

**EFFECTS OF REGIONAL INTEGRATION ON INCOME INEQUALITY IN THE EAST  
AFRICAN COMMUNITY**

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**DECLARATION**

This research project is completely original, and it has never been presented as a prerequisite for a degree or other honor at any University.

Signature..... Date .....

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I can attest that the candidate completed this project under my supervision as University supervisor.

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## **DEDICATION**

This work is dedicated to the wonderful people who have supported and encouraged me throughout the course of my studies, both in my family and social circle.

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## **OPERATIONAL DEFINITION OF TERMS**

*Economic union:* It is a treaty between countries that permits the free movement of commodities, services, and labor across national borders so that they can all benefit economically.

*Financial integration* is an agreement in which financial markets in neighboring, regional, and global economies link together; this could be through foreign investment in the domestic financial market and sharing information among financial institutions.

*Free trade area* is a grouping of states that have agreed to free trade among them, therefore maintaining little or no tariff with no standard trade policy toward non-members.

*Gini index:* is a measure of statistical dispersion which indicates income inequality within a social group of a country.

*Income inequality:* is a significant disparity of income distributions within a country or a social class with a high concentration of income being controlled by a small proportion of the population.

*Intra-regional trade* is the exchange of products and services between the members of a particular trading bloc or in a particular area of the global economy.

*Lorenz curve* is a graph that shows the cumulative proportion of total national revenue versus the cumulative percentage of the population.

*Population density:* is a measurement of population per unit area.

*Regional Integration:* This is an agreement between countries to work together to achieve a common objective; the goal could range between wealth, peace or stability.

*Economic integration* is an agreement between nations to establish free trade between them to secure the benefits of international specialization and international trade.

## **ABBREVIATIONS AND ACRONYMS**

**CET:** Common External Tariff

**DSE:** Dar es Salaam Stock Exchange

**EAC:** East African Community

**EAMU:** East African Monetary Union

**ECOWAS:** Economic Community of West African States

**EU:** European Union

**FDI:** Foreign direct investment

**GDP:** Gross Domestic Product

**H-O:** Heckscher Ohlin Model

**H-O-S:** Heckscher-Ohlin-Samuelson

**MAC:** Monetary Affairs Committee

**MLD:** mean logarithmic deviation of income.

**NSE:** Nairobi Securities Exchange

**OECD:** Organization for Economic Co-operation and Development

**RECs:** Regional Economic Communities

**RSE:** Rwanda Stock Exchange

**UN:** United Nation

**UNCTAD:** Nations Conference on Trade and Development

**UNECA:** United Nations Economic Commission for Africa

**US\$:** United States Dollar

## **ABSTRACT**

Regional integration refers to how two or more nations work together to promote peace, stability, and prosperity. State obstacles that impede the flow of people, capital, commodities, services, and ideas can be removed with the aid of regional integration. The East African Community has been one of Africa's most growing trading blocs in terms of Gross domestic growth. The desire to raise the standard of living within its community propelled the growth of the East African community. Increasing value addition in production, trade, investment, and competitiveness are some of the main strategies that could assist the region in realizing this objective. However, income inequality has been a huge regional problem across many countries in East Africa, hence reducing the effects of the region's positive economic development. The primary goal of this research was to assess how regional integration affected income disparity in the East African Community. Using the panel data, this study empirically analyzed the impacts of regional integration on income disparity in the East African Community from 2000 to 2021. The study considered both economic and financial integration. Random effects method was used in the analysis. The normality, heteroscedasticity, autocorrelation, and multicollinearity tests are among the key diagnostic tests that were done. According to the regression analysis, trade openness and exchange rate, foreign direct investment was seen to reduce income disparity in contrast with economic freedom index and unemployment rate which was seen to increase income inequality. Real interest rate, inflation rate, education personal remittance received as a percentage of Gross Domestic Product and domestic credit to the private sector were found to be statistically insignificant.

## **CHAPTER ONE: INTRODUCTION**

### **1.1. Background of the Study**

#### **1.1.1. Regional Integration Overview**

Regional integration is the process that unites individual regions to work together for a common goal. Regional integration gained momentum after WWII; during this period countries were collectively pooling their resources to develop conflict resolution strategies to contain violent conflicts. According to Has (1958), the establishment of the European Economic Community (EEC) in 1958 was seen as a post-war effort to bring about peace in Western Europe. Thereafter, most of the integration arrangements were mainly based on economic issues focusing on peace building and conflict meditation (Has, 1958).

Regional integration ranges from political, economic, and financial inclusion. (Bong & Premaratne, 2019) defined financial integration as the process through which countries or neighboring economies agree to link together hence increasing capital flow. Financial inclusion can take several forms, including foreign enterprises participating in domestic markets, foreign banks joining domestic markets, securities trading overseas, direct borrowing by local firms in international markets foreign participation in insurance markets, and pension funds. Economic integration is more concerned with establishing free trade between several countries to secure an alliance. It enables global markets to function more consistently with less government intervention, allowing countries to make the most use of their resources.

Geographical gaps between countries, subpar infrastructure, and ineffective policies all impede economic progress (Streeten, 2001). Driven by the desire to reap benefits from integration, African nations have created several trading blocs. The Economic Community of West African States (ECOWAS), the Common Market for Eastern and Southern Africa (COMESA), the West African Economic and Monetary Union (WAEMU), the Southern African Development Community

(SADC), and the East African Community (EAC) are a few of Africa's integration agreements (Ndukwe, 2004)

Countries must work together to provide common goods like security and education, as well as to cooperate in commerce, investment, domestic regulations, transportation, ICT, macroeconomic policy, and financial policy. Through integration, member nations can: improve the competitiveness of markets; Distribute the cost of large projects or public goods; jointly decide on beneficial policies and enjoy additional non-economic benefits like security and tranquility (World Bank, 2000). Globalization is marked by the increase in world output and trade. Both industrialized and emerging countries with outward-focused trade and economic policies have seen notable economic growth as a result of integration. Although there are benefits to regional integration, there are also risks. These include the fact that different countries have different priorities and preferences, that it can be challenging to understand how regional integration will affect trade, investment, growth, and income distributions, and that there will inevitably be winners and losers within the participating nations.

### **1.1.2. The East African Community (EAC)**

EAC comprises eight partners: the Democratic Republic of the Congo, the Republic of Kenya, the Republic of Rwanda, the Federal Republic of Somalia, the Republic of South Sudan, the Republic of Uganda, and the United Republic of Tanzania. The EAC was established by a treaty signed by Tanzania, Kenya, and Uganda on November 30, 1999, after the initial treaty collapsed in 1977 following ideological differences between member nations. The agreement came legally binding on July 7, 2000. Rwanda and Burundi signed the agreement in 2007 while South Sudan was recognized as a full member in 2016 (EAC, 2016a). The treaty's objective was to enhance the

quality of lifestyles for East Africans through broadening and deepening economic, social, political, and cultural integration BAR, J. (2018).

In March 2004, the EAC members ratified the Customs Union Treaty, which set forth a harmonized external tariff on imports from non-member nations while gradually eliminating internal tariffs. However, the ratification did not fully eliminate the trade barriers: Significant trade impediments like rules of origin, police roadblocks, non-harmonized technical rules, customs procedures, and documentation remained (Aloo, 2017).

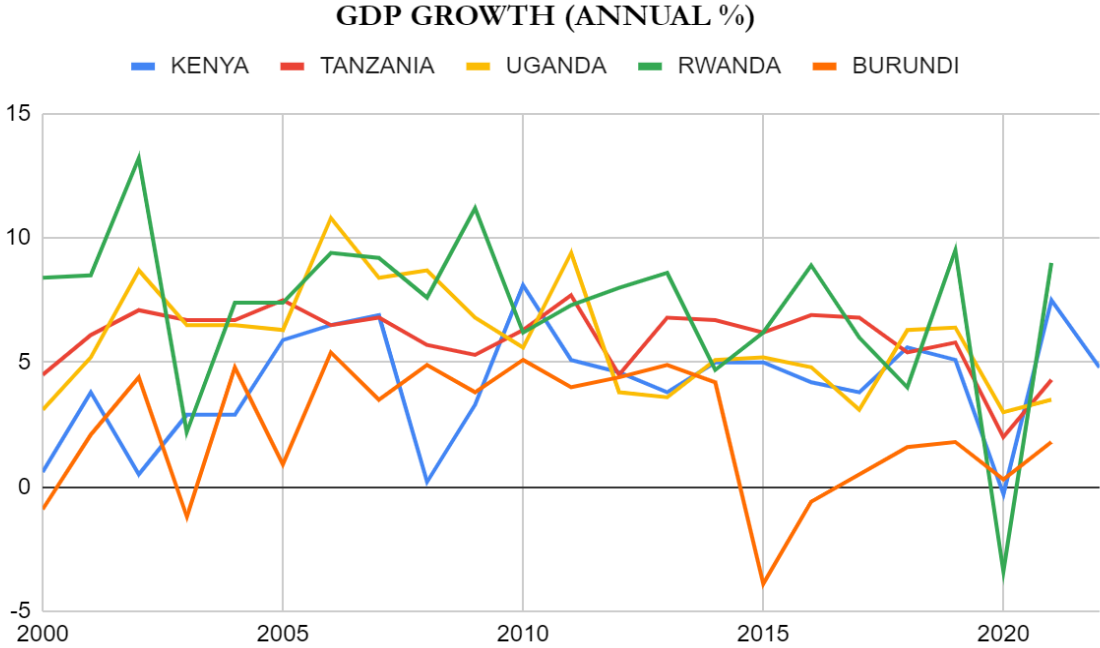
In November 2009, the EAC's common market was established, and it went into force in July 2010; this shifted the focus from tariff liberalization toward strengthening the free flow of commodities, services, labor, and capital. The EAC Monetary Union was formally signed in 2013. The process of establishing an East African Federation is currently being accelerated to create a long-term and stable monetary and political alliance in East Africa.

Many obstacles stand in the way of the EAC's road towards regional integration, such as inadequate or subpar regional infrastructure, weak legislative frameworks, unaligned regional priorities, and divergent national views. Despite these obstacles, member states remain dedicated to eliminating tariff and non-tariff barriers while coordinating trade reforms to promote regional integration. (Drummond, & Williams, 2015)

### **1.1.3: GDP in the EAC**

Regionalism in the EAC has heterogeneous country effects on economic growth. As a result of the implied removal of tariffs, regional trade integration is anticipated to improve commerce and boost growth. Gains in specialization brought about by the utilization of comparative advantages are responsible for the ensuing economic growth. The EAC member states have relatively good

economic growth performance. Economic growth consistently surpasses other trading blocs (Gigineishvili, Mauro & Wang, 2014). Annual percentage GDP growth for the region is show by the diagram below.



**Figure 1:1: Total GDP growth (annual percentage) from 2000-2020 per member country**

Source: World Development Indicators (WDI) Database, 2022.

