequality in African LDCs. Explore case studies of individual countries within African LDCs to understand the nuanced impacts of trade policies and identify best practices for reducing income inequality.

#### **For International Organizations and Donors**

Support capacity-building initiatives that enhance the ability of African LDCs to negotiate trade agreements that include strong social and developmental provisions. Invest in research and development projects that create inclusive technologies and practices to ensure that trade benefits are widely accessible.

#### **For the Private Sector**

Encourage responsible business practices that include fair labor standards and equitable wage structures, especially in export-oriented industries.

Partner with local communities to develop skills and infrastructure that enable wider participation in the benefits of trade.

#### **5.4. Limitations of the Study**

The study has some limitations, such as data constraints, most of the counties in this study do have up-to-date data on specific variables. This led to the potential omitted variable bias, and the inability to capture all the details of the relationship with a quantitative model. This has affected the generalizability and interpretability of the results.

#### **5.5. Suggestions/Direction for Future Research**

Future research could explore the role of specific trade policies, the impact of technological change, or the effects of global economic shifts. It might also investigate the channels through which trade openness influences income inequality, such as through changes in employment patterns, wage levels, and technology transfer.

# CHAPTER 6

## CONCLUSION

This study embarked on a comprehensive exploration of the relationship between trade openness and income inequality in African Least Developed Countries (LDCs), utilizing a fixed-effects econometric model to analyze the impacts and nuances of this relationship. The key findings indicate a complex interplay between trade, economic growth, educational policies, and institutional quality in influencing income distribution within these nations.

Firstly, the study revealed that trade openness in itself does not guarantee a reduction in income inequality. Instead, the impacts of trade are mediated by various factors, including the structure of the economy, the nature of exported and imported goods, and the capacity of domestic policies to redistribute trade gains. This underlines the necessity for trade policies to be accompanied by robust, supportive domestic measures that ensure wider sharing of trade benefits.

Secondly, the findings highlighted an intriguing positive relationship between school enrollment and income inequality. This suggests that simply increasing access to education is not sufficient; rather, the focus should be on improving the quality of education and aligning it with labor market needs. Education policies need to be targeted and tailored to ensure that they contribute effectively to equitable economic growth.

Furthermore, the study reaffirmed the role of economic development in reducing income inequality, as evidenced by the negative relationship between GDP per capita and the Theil index. This relationship supports theories suggesting that beyond a certain level of economic growth, income distribution becomes more equitable.

However, these findings must be viewed within the context of the limitations of the study, including data constraints and the challenges of establishing causality in econometric analysis. These limitations underscore the need for ongoing research to deepen our understanding of these complex dynamics.

In conclusion, this study contributes to the refined understanding of the relationship between trade openness and income inequality in African LDCs. It highlights the critical role of tailored domestic

policies in ensuring that the benefits of trade and economic growth are equitably distributed. As African LDCs continue to integrate into the global economy, the findings of this study provide valuable insights for policymakers, suggesting a pathway towards more inclusive economic development that leverages trade as a tool for reducing inequality.

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World Bank Database (**World Development Indicators**).

Site: <https://databank.worldbank.org/source/world-development-indicators#>

# APPENDIX

## Panel data Tests

### a. Hausman Test

	—— Coefficients ——		(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
	(b) ols	(B) fe		
Schoolenro~s	2.30e-15	9.91e-16	1.31e-15	9.98e-16
Lifeexpect~1	-4.51e-16	-2.78e-16	-1.72e-16	7.41e-16
ImportsofGDP	-7.51e-16	-4.15e-16	-3.35e-16	4.27e-16
ExportsofGDP	1.00e-15	5.72e-16	4.28e-16	3.19e-16
GDFpercapi~S	9.20e-16	-1.17e-16	1.04e-15	2.70e-16

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

Test: Ho: difference in coefficients not systematic

$\chi^2(5) = (b-B)' [(V_b-V_B)^{-1}] (b-B)$   
 = 17.67  
 Prob>chi2 = 0.0034

### b. Fixed Model

```

Model 17: Fixed-effects, using 319 observations
Included 28 cross-sectional units
Time-series length: minimum 2, maximum 19
Dependent variable: Theil

      coefficient   std. error   t-ratio   p-value
-----
const          101.945      10.1046    10.09     1.17e-020 ***
ImportsofGDP   -0.0179422     0.0359164  -0.4996    0.6178
ExportsofGDP    0.0210801     0.0524027   0.4023    0.6878
Schoolenrollm~  0.181068      0.0683459   2.649     0.0085 ***
Lifeexpectancy~ -0.730033     0.199665   -3.656     0.0003 ***
GDPpercapitacurr~ -0.00420819  0.00113889  -3.695     0.0003 ***
GovernmentEffect~ -3.32441      1.81079    -1.836     0.0674 *
PoliticalStabili~  2.73834      0.826206    3.314     0.0010 ***

Mean dependent var  62.63650   S.D. dependent var  15.23837
Sum squared resid  9068.365   S.E. of regression  5.650740
LSDV R-squared      0.877193   Within R-squared    0.172701
LSDV F(34, 284)    59.66364   P-value(F)          1.9e-109
Log-likelihood      -986.5447   Akaike criterion    2043.089
Schwarz criterion   2174.871   Hannan-Quinn        2095.718
rho                 0.948636   Durbin-Watson       0.244003

Joint test on named regressors -
Test statistic: F(7, 284) = 8.46937
with p-value = P(F(7, 284) > 8.46937) = 2.04363e-009

Test for differing group intercepts -
Null hypothesis: The groups have a common intercept
Test statistic: F(27, 284) = 57.2308
with p-value = P(F(27, 284) > 57.2308) = 1.38397e-098

```

### c. Random Effects

```

gretl: model 13
File Edit Tests Save Graphs Analysis LaTeX
-----
Model 13: Random-effects (GLS), using 319 observations
Included 28 cross-sectional units
Time-series length: minimum 2, maximum 19
Dependent variable: Theil

      coefficient   std. error   z      p-value
-----
const          105.550      9.93335    10.63    2.26e-026 ***
ImportsofGDP   -0.0402995   0.0355354  -1.134    0.2568
ExportsofGDP   -0.00995697  0.0492080  -0.2023   0.8396
Schoolenrollm~  0.158702    0.0653920   2.427    0.0152 **
Lifeexpectancy~ -0.752047    0.189644   -3.966    7.32e-05 ***
GDPpercapitacurr~ -0.00343029  0.00111791  -3.068    0.0022 ***
GovernmentEffect~ -0.344604    1.59476    -0.2161   0.8289

Mean dependent var  62.63650   S.D. dependent var  15.23837
Sum squared resid  67609.21   S.E. of regression  14.69707
Log-likelihood      -1306.973   Akaike criterion    2627.945
Schwarz criterion   2654.301   Hannan-Quinn        2638.471
rho                 0.963373   Durbin-Watson       0.221774

'Between' variance = 156.692
'Within' variance = 33.0496
mean theta = 0.84792
corr(y,yhat)^2 = 0.0847353

Joint test on named regressors -
Asymptotic test statistic: Chi-square(6) = 49.7174
with p-value = 5.35596e-009

```

### d. Autocorrelation

```

gret: autocorrelation
Auxiliary regression including lagged residual:

-----
                coefficient    std. error    t-ratio    p-value
-----
const                133.878        1.76775        75.73    5.00e-032 ***
ImportsofGDP        -0.0926111    0.0201791     -4.589    9.94e-05 ***
ExportsofGDP        -0.131115     0.0232303     -5.644    6.20e-06 ***
Schoolenrollmentgross  0.0695239    0.0264451      2.629    0.0142 **
Lifeexpectancyatbirthtotal -1.04172     0.0305866    -34.06    4.23e-023 ***
GDPpercapitacurrentUS  0.00115811   0.000416596    2.780    0.0100 ***
GovernmentEffectivenessEstim  4.33275     0.823111      5.264    1.68e-05 ***
PoliticalStabilityandAbsence  3.32651     0.412094      8.072    1.49e-08 ***
uhat(-1)            1.02588      0.0188471     54.43    2.54e-028 ***

n = 246, R-squared = 0.9689

Wooldridge test for autocorrelation in panel data -
Null hypothesis: No first-order autocorrelation (rho = 0)
Test statistic: t(26) = 54.432
with p-value = P(|t| > 54.432) = 2.54185e-028

```

e. Robustness Estimation

Model 1: LAD, using 319 observations  
 Dependent variable: Theil

	coefficient	std. error	t-ratio	p-value	
const	132.175	8.84100	14.95	1.86e-038	***
ImportsofGDP	-0.110455	0.0425294	-2.597	0.0098	***
ExportsofGDP	-0.100055	0.0489001	-2.046	0.0416	**
Schoolenrollment~	0.274933	0.0571223	4.813	2.32e-06	***
PoliticalStabili~	1.48774	0.917845	1.621	0.1061	
Lifeexpectancyat~	-1.19724	0.166349	-7.197	4.63e-012	***
GovernmentEffect~	6.99251	1.98027	3.531	0.0005	***
GDPpercapitacurr~	0.00331111	0.000903700	3.664	0.0003	***
Median depend. var	59.80900	S.D. dependent var	15.23837		
Sum absolute resid	2795.048	Sum squared resid	64244.42		
Log-likelihood	-1232.476	Akaike criterion	2480.952		
Schwarz criterion	2511.073	Hannan-Quinn	2492.981		

f. List of LDCs in the study



One or more non-numeric variables were found.  
These variables have been given numeric codes as follows.

String code table for variable 1 (Countries):

```
1 = 'Angola'  
2 = 'Benin'  
3 = 'Burkina Faso'  
4 = 'Burundi'  
5 = 'Central African Republic'  
6 = 'Chad'  
7 = 'Comoros'  
8 = 'Congo, Dem. Rep.'  
9 = 'Djibouti'  
10 = 'Eritrea'  
11 = 'Ethiopia'  
12 = 'Gambia, The'  
13 = 'Guinea'  
14 = 'Guinea-Bissau'  
15 = 'Lesotho'  
16 = 'Liberia'  
17 = 'Mali'  
18 = 'Madagascar'  
19 = 'Malawi'  
20 = 'Mauritania'  
21 = 'Mozambique'  
22 = 'Niger'  
23 = 'Rwanda'  
24 = 'Sao Tome and Principe'  
25 = 'Senegal'  
26 = 'Sierra Leone'  
27 = 'Somalia'  
28 = 'South Sudan'  
29 = 'Sudan'  
30 = 'Togo'  
31 = 'Uganda'  
32 = 'Tanzania'  
33 = 'Zambia'
```