The EAC member countries have reported significant differences in growth rates over the years. With a total GDP of US \$37.9 billion and a GDP per capita of US \$847, Uganda experienced its highest-ever annual GDP growth of 10.8% in 2006. The GDP per capita for 2020 was \$847, with a recorded GDP growth rate of under 3%. With a GDP of US \$34.66 billion and a GDP per capita of US \$769, Tanzania experienced the highest annual GDP growth of 7.7% in 2011. In contrast, the lowest GDP growth reported was 2% in 2020, when the GDP was 62.41 billion US dollars.

and the GDP per capita was US\$1042.

The highest annual GDP growth reported in Rwanda was 13.2 percent recorded in 2002. During that year, the GDP reported was US \$1.97 billion with GDP per capita of US \$ 235. In contrast, the lowest GDP growth reported was -3.4 percent in 2020 with GDP per capita of US \$ 775 and total GDP was US \$ 37.6 billion.

The highest annual GDP growth reported in Burundi was 4.9 percent recorded in 2009. During that year, GDP per capita reported was US \$ 195. while the total GDP was US \$ 1.6 billion. In contrast, the lowest GDP growth reported was -3.9 percent in 2015 with GDP per capita of US \$ 289 and total GDP was US \$ 3.1 billion.

**1.1.4. Trade integration in the EAC**

The EAC has been putting a lot of effort into promoting trade both within and the rest of the world (McAuliffe, Saxena, Yaraba, & International Monetary Fund, 2012). The figure below shows the total EAC trade trends from 2006 to 2020.



**Figure 1:2: Total EAC trade trend from 2005-2020**

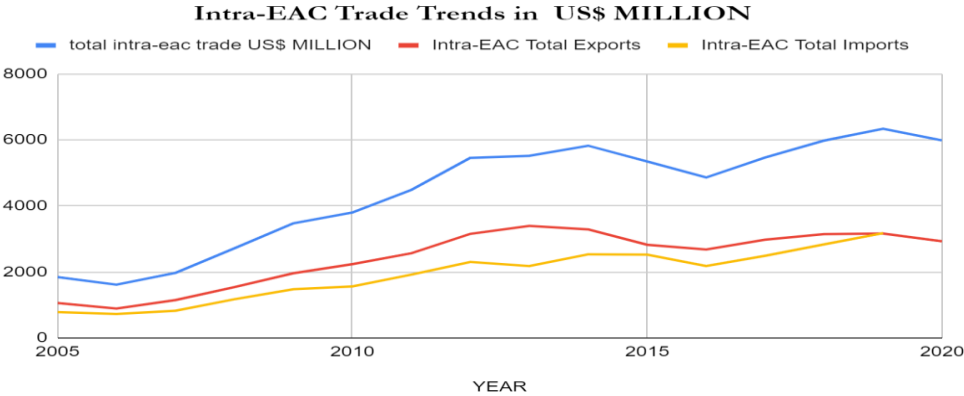
Source: World Development Indicators (WDI) Database, 2022.

According to Figure 1.2, total EAC trade has been on an upward trend since 2006 with slight fluctuations; the region reported a total of US \$ 51915 million in 2020 which was slightly lower compared to US \$ 55278.2 million reported in 2019. The decline was attributed to the outbreak of COVID-19 which hindered most economic activities, including trade and investment.

**1.1.4.1: EAC Intra-Regional Trade**

Through trade, a nation can gain a variety of benefits. For instance, a nation might take advantage of its comparative advantage by focusing on producing certain kinds of goods at the lowest possible opportunity cost (Baldwin & Robert, 2008). Adopting trading practices boosts competition resulting in lower product prices, hence an increase in consumer purchasing power. The core of EAC Partner States' trade policies is regional trade integration, which entails improving state institutions and private sector organizations responsible for export promotion (African Development Bank Group, 2019).

However, intra-regional trade in East Africa remains low compared to the region’s total trade (United Nations, 2018). The intra-EAC trade from 2006 to 2020 is represented graphically in the figure below.



**Figure 1.3: Intra-EAC Trade trends from 2005-2020**  
 Source: World Development Indicators (WDI) Database, 2022.

Despite the low intraregional trade, the Intra-EAC trade trend has shown growth since 2005. Both the intra-import and export have been on an upward trend too, with total intra-export being slightly higher than the imports.

The highest figure of total intra-regional trade reported was US \$6338.6 million in 2019 while the lowest figure of the total intra-regional trade reported in the EAC was US \$1617.1 million. In 2020, total intra-regional exports were US \$2929.6 million while the lowest figure ever reported was US \$890.2 million in 2006. On the other hand, total intra-EAC import reported in 2020 was US \$ 3175.8 million while the lowest figure was US \$727 million in 2006.

### **1.1.5. Financial Integration in the EAC**

Developed financial markets encourage growth through pooling regional savings and investments, channeling the resources to neighborhood businesses, and allowing risk diversification (Drummond, Wajid & Williams, 2015). Financial markets that run smoothly can reduce poverty and spur growth in the economy. The EAC's financial markets are still underdeveloped because of structural limitations. Investors and issuers are hard to come by due to low income and a small private sector. Nations can get beyond these obstacles with the aid of regional integration. If properly managed, integrated financial markets will facilitate the pooling of savings across the region, the sharing of costs and information among members, increased risk diversification, increased innovation among financial institutions and a greater degree of integration into the global economy. (Irving, 2005; Co-operation in fiscal and monetary issues is key to achieving monetary stability within a trading block. Monetary stability facilitates economic integration efforts and attains sustainable economic development.

#### **1.1.5.1. Foreign Direct Investment (FDI) in the EAC**

Developing states are gradually turning to FDI as a channel to financial development, modernization, job creation and growth. Penev and Marui (2014) found that FDI adds to domestic accumulation, resulting in greater production capacities and employment.

FDI inflows into the EAC are a crucial tool for promoting industrialization, transformation, and the modernization of agriculture in the area. The region's industrial production has grown over the past few years. Similarly, the region has worked to take advantage of its abundance of natural resources, including oil in Uganda, minerals in Burundi, Rwanda, Tanzania, and Uganda, and financial services and tourism in most of the Partner States.

To encourage industrial development and resource exploitation and thus create a favorable environment for FDI, the Partner States have implemented changes that improve the investment climate. However, poverty and economic inequality continues to exist and provide a significant problem despite rising investments in developing countries. The figure below depicts the FDI inflows in the EAC.

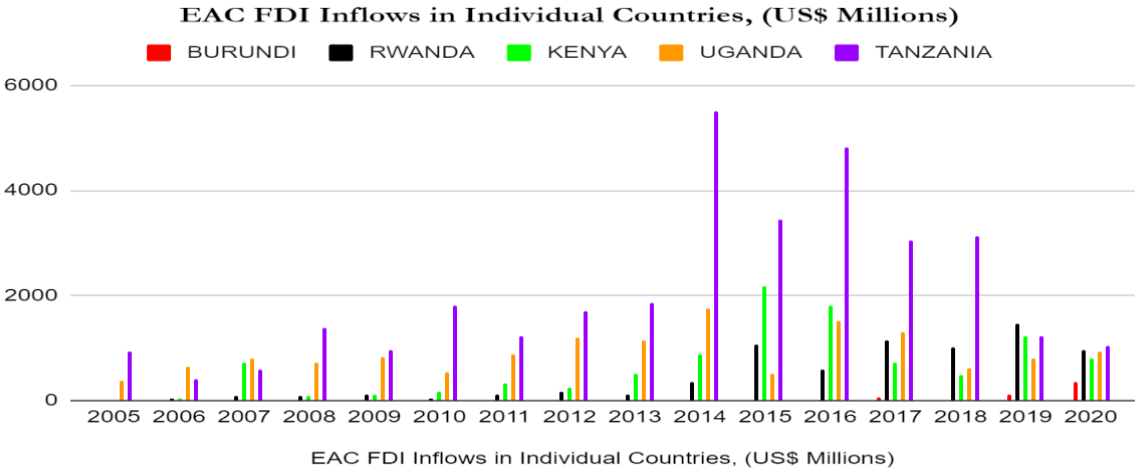


Figure 1.4: The FDI flows in individual countries (US \$millions)

Source: World Development Indicators (WDI) Database, 2023.

FDI inflow to the EAC countries in the 1990s was essentially nonexistent. Since 2001, increased FDI inflows into the EAC countries have led to the ratio of inward FDI stock to GDP to rise, from

a mean of 12.9% in 2001 to 19.4% in 2013. In 2010, the region's FDI level recovered to a pre-crisis level. From there, it grew steadily, reaching a peak of USD 3650 million in 2013.

The disparities between the individual nations are significant. Uganda and Tanzania accounted for 87% of the total FDI reported in the EAC. Kenya, which has the strongest economy in the area, lags well behind these two nations. Burundi's FDI inflow remains low compared to other member states, as its highest reported figure was 65.1 million in 2017. In 2018, Tanzania reported the highest figure of 3122.4 million compared to other member countries, followed by Rwanda with \$1015.3 million.

#### **1.1.6. Income Inequality in the EAC**

The Gini index and the proportional share of total household income obtained by each quintile are two of the most used income distribution metrics. The Census Bureau also generates estimates of the mean logarithmic deviation of income (MLD), the Atkinson measure, and the ratio of income percentiles in addition to these two metrics. The Gini index is the most accurate metric to assess income inequality. The Gini index calculates how far away from perfectly equitable the income distribution is in each economy or social class. The Gini index is a number between zero and a hundred. Perfect equality is represented by zero, whereas perfect inequality is represented by hundred. (African Union Commission, 2018).

East Africa's GDP has grown considerably in recent years, but this expansion has not translated into substantial structural job creation nor transformation (African Development Bank Group, 2019). Rapid economic growth neither alleviates poverty nor lowers income inequality at the same rate. Many East African countries have extensive and rising informal industries, resulting in poor earnings, limited chances for skill development, and employment insecurity for many people. The services sector in the EAC has increased to about 60 percent of GDP, owing primarily to non-

tradable services and informal sector, while the manufacturing sector has stayed stable at 20 percent (African Development Bank Group, 2019). The impact of public and private investment is diminishing hence GDP growth is increasingly contributed by private consumption. Primary commodity exports account for 52 percent of overall exports, while finished product imports account for 70 percent of total imports in the region.

East Africa is a region high in inequality; Income disparity differs by country, but it is on the rise globally (Martin & Kamande, 2022). Only 37 percent of the overall populace has access to electricity, forty-eight percent to drinkable water, and 20 percent to sanitation facilities. At the same time, there are considerable differences between countries and between urban and rural populations (African Union Commission, 2018). Despite a drop since 1999, the region's poverty rate remains high at 35 percent. Several states are combating poverty by improving social security systems and investing so much in education and skill development. For these programs to achieve their goal of fostering more equitable development, such investments must report significant growth. Even as the majority struggles to achieve their most basic requirements, like accessibility of decent jobs, healthcare, and education, wealth is also becoming highly concentrated in the hands of just a few percent of people.

In 2012, the industrial industry in East Africa employed around 560,000 people (The SID & Trademark East Africa, 2013). Formal, wage-paying employment is a luxury enjoyed by a few (Buckley, 2014). The wage data emphasizes the discrepancy in earnings even further for individuals who are fortunate enough to secure lucrative employment. The lowest statutory monthly minimum earnings in East Africa range from \$8 in Uganda to \$3.10 in Burundi, which is way lower than the official poverty level of \$12. In Rwanda, the typical monthly wage was \$176 in comparison to \$84

in Tanzania. Nearly half of working Rwandans are paid more than the poverty line (The SID & Trademark East Africa, 2013).

**1.1.6.1. Inequality Trend and Indicators in the EAC**

Access to fundamental necessities is another way to measure inequality. Many nations have significant disparities in the provision of not only income but basic needs. Trends in income disparity are shown in the figure below.

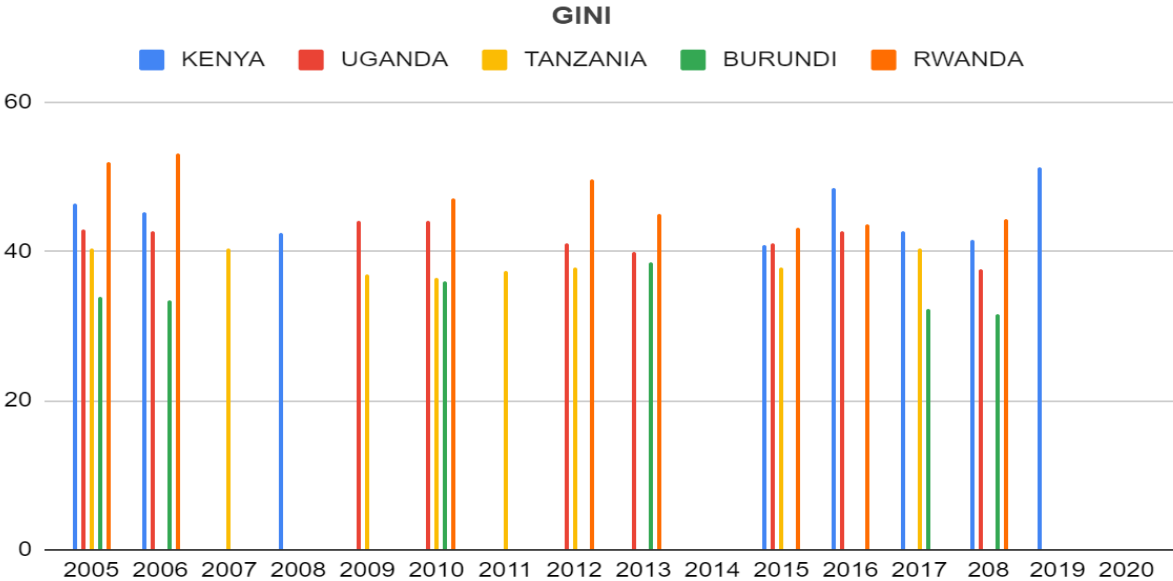


Figure 1.5: The Gini Index trend in the EAC region since 1999  
 Source: *World Development Indicators* (database).

In general, all EAC member nations have reported a very high Gini index, which corresponds to high inequality, as seen in figure 1.5. The recent Gini reported by Kenya was 51.3 reported in 2019, Uganda reported 37.6 in 2018, Tanzania reported 40.5 in 2017, Burundi reported 31.6 in 2018 while Rwanda reported 44.3 in 2018. Therefore, policymakers should be concerned about inequality because it impedes poverty reduction and leads to a lack of social cohesiveness, which can lead to conflict (African Union Commission, 2018)

## **1.2: Statement of the problem**

Regional integration continues to be a vital tool used to enhance trade in Africa (Makochekanwa, 2014). One of the main objectives for the founding of the EAC was to enhance the living standards of its people. On average, the EAC reported economic growth of 5.6 percent in 2016 (UNCTAD, 2018). The bloc has indicated a considerable achievement in the trade liberation process, which resulted in a broader market.

Despite the region achieving several milestones in the integration journey and having reported impressive economic growth, Africa's vast challenge of income inequality still holds for EAC, and poverty reduction remains limited except in small island economies. About half of the vicinity's populace survives on much less than the worldwide poverty level of \$1.25 per day. The inequality levels hinder the growth's impact within the region since the top 20 percent of the entire population controls about 48.6 percent of the total earnings. In comparison, the bottom 20 percent handiest earn 6 percent (African Development Bank, 2018).

If the East African Community were a single entity and its \$83 billion in revenue in 2011 was distributed according to the most recent income sharing, it would be the wealthiest 10 percent would have shared 34.93 percent of the total income among themselves. The most deficient 40 percent, almost 57 million East Africans, would have shared approximately 13.73 percent of the total income, leaving 50 percent of the total income to the middle majority (SID & Trademark East Africa, 2013).

Inequality should be a significant concern for policymakers because it adversely affects poverty reduction, causing a lack of social cohesion. Many scholars like Ametoglo, Guo, & Wonyra (2018), Busemeyer & Tober (2015), Munir et al. (2013), Beckfield (2006), and Herault, N. (2007). have expressed serious concerns about how regional integration affects income disparity.

Even though many researchers have expressed interest in the inequality, the issue on how regional interpretation affects income inequality remains inconclusive as all those studies pose contradicting conclusions. Therefore, it is still unclear if regional integration enhances development or results in wider disparities. It, therefore, called for an evaluation based on the increasing rates of inequality. Therefore, the study aimed at understanding how inclusive and equitable the regional integration process is in the EAC region.

### **1.3. Research questions.**

The Following were the questions that the study aimed to address:

- i. What is the effect of economic integration on income inequality in the EAC?
- ii. What is the effect of financial integration on income inequality in the EAC?

### **1.4 Research objectives**

The overall objective was to determine the effects of regional integration on income inequality in EAC. The specific objectives were:

- i. To determine the effect of economic integration on income inequality in the EAC
- ii. To determine the effect of financial integration on income inequality in the EAC

### **1.5. The significance of the study**

The study was considered important for a variety of reasons. To begin with, it provides empirical and theoretical insight into the link between regional integration and economic disparity. Second, the study advises policymakers on how to narrow the wealth disparity between rich and poor. Finally, the study adds to the existing information on this topical issue and provides current and future academics and researchers with the urge to pursue further research.

### **1.6. Scope of the study**

The primary focus of this research is income disparity and how it relates to the regional integration of the EAC member states. The focus of the study was solely on economic and financial integration.

Kenya, Uganda, Tanzania, Rwanda, and Burundi are the EAC members that are featured in this analysis. The research covers the years 2000, when EAC was reborn, to 2021. The availability of data informs the rationale for this time frame. Secondary data from public data sources was used in this investigation. The study focused on the intra-EAC import share of GDP, intra-EAC export share of GDP, FDI, and portfolio investment.

### **1.7. Organization of the study**

There were five chapters to the project. The background of the study and its objectives were presented in this chapter, while the second section examines related research. The third section describes the research strategy and methodologies employed. The fourth section presents and discusses the study's findings. The summary of the findings and their implications for policy are discussed in the last chapter.

## **CHAPTER TWO: LITERATURE REVIEW**

### **2.1 Introduction**

The literature on regional integration and income disparity is reviewed in this chapter, both theoretically and empirically.

### **2.2: Theoretical Literature**

#### **2.2.1: Comparative Advantage Theory**

This theorem was developed in 1871 by David Ricardo (Schumacher, 2012). The theory argued that comparative advantage, rather than absolute cost advantage, governs international trade. The primary basis for trade is a difference in technological level, while the direction of trade is determined by a relative comparison of isolated prices (Senga, 2017). Importing countries' customers benefit by paying cheaper prices compared to prices they would have paid for locally produced goods. There is no comparative advantage and no need for trade if two countries have the same level of technology.

Several assumptions underpin the Ricardian comparative cost analysis. One, no government interference. Two, both commodity and factor markets have perfect competition. Three, the economy is in a state of stagnation. Fourth, production is of first-degree homogeneity. Fifth, transportation expenses are not included, therefore manufacturing costs are expressed in terms of labor inputs. The assumption of a single production element and the resulting non-diminishing marginal returns are two major limitations in the Ricardian theory. The third limitation is that it doesn't try to explain why there are variances in relative costs (Miki, 1999).

According to the theory of comparative advantage, demand for low-skilled labor will increase disproportionately when a developing nation begins to trade internationally. As a result, their incomes should increase in comparison to those of higher-skilled natives, which should reduce income disparity there.

However, one of the limitations of the theory is that it measures static advantage but fails to consider the dynamic advantages.

### **2.2.2: Heckscher-Ohlin Model**

The model was developed in the 1930s by Eli Heckscher and Bertil Ohlin (Finflay, 2006). By introducing the second element of production, the model expands on the Ricardian model. The model is a  $2 \times 2 \times 2$  model, which means two nations, products, and factors involved.

The H-O model is built on several assumptions, first, the presence of two countries. Second, there are two components: capital and labor. Three, production technology is similar across countries. Four, prices are consistent throughout the board. Five, the two countries' tastes are the same. Sixth, the factor endowments of the two nations differ. States are categorized based on how plentiful capital or labor is based on their relative factor endowments. Seven, Factor Intensities may differ. According to relative factor intensities, items are characterized as capital-intensive or labor-intensive. Eight, the market is believed to be competitive, with no restrictions on entry or leave. Nine, between the two countries, there are no transportation costs, trade barriers, or trade restrictions (Heckscher, Flanders, Flam & Ohlin, 1991).

According to the theory, the disparities in comparative costs are caused by variances in factor endowment and the fact that various items require different factor proportions for production. Assume K represents the availability of capital in a country while L represents labor, PK is taken to be the total price of capital while PL is total the price of labor. Consider countries A and B; capital is abundant in country A, whereas labor is comparatively scarce in country A. The difference in factor endowments will result in differences in factor prices, hence variances in comparative production costs.

Differential costs are accounted for by variances in factor productions required to manufacture different commodities. Market prices change due to variances in the comparative costs of producing different products.

Country A will produce capital-in depth products and import labor-intensive goods. labor-intensive goods. Country B, on the other hand, will produce labor-intensive commodities and export capital-intensive goods. The Heckscher-Ohlin Model is not limited to natural resources or commodities instead the model accounts for factors of production and how they affect exportation.

The theory's first shortcoming is that it was unable to develop the idea of general equilibrium. The theory ignores curial factors that have significant effects on cost of production such as transport costs, economies of scale among others.

The theory's reliance on extremely oversimplified assumptions such as perfect competition, full utilization of resources. Given these presumptions, the entire model becomes rather unrealistic.

The theory also fails to consider the significance of product differentiation in global trade where trade can still occur even though factors of production are the same.

### **2.2.3: The Stolper-Samuelson Theorem**

The theorem was developed in 1941, the model describes a link between changes in output prices and factor prices (Suranovic, 2010). According to the theorem, commodity and the factor price have a unique relationship. When a commodity's price rises, the price of the corresponding intensive factor increases more than proportionally (Deardorff & Stern, 1994). The theorem also explains how tariffs impact capitalists' and workers' income. If capital-intensive prices grow, the capital price rises while the labor wage rate falls, according to the theory.

### **2.2.4: Heckscher-Ohlin-Samuelson model (H-O-S)**

The H-O-S theorem combines the H-O and Stolper-Samuelson Theorems. The H-O-S model investigates what causes comparative advantage in the first place. The model is based on several

assumptions. First, countries are endowed differently. Second, the relative intensities of production processes for different products are different (Yoshihara & Kurose, 2016). The only two components of production used are labor and capital. Think about a situation where two nations, A and B, use labor and capital to make fabric and automobiles. While country B is rich in capital, country A is rich in labor. Holding other factors constant, labor in A will be cheaper than in B. Assume that clothing production uses more labor than automotive production in terms of capital. Clothing will be produced at a lesser cost in A than in B. According to the same logic, vehicles will be cheaper in B than in A. Consistent with the Heckscher-Ohlin theorem, a country exports goods produced intensively through its relatively ample factor of production while importing goods produced intensively by using its surprisingly scarce factor of production. Thus, A exports clothes to B, and B exports vehicles to A. Although there are numerous underlying assumptions in the formal analysis, the conclusion about the trade pattern is obvious and consistent with common sense. Therefore, the HOS model predicts that enhanced trade openness will benefit low-wage employees in developing countries as well as skilled workers in developed countries, resulting in a reduction in income disparity in developing states and an increase in income inequality in developed states. H-O-S also produces trade implications for factor pricing and income distribution in the countries. International trade results in a relative increase in demand for labor to produce more clothes in A in comparison to demand for capital. As a result, the price of labor in A will rise compared to the price of capital. On the other hand, country B price of capital will rise due to an increase in relative demand in comparison to the price of labor. The change in factor price will be experienced until the equilibrium is reached where  $w_A = w_B$  and  $r_A = r_B$ : this gives the *factor-price equalization theorem*.

The H-O-S model suffers two major limitations, one is the issue of specialization while the other is the problem of reciprocal demand in a situation where a poor country has nothing to trade with then, minimal to no trade will exist.

### **2.2.5: The Rybczynski Theorem**

The factor endowments were assumed to be fixed in both the H-O theory and the factor-price equalization theory. In 1955, T.M. Rybczynski published a paper evaluating the effects of increased production factors on production, consumption, and trade terms (Hanson & Slaughter, 1999). When the supply of one of the factors of production increases, holding the supply of the other factor constant, the output of the good produced with the increasing factor increases in absolute terms, while the output of the other good declines. However, this is achieved if factor prices remain constant. Assume that in a country with a labor surplus, the labor supply is increased. It will lead to an increased output of the labor-intensive commodity, say cloth, and reduced capital-intensive products, say steel (Hanson & Slaughter, 1999).

The theorem is useful in analyzing economies with increasing return to scale, on the other hand the models suffered several weaknesses. One, the theorem disregards any possible changes in scale of production and fails to consider any possibility of increasing return to scale which could affect the total output of the economy.

### **2.3. Empirical Literature**

(Beckfield, 2006) researched on European Integration and income inequality. The study applied both random and fixed effects models in the analysis. The findings reveal that economic integration has a favorable effect as inequality diminishes as integration increases, whereas political integration increases inequality. However, the study had two major limitations: the measurement of political integration and the small sample problem, which limited the observations to be incorporated, as

suggested by the literature. To overcome such limitations, the current study used better measures of regional integration and included a wide range of data to avoid small sample problems.

Herault, N. (2007) researched trade liberalization, poverty, and inequality in South Africa. The research employed a macro-oriented CGE model with a macro simulation model with the main goal of evaluating the consequences of global commerce on families, specifically on income. The study's conclusions indicated that there is a trade-off, which means that trade liberalization lessens poverty.

Aradhyula et al. (2007) researched on the impact of trade openness on per capita income and income inequality. The research applied two-stage least squares to analyze panel data. Real per capita gross domestic product at PPP (PCGDP) was the dependent variable of interest, while explanatory variables include openness to trade, Gross secondary school enrollments, geographic regions of the sampled countries, demographic statistics, measures of democracy, corruption among others. The study found that, while business does create inequality, the size of the growth is smaller in industrialized countries.

Munir et al. (2013), worked on a study to evaluate the link between trade openness and income disparity in Pakistan. The Co-Integration Approach and VECM model were employed in the study. The results showed that FDI decreased inequality whereas trade, remittances, interest rates, and urbanization all increased it. According to the report, wealth gaps increased as Pakistan's economy got more liberalized.

Pham, T. H. H. (2014), conducted a study on Intra-regional trade and income inequality. Using a data sample of nineteen nations in the Asia-Pacific area for the period 1998-2011, the study looked at the link between regional trade and income disparity. To explain income disparity as a function of bilateral trade factors, the gravity model was applied. The study found that intra-regional exports

can help to reduce income disparities within countries, whereas intra-regional imports have the reverse effect.

(Busemeyer & Tober, 2015) looked at the impact of European integration on income inequality in the European Union. While highlighting theoretical elements that link rising inequality levels, the study distinguished between political and economic integration. From 1999 to 2010, panel data was used for 15 member states. The findings demonstrated a higher correlation between political integration and income disparity, however, there didn't seem to be a connection between economic integration and inequality. As a result, the level and trend of inequality in the EU are linked to the country's political integration.

(Ametoglo & Ping, 2016) conducted a study on regional economic integration and income inequality in Latin America based on the Andean Community of Nations (CAN). The research looked at CAN's panel data from 2000 to 2013. The study concluded that regional commerce has significantly contributed to the region's decreased inequality. Intraregional commerce raises income, but as member countries grow more integrated, this decreases. On the other hand, the results did not clearly show that economic growth influences earning disparity, but they did show how integrated the member states are.

(Suanes, 2016), conducted a study on the relationship between foreign direct investment and income inequality in Latin America. The study used panel data for thirteen economics for a period between 1980-2009. The study used the first difference generalized model of moments (GMM) which provided a way considering the unobserved heterogeneity within the country. The empirical finding of the study resulted in a conclusion that FDI had a favorable impact on income inequality, especially in the service and manufacturing industries.

(Ametoglo, Guo, & Wonyra, 2018) worked on a study paper to establish the relationship between regional integration and income disparity in the ECOWAS area. The study evaluated data from fifteen member countries from 2004 to 2013. According to the findings of the study, political integration reduces income disparity within the trading bloc, but economic integration widens it. The study also found that, in line with the pattern of global trade indicated by the Heckscher-Ohlin model, higher FDI lowers the inequality gap in ECOWAS. The findings, however, contradicted Beck field's 2006 research, which found a favorable association between political integration and income disparity.

(Gani, 2021) examined the question of whether financial integration contributes to inequality. The study employed a panel co-integration analysis in Europe to analyze data between 2000 and 2016. Financial integration, financial development, financial openness, GDP per capita, and inflation rate were the study's variables. According to the findings, the degree of financial development is correlated with income disparity. The study also discovered that compared to nations with high degrees of financial integration, those with low levels of financial integration have less income inequality.

(Eichengreen, Csonto, El-Ganainy, and Koczan, 2021), conducted research on financial globalization and inequality: capital flows as a Two-Edged sword. Variables included in the model were FDI, portfolio financial capital inflows, official development assistant, and remittance. The study concluded that financial globalization tends to foster economic growth as well as raise inequality.

#### **2.4 Overview of literature review**

This segment outlines a brief precis of the literature review. The first part of the chapter focused on outline the various theoretical perspectives including the Ricardian theory which argued that

comparative advantage, rather than absolute cost advantage, governs international trade. The second theory is the H-O model which states that disparities in comparative costs are caused by variances in factor endowment and the fact that various items require different factor proportions for production. The difference in factor endowments will result in differences in factor prices, hence variances in comparative production costs. The third theory is the Stolper-Samuelson theorem which states that the commodity and the factor price have a unique relationship. When a commodity's price rises, the price of the corresponding intensive factor increases more than proportionally. Lastly, the H-O-S model which predicts that enhanced trade openness will benefit low-wage employees in developing states as well as skilled workers in developed nations. The current study was guided by the H-O-S model.

Numerous studies have been undertaken on the effects of regional integration on income inequality. Nevertheless, a research gap still exists which this study will endeavor to fill. All these studies as portrayed in the literature review shows no agreement on how really regional integration affects income inequality. Beckfield (2006) researched European integration and income inequality and the findings relieved that economic integration reduces income inequality. This was in line with Herault (2007) and Pham (2014) and Ametoglo & Ping (2016) who all concluded that integration reduces income inequality. On the other hand, researchers like Aradhyula (2007) and Ametoglo, Guo & Wonyra (2018) concluded that economic integration widens the gap between them have and have not. Munir et al. (2023), evaluated the link between trade oppres and income inequality in Pakistan and concluded that FDI decreases income inequality; this was in contrast with the studies by Suanes (2016) and Gani (2021) which concluded that FDI reduces income inequality. However, Busemeyer & Tober (2015) found no connection between economic integration and income inequality. The lack of consensus called for further research on the same.

## CHAPTER THREE: METHODOLOGY

### 3.1. Introduction

This section focuses on the study's methodology, research design, theoretical foundations, and model specifications. This chapter also covered the definition and measurement of variables, as well as the types of data used and their sources. The chapter also outlines the diagnostic tests that were used to assess the reliability of the findings.

### 3.2. Research Design

This paper empirically evaluated the effects of economic integration and financial integration on the income inequality in the EAC using the panel regression analysis between 2000 and 2018. To do this, the study used a no experimental research approach with annual secondary data for Gini index, intra-export share of GDP, intra-export share of GDP, FDI inflows, net portfolio investment, education, inflation and real interest rate.

### 3.3. Theoretical Framework

The H-O-S model provides the most insight into the relationship between income inequality and international trade. In the H-O model there are two individuals, those who earn income from labor and the capitalist. To ascertain the impact of the shift to free trade on the purchasing power of capitalists and workers, real income changes are evaluated.

Consider the production function below.

$$Y(t) = F[K(t), L(t)] = K(t)^\alpha L(t)^{1-\alpha} \dots\dots\dots (3.1)$$

$$Y = AK^\alpha L^{1-\alpha} \dots\dots\dots (3.2)$$

The K in equation 3.2 represents capital while L represents labor while A is the technology.

The marginal productivities are given as follows and are positive.

$$\frac{\partial F}{\partial K} = \alpha AK^{\alpha-1} L^{1-\alpha} > 0 \dots\dots\dots (3.3)$$

$$\frac{\partial F}{\partial L} = 1 - \alpha AK^\alpha L^{-\alpha} > 0 \dots\dots\dots (3.4)$$

The firm's minimization of costs requires the optimal choice of L and K.

The cost minimization problem below was considered,

$$\text{Min } (wn + rk) \text{ s.t } F(k, n) = x_0 \dots\dots\dots (3.5)$$

The model assumed a constant return to scale; hence, for constant factor costs, minimizing cost will be the same problem whatever the scale of production.

Therefore,  $x_0 = 1$

The cost minimization problem was therefore expressed as follows,

$$\text{min}( wn + rk) \text{ s.t } F(k, n) = 1 \dots\dots\dots (3.6)$$

$$L = (wn + rk) - \lambda(F(k, n) - 1)$$

$$\frac{\partial L}{\partial n} = w - \lambda \frac{\partial F}{\partial n} = 0$$

$$\frac{\partial L}{\partial k} = r - \lambda \frac{\partial F}{\partial k} = 0$$

$$\frac{w}{r} = \frac{F_n}{F_k}$$

In terms of production theory, this equality says that cost minimization requires that the marginal substitution rate equals the ratio of factor prices.

The solution to the minimization problem above is the cost function and was re-written as follows,

$$C(w, r) = \text{min} \left\{ \frac{wn+rk}{F(k,n)} = 1 \right\} \dots\dots\dots (3.7)$$

The minimum cost for producing one unit of output is  $C(w, r)$ . This means that the cost function can be rewritten as follows.

$$C(w, r) = w\alpha_n + r\alpha_k \dots\dots\dots (3.8)$$

Differentiating the unit cost function in respect to wage gives the following results,

$$\frac{\partial c(w,r)}{\partial w} = \alpha_n + \left( w \frac{\partial \alpha_n}{\partial w} + r \frac{\partial \alpha_k}{\partial w} \right) \dots\dots\dots (3.9)$$

Equation 3.9 indicates how much labor is required to create one unit of the output. The capital needed to create one unit, however, was provided by the cost derivative defined in terms of r.

Assume that two countries, nation 1 and nation 2, are engaged in the production of two products y and x; and are labor and capital intensive respectively. Assume that capital is abundant in country 1, and labor is abundant in country 2. When these two nations transition from an autarky to a free trade agreement, each will import commodities made with less plentiful factors and export goods produced with abundant factors. Each country's import price will increase in proportion to its import.

Consequently,  $\frac{Py}{Px} \uparrow$  in country 1 and  $\frac{Px}{Py} \uparrow$  in country 2. In country 1, an increase in the  $\frac{Px}{Py}$  ratio signifies that the percentage change in Px surpasses the percentage change in Py.

Applying the magnification effects for prices implies that,

$$\hat{r} > \hat{Px} > \hat{Py} > \hat{w} \dots\dots\dots (3.10)$$

Hence, this points to  $\frac{r}{Px} \uparrow, \frac{r}{Py} \uparrow$ . this indicates that real rent in terms of both good x and y increases

hence  $\frac{w}{Px} \downarrow, \frac{w}{Py} \downarrow$  where real wage in both good x and y falls.

As a result, under free trade as opposed to autarky, a person in nation 1 who receives all their income from capital can buy more items. However, workers are worse off.

Based on the price magnification effects, country 2's  $P_y$  percentage change is higher than its  $P_x$  percentage change.

$$\hat{w} > \hat{P}_y > \hat{P}_x > \hat{r} \dots\dots\dots (3.11)$$

which in turn implies that

$$\frac{w}{P_y} \uparrow, \frac{w}{P_x} \uparrow \text{ which means that,}$$

$$\frac{r}{P_x} \downarrow, \frac{r}{P_y} \downarrow \text{ which means that real rent in goods falls.}$$

Then an individual in country 2 who receives wages as the only source of income can purchase more goods on a free trade area compared to autarky. As both countries transition from autarky to a free trade area, H-O models predict that there will be a redistribution of income in both countries. According to the theory, some individuals will gain from trade while others will lose. The fundamental basis of trade in the model is evaluated to distinguish between winners and losers. The basis of trade will depend on the country's resource abundance. However, redistribution of income will be between factors of production and not between industries.

Therefore, inequality can be expressed as a function of trade reforms as follows,

$$y_{it} = \gamma TradeReforms + \epsilon t \dots\dots\dots (3.12)$$

$Y_{i,t}$  describes the measure of income inequality of country  $i$  in period  $t$ . while trade reforms represent the trade agreements made by the trading bloc

### 3.4 Model Specification and Estimation

Guided by the relevant literature, we assume that the income inequality is represented by the Gini coefficient. Gini coefficient is likely to be determined by several factors: trade, the level of human capital and institutional quality.

the model used in the study is implicitly specified as follows,

$$Gini_{it} = \alpha_0 + \beta Trade_{it} + \gamma X_{it} + \mu_i + \eta_t + \varepsilon_{it} \dots\dots\dots (3.13)$$

$Gini_{it}$  represents Gini-coefficient-a proxy for income inequality in country i at year t, where trade represents regional openness.  $x_{it}$  represents vectors of other determinants of income inequality like portfolio investment inflows, exchange rate, real interest rates and domestic credit to the private sector.  $\mu_i$  represent specific country dummies while  $\eta_t$  represent time-specific dummies while  $\varepsilon_{it}$  is the error term.

Equation 3.12 can be broken down as follows,

$$(gini)_{it} = \alpha_0 + \alpha_1(TO)_{it} + \alpha_2(FO)_{it} + \gamma X_{it} + \mu_t + \eta_i + \varepsilon_{it} \dots\dots\dots (3.14)$$

Trade and financial openness were indicators of regional integration. TO, which represented trade openness, captured the effects of trade integration by determining how the economy is exposed to and reliant on international trade. On the other hand, the financial integration was captured by variable FO.

A model for effects of economic integration on income inequality was decomposed as follows,

$$(gini)_{it} = \alpha_0 + \alpha_1(TO)_{it} + \gamma X_{it} + \mu_t + \eta_i + \varepsilon_{it} \dots\dots\dots (3.15)$$

Where TO represent the trade openness index, the control variables  $\gamma X_{it}$  included education, inflation rate, exchange rate, real interest rates, economic freedom index and the domestic credit to the private sector.

While the model for the effects of financial integration in income inequality was as follows

$$(gini)_{it} = \alpha_0 + \alpha_1(FDI)_{it} + \alpha_2(PI)_{it} + \delta(Controls) + \mu_t + \eta_i + \varepsilon_{it} \dots\dots\dots (3.16)$$

The FDI indicated the inward FDI as a percentage of GDP, and the PI represented portfolio investment, both as measurements of financial integration.

### 3.5 Definition and measurement of variables

The section outlined the variables that were included in this study's analysis, how they were measured and how they were to be represented in the model.

**Table 3. 1: Definition and measurement of variables**

Variable	Symbol	Definition and measurement
Income inequality	Gini	Income inequality refers to uneven income distributed across a population. The Gini coefficient ranges between 0% and 100%.
Trade openness index	TO	measures the extent to which a country is engaged in the global trading system. The index is achieved from exports plus imports as a share of GDP
Foreign Direct Investments to GDP Ratio (%)	FDI	The amount of inward direct investments made in the reporting country by non-resident investors as a share of GDP.
Portfolio investment inflows, equities	PI	Defined as net stock inflows apart from those reported as FDI. Included are shares, stocks, depository receipts, and direct stock purchases made on the local stock market.

Education	EDU	This is the proportion of students who are officially enrolled in secondary school among all students who are of official school age.
Exchange rate	EXR	The relative price of one currency expressed in terms of another currency
Inflation rate	$\Pi$	A gradual rise in the price of products and services that lowers purchasing power; It is measured using the consumer price index
Real interest rates	r	Interest rates on loans that have been adjusted for inflation. Measured by the GDP deflator
Economic freedom index	EFI	Evaluates the degree of freedom in various nations using a variety of factors, including trade openness, taxation, judicial performance, among others. The index ranges from 0 to 100.
unemployment (percentage of total labor force)	$\mu$	The unemployment rate of a nation refers to the portion of individuals who want to work yet can't secure jobs. This incorporates laborers who have lost jobs and are looking for new ones, laborers whose job ended due to economic downturn, and laborers for whom there are no jobs on the grounds that the work supply in their industry is larger than the demand. It is measured as a percentage of total labor force.
Personal remittance	REMI	Personnel remittances comprise employee salaries as well as personal transfers. Any transfers that resident households have made or received from non-resident households in a certain period, whether in actual money or in kind, are inclusive of personal transfers. expressed as a proportion of the GD
Domestic credit to the private sector (percentage of GDP)	DCP	refers to any financial resources, including loans, trade credits, and other receivables, that financial institutions offer to the private sector. Performance score is a weighted average ranging from 0 to 100

### 3.6 Data Sources and Type

The study used secondary data collected between the years 2000 and 2021. The period chosen was informed by the fact that the EAC has achieved significant milestones in its integration objectives.

This period also witnessed many deliberations between East African countries centered on

removing non-tariff 39 barriers that greatly hindered regional trade. During this time, one-stop border posts were established, as well as a slew of other initiatives aimed at improving the flow of people and goods across East African borders. Several sources, including EAC secretariat documents, World Bank publications, and the author's computed data from the two sources, were used to compile the panel data.

### **3.7 Data analysis**

Panel data is superior for investigating the dynamics of changes and comprehending the dynamic behavior of transitions (Baltagi, 2021); therefore, the study employed this framework to establish the effects of regional integration on income inequality in the EAC.

### **3.8 Diagnostic tests**

#### **Normality test**

The normality test hypothesis was as follows hypotheses in this test are:

$$H_0: E(\varepsilon_{it}) = 0(\text{error, distributed normally})$$

$$H_1: E(\varepsilon_{it}) \neq 0(\text{error, not distributed normally})$$

#### **Autocorrelation test**

The test was conducted to determine if the error terms were correlated. Autocorrelation exists if the error terms are correlated. Regression coefficients are inefficient in the presence of autocorrelation, and their estimated variance is inconsistently biased.

#### **Heteroscedasticity test**

heteroscedasticity was conducted to determine if the error variant has a constant nature to produce the best OLS estimator.

hypothesis is:

H<sub>0</sub>: error does not contain heteroscedasticity.

H<sub>1</sub>: error contain heteroscedasticity.

### **Multicollinearity test**

OLS assumes that there is no significant correlation between the predictor variables. Detection of multicollinearity is done using a sample of correlation coefficient (Gujarati, 2004; Sutikno et al., 2017). If the correlation coefficient is greater than 0.85, then the model potentially suffers from multicollinearity, and vice versa.

### **Serial correlation**

The R squared value increases and the standard errors of the coefficients are smaller than they should be because of serial correlation.

### **Hausman Test**

The Hausman test was carried out to figure out which of the fixed effect and random effects models is best fit for analysis. The null hypothesis of the Hausman's test is that H0 is also a consistent estimator whereas the alternative hypothesis is that H1 is not a consistent estimator.

### **Lagrange Multiplier Test for time effects**

The significance of random effects in panel data models was assessed using the Lagrange multiplier test for time effects.

## CHAPTER FOUR: EMPIRICAL FINDINGS

### 4.1. Introduction

The analysis outcome, data sources, and descriptive statistics are all presented in this chapter. The empirical findings are organized according to the study's objectives.

### 4.2. Descriptive Statistics for Variables

To summarize data and show how it is distributed, descriptive statistics are utilized.

**Table 4. 1: The Descriptive Statistics**

Variable	Obs	Mean	Std. Dev.	Min	Max
GINI	55	42.715	5.415	31.6	53.1
GDP	110	23.51	25.248	.78	110.35
TO	110	39.866	10.112	21	64.48
FDI	110	1.961	1.622	-.01	6.46
DCP	110	17.026	7.596	3.1	35.1
PI	110	-18.638	406.802	-3720	1320
Edu	89	33.608	15.176	10	71.2
r	106	8.534	8.056	-34.462	23
EFI	105	57.162	5.292	42.3	71.1
$\Pi$	110	7.435	4.942	-2.815	26.24
XRT	110	1234.08	947.375	67.32	3727.07
Unemployment	110	4.621	3.77	.91	15.79
Remittance	110	1.776	1.481	0	7.2

According to table 4.1, the Gini index ranged from a minimum 31.6 percent to a maximum of 53.1 percent, with a mean of 42.715 percent and a standard deviation of 5.415. Trade openness index averaged at 39.866, the maximum value was 64.48 while the lowest value being 21 with a standard deviation of 10.111.

FDI inflow as a share of GDP had a standard deviation of 1.622, with the highest value of 6.46 while smallest value was -0.01. With a standard deviation of 7.596, domestic credit to the private sector averaged at 17.026 million dollars with the lowest reported value of 3.1million dollars and highest value being 35.1million dollars. The average portfolio investment inflow was -18.63 million

dollars with standard deviation of 406.8019, the portfolio investment within the region ranged between -3720 million dollars and 3120 million dollars.

According to table 4.1, the proportion of students who are officially enrolled in secondary school among all students who are of official school age averaged at 33.608 with a standard deviation of 15.177. The lowest figure reported was 10 percent while the highest was 71.1 percent.

The real interest rate averaged 8.534 with a standard deviation of 8.056. The minimum value reported was -34.462 with a maximum of 23. On the other hand, the Economic freedom index averaged at 57.16 and a standard deviation of 5.292. The lowest economic freedom index figure reported was 42.3 while the highest value was 71.1. Inflation rate averaged at 7.435 with the standard deviation of 4.94, the minimum inflation rate reported was -2.815 while the maximum was 26.24. The exchange rate had mean 1234.08 with a minimum of 67.32 and a maximum of 3727.07

Unemployment rate averaged at 4.621 with standard deviation of 3.77. The highest unemployment rate reported was 15.49 with the lowest being 0.91. On the other hand, personal remittance received had a mean of 1.776 and a standard deviation of 1.481. The lowest percentage reported in the area was 0 with the highest percentage being 7.2 percent.

### 4.3. Diagnostic test

#### 4.3.1. Multicollinearity test

A multicollinearity test was conducted to see the correlation of each predictor variable used in the regression model.

**Table 4. 2: Variance inflation factor**

	VIF	1/VIF
DCP	9.28	.108
Edu	7.435	.134
TO	3.455	.289

XTR	3.423	.292
FDI	2.548	.392
GDP	2.196	.455
EFI	2.094	.477
Unemployment	1.998	.5
ir	1.715	.583
R	1.576	.634
Remittance	1.532	.653
PI	1.09	.917
Mean VIF	3.195	.

According to table 4.2, the mean VIF was 3.193 which was below 4 indicating that variables are moderately correlated. However, DCP and Edu had a higher VIF indicating high multicollinearity.

**Table 4. 3: Variance inflation factor**

	VIF	1/VIF
XRT	2.233	.448
TO	1.93	.518
EFI	1.761	.568
ir	1.556	.643
Unemployment	1.553	.644
R	1.502	.666
GDP	1.494	.669
FDI	1.479	.676
Remittance	1.173	.853
PI	1.106	.904
Mean VIF	1.579	.

Table 4.3 indicates a repeat VIF without the two highly correlated variables and the mean was 1.59.

#### 4.3.2: Hausman test.

H<sub>0</sub>: random effects model was appropriate

H<sub>1</sub>: fixed effects model was effective

$$\text{chi2} = 2.41$$

$$\text{Prob} > \text{chi2} = 0.9921$$

Given that  $\text{Prob} > \text{chi2} = 0.9921 > 0.05$ , then the null hypothesis was accepted.

### 4.3.3: Breusch and Pagan Lagrangian multiplier test for random effects

The test was used in the study to test for random effects. It ascertains if the variance of the error term in a regression is affected by the values of the independent variables. The null hypothesis is that variances across entities equal zero.

$$GINI[x, t] = Xb + u[x] + e[x, t]$$

**Table 4.4: Breusch- Pagan Lagrangian multiplier test results**

	Var	sd = sqrt (Var)
GINI	32.59767	5.709437
e	21.90691	4.680482
u	3.212053	1.79222

Test: Var(u) =

$$chibar2 (01) = 16.80$$

$$Prob > chibar2 = 0.0000$$

We reject the null hypothesis and conclude that random effects are necessary if  $Prob > chibar2 < 0.05$ .

### 4.3.4: Normality test

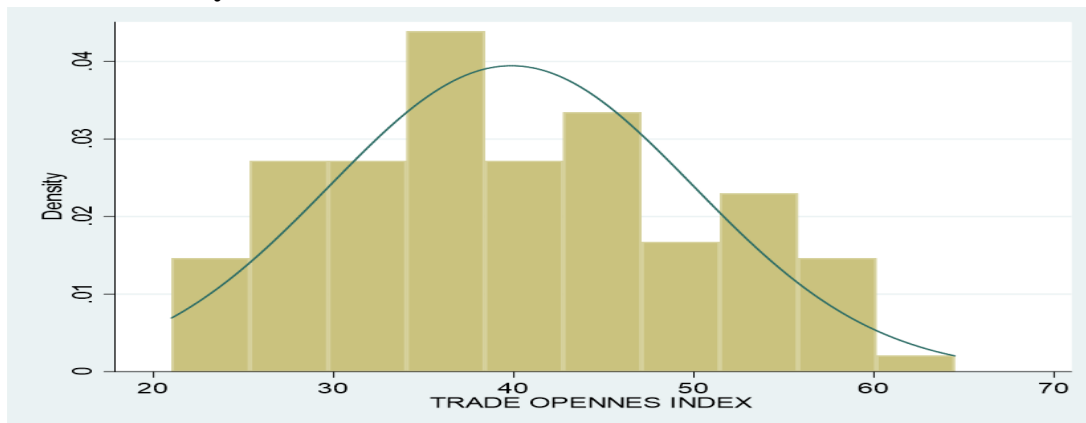


Figure 4. 1 Normality test: Dependent Variable: economic integration

Source: Author (2022)

Jarque-Bera normality test: 3.55 Chi (2) .1695

For the normalcy test, the J-B probability should be greater than 0.05. Under the null hypothesis, the error term was thought to have a normal distribution. Figure 4.1 demonstrates that the Jarque-Bera statistic, at 3.55 with a probability value of 0.1695, was higher than the p-value of 0.005 (5%). Hence, the null hypothesis was not rejected leading to the conclusion of normal distribution.

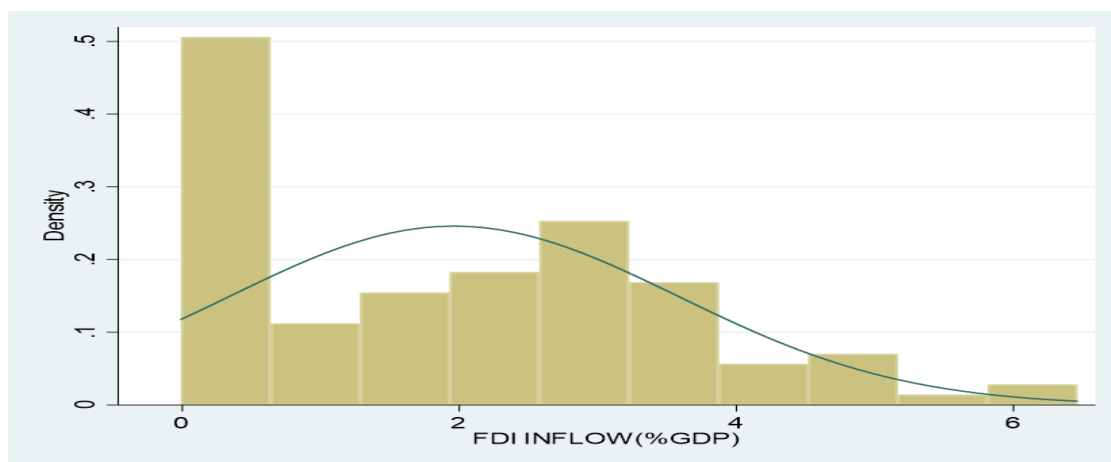


Figure 4. 2: Normality test: Dependent Variable: FDI inflow

Source: Author (2022)

Jarque-Bera normality test: 6.044 Chi (2) .0487

As shown in Figure 4.2, the null hypothesis was not rejected since the Jarque-Bera Statistics was more than the p-value of 0.005 (5%) at 6.044 with a probability value of 0.487.

### 3.3.5. Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

H0: no heteroscedasticity

H1: error contain heteroscedasticity

$$chi2(1) = 16.26, \quad Prob > chi2 = 0.0001$$

$Prob > chi2 = 0.0001 < 0.05$ , therefore, the null hypothesis is rejected and concludes heteroskedasticity.

## 4.4. Empirical Results

### 4.4.1. Effects of Economic Integration on Income Inequality in the EAC

The first objective of the study was to use the model below to estimate the effects of economic integration on income disparity in the EAC.

$$(gini)_{it} = \alpha_0 + \alpha_1(TO)_{it} + \delta(Controls) + \mu_t + \eta_i + \varepsilon_{it}$$

**Table 4. 5: Regression results for economic integration**

GINI	Coef.	St.Err.	t-value	p-value	[95% Conf Interval]	Sig
GDP	-.026	.039	-0.67	.502	-.103 .051	
TO	-.242	.106	-2.28	.023	-.45 -.034	**
Edu	-.028	.076	-0.37	.709	-.178 .121	
R	-.053	.103	-0.52	.606	-.256 .149	
EFI	.435	.187	2.32	.02	.068 .802	**
ir	-.091	.188	-0.48	.629	-.46 .278	
XRT	-.003	.001	-3.06	.002	-.006 -.001	***
Constant	35.258	9.534	3.70	0	16.572 53.945	***
Mean dependent var		43.027	SD dependent var		5.580	
Overall r-squared		0.263	Number of obs		44	
Chi-square		12.841	Prob > chi2		0.076	
R-squared within		0.077	R-squared between		0.912	

\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

Source: Author's own compilation (2023)

Based on the random effects regression results, the coefficient for GDP was -0.026 which was not statistically significant. The trade openness score was -0.242, which was found to be significant at 5%. Thus, a one percent increase in trade openness corresponds to a 0.242 percent reduction in income inequality. These findings collaborated with Beckfield (2006) and Herault (2007).

The regression analysis above shows the coefficient of education which indicates the proportion of students who are officially enrolled in secondary school among all students who are of official school age was -0.28. The coefficient was statistically insignificant at 5 percent. The coefficient for real interest rate was -0.53 but was statistically insignificant. The coefficient for economic freedom index as per the results was 0.435 which was a statistically significant coefficient at 5 percent. It follows that an increase of one percent on the economic freedom index will lead to a 0.435 rise in income inequality.

On the other hand, the coefficient for inflation rate was -0.091. The coefficient was statistically insignificant at 5%, indicating that the variable was unimportant in explaining regional income inequality. The coefficient for exchange rate was -0.0034 which was statistically significant at 5 percent. This means that a percent change in exchange rate results in a 0.0034 decrease in income inequality.

The results concurred with Ameteglo et al. (2018), who examined the relationship between regional integration and economic inequality in the ECOWAS area. According to the study's findings, a region's income disparity is decreased by increased trade openness. This was in line with the H-O-S model, which claims that when developing nations trade internationally, they manufacture commodities in which they have a comparative advantage, which raises the demand for low-skilled labor and salaries. Therefore, inequality may decrease.

The study also agreed with the Al-Jaid and Mohammad (2021) study, which looked at the influence of trade openness on income disparity in a few developed countries. According to the estimation results, openness reduces income equality levels in developing countries.

#### 4.4.2. Effects of Financial integration on income inequality in the EAC

The study's second objective was to determine the effects of financial integration on income inequality in EAC using the model below

$$(gini)_{it} = \alpha_0 + \alpha_1(FDII)_{it} + \alpha_2(NPI)_{it} + \delta(controls) + \mu_t + \eta_i + \varepsilon_t$$

**Table 4. 6: Regression results for financial integration**

GINI	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
GDP	.013	.024	0.55	.582	-.034	.061	
FDI	-.934	.44	-2.12	.034	-1.795	-.072	**
PI	-.003	.003	-1.16	.244	-.008	.002	
ir	-.098	.156	-0.62	.532	-.404	.209	
R	-.075	.093	-0.80	.423	-.257	.108	
EFI	.126	.155	0.81	.416	-.177	.43	
Unemployment	.748	.191	3.92	.0001	.374	1.123	***
Remittance	.744	.494	1.51	.132	-.224	1.712	
Constant	33.603	8.288	4.05	0.001	17.359	49.847	***
Mean dependent var		42.717	SD dependent var		5.362		
Overall r-squared		0.353	Number of obs		52		
Chi-square		23.460	Prob > chi2		0.003		
R-squared within		0.085	R-squared between		0.977		

\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

According to table 4.6, the coefficient for GDP was 0.013 but statistically insignificant at 5 percent. FDI had a coefficient of -0.934 and was statistically significant at 5 percent interval level. This indicates that an increase in FDI inflow by 1 percent results in a decrease in income inequality by 0.934. The coefficient for portfolio investment was 0.003 which was found not to be significant. Real interest rate and inflation rate were found not to be significant also with coefficients of -0.075 and -.098 respectively.

Based on the regression results presented above, the Economic freedom index had a coefficient of 0.126 which was statistically not significant. The coefficient for unemployment was 0.748 which

was statistically significant. This Means that a one percent increase in the unemployment rate will result in a 0.748 percent increase in income inequality in the region. Remittance received was seen to have a coefficient of 0.744 but not significant.

## **CHAPTER FIVE: SUMMARY, CONCLUSION, AND RECOMMENDATIONS**

### **5.1. Introduction**

The section presents the findings, analysis, and recommendations. Additionally, the chapter emphasize the significance of the findings for policymaking and points out areas that required further research.

### **5.2. Summary**

The overall goal of the study was to ascertain how regional integration affects income disparity in the EAC. The goals of the research were to analyze the impact of economic and financial integration on income disparity in the EAC. Regional integration is a critical issue in Africa because it connects global economies' products and financial markets through the forces of trade and capital flow across borders. Regional integration has the potential to provide significant economic benefits by allowing countries to increase market effectiveness, split the cost of providing public goods, and get additional advantages besides economic growth, like peace and security.

The study's motivation is that the region is doing well in integration, and GDP has expanded moderately in recent years. Although there has been strong economic development and efforts to promote integration, neither rapid structural change nor job creation is being achieved by the economy. Therefore, the study sought to understand how equitable the integration process is in EAC. The study's objectives were achieved using the random effect model. To achieve this objective, data on; the Gini index, GDP, trade openness, FDI inflow, Domestic credit to the private sector, Portfolio investment inflows, Education, Exchange rate, Inflation rate, Real interest rates, Economic freedom index, unemployment rate and personal remittance received was collected from various sources.

### **5.3. Conclusion**

In conclusion, the regression findings showed that a percentage change in the trade openness index resulted in a decline in inequality in the region. In contrast, a rise in the economic freedom index was reported to increase income inequality. The exchange rate was also seen to reduce the level of income disparity in the region. An increase in FDI in the region was also seen to reduce income inequality while increase in unemployment rate increases income inequality.

### **5.4. Policy implication**

In-depth empirical data on the links between regional integration and income disparity in the EAC have been given in this research. Even though the EAC region has grown significantly in terms of GDP, inequality continues to be a major obstacle that has impeded this development. Regional integration ought to be supported by structural changes that lessen inequality and broaden inclusivity.

There are several measures that regional governance can adopt to enhance trade openness within the region. One is to adhere to the customs union protocol whose main objectives included promoting production efficiency within the region, promoting economic development, enhancing both domestic and cross-border investment, and industrial diversification. All member states should agree and work on simplifying, harmonizing, and standardizing all trade-related information and documentation to facilitate trade in goods among them. The EAC member countries should as well liberalize trade in services more, this can be done by adding more services like energy, environmental, social, health, recreation, culture, and sporting services among other services to the initial commitment to liberalize seven propriety sectors namely business, financial, communication, distribution, transport, education and tourism. For this to succeed all restrictions to trade in services within the region should be removed.

Another instrument that the region might use is its exchange rate. In general, a country's central bank determines its fixed or pegged rate. Demand and supply dictate exchange rates, and to maintain the exchange rate, the country will either buy or sell its currency against the currency to which it is tied. Every government should be responsible for developing an exchange rate policy that is compatible with the underlying macroeconomic conditions. This is significant because the high variability of fluctuation in exchange rates around the expected value can lead to negative consequences such as price inflation and severe output contraction. As a result, the governments of the member countries should strive to reduce large swings in the exchange rate, which can lead to speculative attacks and weaken the stability of the money demand function.

According to the findings, FDI was found to reduce income inequality in the region. FDI are key drivers for economic growth and development in a region. This is mainly because they bring with them new technology, expertise and capital. The regional administration can implement several initiatives to help draw in more FDI, including, the government's subsidies, low-interest loans, tax exemptions, and other incentives. The tax break helps reduce the cost and the risk associated with investing in a new market while the low-interest loan will help with necessary capital. The member states can also provide regulatory support and improve infrastructure.

Unemployment on the other hand was seen to increase income inequality. There are several measures that the EAC can put in place to curb inequality. Regional policymakers should focus on expanding output which in return will stimulate aggregate demand, hence reducing cyclical unemployment. The policy makers can as well focus on supply-side policies that will make the labor market more flexible. Flexibility can be increased through labor mobility, wage flexibility or flexibility of working programs. Investing in training schemes and education is also key in helping

cub structural employment. These training helps people to acquire skills needed and applicable in the job market.

### **5.5. Areas for Further Research**

The emphasis was only on financial and economic integration. The study focused on the intra-EAC import share of GDP, intra-EAC export share of GDP, FDI, and portfolio investment. The study calls for more study on other economic and financial integration indicators and incorporates political integration.

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## APPENDIX

### Linear regression

GINI	Coef.	St.Err	t-value	p-value	[95% Conf	Interval]	Sign
GDP	.14	.081	1.72	.094	-.025	.304	*
TO	-.125	.257	-0.49	.629	-.643	.394	
FDII	.922	1.338	0.69	.495	-1.779	3.623	
PI	.001	.007	0.09	.931	-.014	.015	
R	.037	.259	0.14	.888	-.486	.56	
EFI	.314	.504	0.62	.537	-.704	1.332	
$\pi$	-.398	.443	-0.90	.374	-1.291	.496	
XRT	0	.003	-0.12	.905	-.006	.005	
Unemployment	.91	.656	1.39	.173	-.414	2.235	
Remittance	.423	1.487	0.28	.777	-2.578	3.424	
Constant	18.467	23.14	0.80	.429	-28.231	65.164	
Mean dependent var		38.796	SD dependent var			13.725	
R-squared		0.244	Number of obs			53	
F-test		1.357	Prob > F			0.233	
Akaike crit. (AIC)		434.199	Bayesian crit. (BIC)			455.873	

\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

Breusch-Pagan	/	Cook-Weisberg	test	for	heteroskedasticity
Ho:		Constant			variance
Variables:		fitted	values	of	GINI
chi2(1) =					16.26
Prob	>	chi2	=		0.0001

### Regression results for economic integration

Random-effects GLS regression

Group variable: x

R-sq:

within = 0.0702

between = 0.9362

overall = 0.2704

corr (u\_i, X) = 0 (assumed)

Number of obs = 42

Number of groups = 5

Obs per group:

min = 7

avg = 8.4

max = 10

Wald chi2(7) = 12.60

Prob > chi2 = 0.0525

GINI	Coef.	Std. Err	z	P> z	[95% Conf.	Interval]
GDP	-.029186	.0404363	-0.72	0.470	-.1084396	.0500677
TO	-.2390472	.1131008	-2.11	0.035	-.4607207	-.0173737
EDU	-.0271059	.0779333	-0.35	0.728	-.1798524	.1256405
r	-.0506902	.1059324	-0.48	0.632	-.2583139	.1569334
EFI	.4677425	.1999855	2.34	0.019	.0757782	.8597068
$\pi$	-.1181537	.1971309	-0.60	0.549	-.5045232	.2682158
XRT	-.0035326	.0011561	-3.06	0.002	-.0057985	-.0012666
_cons	33.71749	10.04227	3.36	0.000	14.035	53.39998
sigma_u	0					
sigma_e	5.3278291					
rho	0 (fraction of variance due to u_i)					

### Regression results for financial integration

Random-effects GLS regression

Group variable: x

Number of obs = 47

Number of groups = 5

R-sq:

within = 0.0296

between = 0.7495

overall = 0.2189

Obs per group:

min = 7

avg = 9.4

max = 11

corr(u\_i, X) = 0 (assumed)

Wald chi2(8) = 10.65

Prob > chi2 = 0.2225

GINI	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
GDP	-.0119113	.0365921	-0.33	0.745	-.0836306	.059808
FDII	-.7899497	.6065195	-1.30	0.193	-1.978706	.3988067
DCP	.0054248	.1629972	0.03	0.973	-.3140439	.3248935
PI	.001252	.0030514	0.41	0.682	-.0047286	.0072325
r	-.0094889	.1084706	-0.09	0.930	-.2220874	.2031096
EFI	.3538167	.191093	1.85	0.044	-.0207188	.7283521
$\pi$	-.2231123	.1920312	-1.16	0.245	-.5994867	.153262
XRT	-.0022213	.0010503	-2.12	0.034	-.0042799	-.0001628
_cons	29.11691	10.5459	2.76	0.006	8.447328	49.7865
sigma_u	0					
sigma_e	5.1110232					
rho	0 (fraction of variance due to u_i)					

## DATA

COUNTRY	x	YEAR	GIN I	GDP	TRADE OPENNESS INDEX	FDI INFLOW (%GDP)	DCP	PI MILLION US\$	Edu	R	EFI	ir	EXCHANGE RATE	Unemployment rate %OF Total labor force	Remittance % GDP
KENYA	1	2000	-	12.71	53	0.9	25.8	14.4	38.6	15.3	63	9.98	76.2	3.130	4.2
KENYA	1	2001		12.99	56	0	25.2	1.4	39.4	17.8	60.6	5.74	78.6	3.070	0.4
KENYA	1	2002	44.3	13.15	55	0.2	25.9	4.8	40.5	17.4	65	1.96	78.8	3.090	0.4
KENYA	1	2003		14.9	54	0.5	25.2	37.7	43.0	9.8	60.2	9.82	75.9	3.040	0.4
KENYA	1	2004	41.9	16.1	59	0.3	27.3	66.3	46.0	5	54	11.62	79.2	3.000	2.3
KENYA	1	2005	46.5	18.7	64.48	0.1	26.28	30.5	47.0	7.61	58	10.313	75.6	2.970	2.3
KENYA	1	2006	45.2	25.83	55.24	0.2	22.89	20.6	48.8	-8.01	60	14.454	72.1	2.940	2.2
KENYA	1	2007		31.96	53.89	2.3	23.05	24.7	50.8	4.819	60	9.759	67.3	2.920	2
KENYA	1	2008	42.5	35.9	57.58	0.3	25.38	26.1	56.6	-0.985	59	26.24	69.2	2.980	1.9
KENYA	1	2009		42.35	46	0.3	25.02	20.9	56.8	-10.1	59	9.234	77.4	2.920	1.5
KENYA	1	2010	-	45.41	50	0.4	27.23	29.0	47.8	12.5	58	3.961	79.2	2.850	1.5
KENYA	1	2011		46.87	58	3.1	30.57	1.7	48.8	4.5	57	14.022	88.8	2.860	2
KENYA	1	2012	-	56.4	52	2.4	29.54	-217.7	49.3	9.3	58	9.378	84.5	2.840	2.1
KENYA	1	2013		61.67	47	1.8	31.71	-270.5	54.3	9.3	56	5.717	86.1	2.830	2.1
KENYA	1	2014		68.29	46.17	1.2	34.13	-3720.0	58.7	8.2	57	6.878	87.9	2.800	2.1
KENYA	1	2015	40.8	70.12	40.33	0.9	34.25	155.1	63.3	6.3	56	6.582	98.2	2.770	2.2
KENYA	1	2016	48.5	74.82	34.87	0.6	33.25	370.0	66.7	8.2	58	6.297	101.2	2.760	2.3
KENYA	1	2017	42.7	82.04	36	1.6	29.46	850.7	68.5	5.7	54	8	103.4	3.520	2.4
KENYA	1	2018	41.6	92.2	34.41	0.8	31.2	-720.2	70.3	8.5	55	4.69	101.1	4.250	3
KENYA	1	2019	51.3	100.38	31.76	0.5	30.78	-425.1	71.2	7.8	55	5.236	102.0	5.010	2.8
KENYA	1	2020	36.4	100.67	27.23	0.4	32.1	1320.0		6.7	55	5.4	106.5	5.62	3.1
KENYA	1	2021	38.7	110.35	30.67	0.4	31.1	225.1		7.8	55	6.11	109.6	5.5	3.4
BURUNDI	2	2000	48.5	0.87	23	1.3	17.1	0.0		-16.7	42.6	24.43	720.7	3	0
BURUNDI	2	2001		0.88	21	-0.01	16.3	0.0	10.0	2.7		9.3	830.4	3	0
BURUNDI	2	2002		0.83	22	0	20.3	0.0	10.0	18.3		-1.37	930.8	3.13	0
BURUNDI	2	2003		0.78	27	0.01	20.1	0.0	11.0	5.6		10.65	1082.6	3.09	0
BURUNDI	2	2004		0.92	32	0	17.4	0.0	12.0	4.5		8.18	1100.9	3.19	0
BURUNDI	2	2005	34	1.12	35.1	0	14.54	0.0	12.7	-0.334		13.252	1081.6	3.18	0
BURUNDI	2	2006	33.4	1.27	42.4	0	15.83	0.0	13.9	13.833	49	2.735	1028.7	2.42	0
BURUNDI	2	2007		1.36	38.8	0.04	14.77	0.0	14.8	7.915	47	8.412	1081.9	1.63	0
BURUNDI	2	2008		1.61	47.2	0.240	13.66	0.0		-6.195	46	24.407	1185.9	1.6	0.2
BURUNDI	2	2009		1.78	35.8	0.020	14.63	0.0	19.5	3.275	49	10.555	1185.7	1.6	1.6
BURUNDI	2	2010	36.1	2.03	39.5	0.040	18.36	0.0	22.8	3.554	48	9.592	1230.8	1.6	1.7
BURUNDI	2	2011		2.24	43	0.150	21.56	0.0	25.5	4.492	50	18.161	1261.1	1.59	2
BURUNDI	2	2012		2.33	43.69	0.030	20.21	0.0	28.7	0.024	48	7.938	1442.5	1.57	2
BURUNDI	2	2013	38.6	2.45	47	4.470	19.39	0.0	33.4	6.662	49	4.405	1555.1	1.57	2
BURUNDI	2	2014		2.71	43	3.020	19.29	56.4	39.4	9.841	51	5.545	1546.7	1.52	2.1

BURUNDI	2	2015		3.1	22.84	1.600	16.39	0.0	44.4	-4.949	54	5.558	1571.9	1.38	1.6
BURUNDI	2	2016		2.64	23.04	0.000	17.17	0.0	47.5	13.152	54	5.558	1654.6	1.26	1.2
BURUNDI	2	2017	32.2	2.71	22.24	0.010	15.46	0.0	49.3	3.004	53	16.053	1729.1	1.14	1.2
BURUNDI	2	2018	31.6	2.66	26.6	0.040	18.03	0.0	48.5	18.2	51	-2.815	1782.9	1.13	1.8
BURUNDI	2	2019	51.6	2.58	29.03	0.040	20.7	0.0	45.1	13.6	49	-0.67	1845.6	1.13	1.9
BURUNDI	2	2020	51.3	2.65	26.77	0.320	23.4	0.0	48.0	5.9	49	7.32	1915.1	1.14	1.8
BURUNDI	2	2021		2.78	28.82	0.280	35.1	0.0		4	50	8.4	1976.0	0.91	1.7
RWANDA	3	2000	48.5	2.07	27	0.390	8.7	0.0	11.0	12.8	42.3	3.9	389.7	11.94	0.3
RWANDA	3	2001		1.97	29	0.940	9.1	0.0	12.0	16.8	45.4	3.34	443.0	11.94	0.4
RWANDA	3	2002		1.97	28	0.080	9.4	0.0	13.0	22.6	50.4	1.99	475.4	11.88	0.4
RWANDA	3	2003		2.14	29	0.220	8.9	0.0	14.0	-3.6	47.8	7.45	537.7	12.03	0.4
RWANDA	3	2004		2.38	33	0.320	9.8	0.0	16.0	4.4	53.3	12.25	577.5	11.78	0.4
RWANDA	3	2005	52	2.39	34.24	0.270	10.3	0.0	17.0	6.2	56	5.035	557.8	11.93	0
RWANDA	3	2006	53.1	3.32	33.24	0.920	11.8	0.0	18.0	13.1	59	7.251	551.7	11.65	0
RWANDA	3	2007		4.07	35.99	2.030	12	0.0	20.0	2.7	57	7.026	547.0	11.64	0
RWANDA	3	2008		5.18	37.63	1.980	13.4	0.0	22.0	1.6	57	10.278	546.9	11.57	0
RWANDA	3	2009		5.67	36.83	2.090	11.2	0.0	26.0	8.9	58	12.142	568.3	11.68	0
RWANDA	3	2010	47.2	6.12	37.3	3.530	11.5	-6.7	32.0	13.4	58	6.2	583.1	11.68	1.7
RWANDA	3	2011		6.88	39.74	1.630	13.3	-84.6	36.0	8.8	57	12.691	600.1	11.80	2.5
RWANDA	3	2012	49.7	7.66	40.56	3.520	15.8	-8.0	38.0	11.4	57	16.001	614.3	11.70	2.4
RWANDA	3	2013	45.1	7.82	42.72	2.990	16.2	-402.7	41.0	12	58	7.871	646.6	11.80	2.2
RWANDA	3	2014		8.25	43.93	3.810	17.6	56.7	40.0	12	58	6.13	682.4	11.87	2.2
RWANDA	3	2015	43.2	8.55	45.23	1.900	21	-7.9	38.0	16.8	58	5.588	719.9	11.85	1.9
RWANDA	3	2016	43.7	8.7	49.51	3.220	20.5	-4.9	37.0	11.7	59	5.175	787.3	11.80	2
RWANDA	3	2017		9.25	53.86	2.980	20.6	74.1	39.0	8.3	59	5.319	831.6	11.80	2.3
RWANDA	3	2018	44.3	9.64	55.76	3.800	21.4	14.8	41.0	17.7	60	3.494	861.1	10.76	2.7
RWANDA	3	2019	46.1	10.35	57.93	2.540	21.5	30.4	44.0	13.7	71.1	3.464	899.4	11.54	2.5
RWANDA	3	2020		10.18	55.13	0.980	25.1	-26.5	44.0	9	70.9	9.85	943.3	11.83	2.8
RWANDA	3	2021		11.07	53.85	1.910	25.4	-200.0	46.0	13.1	68.3	-0.39	988.6	15.79	3.5
TANZANI A	4	2000	37.3	13.38	24	3.460	3.1	0.0		12.4	56	5.92	800.4	3.07	0.1
TANZANI A	4	2001		13.58	28	4.040	4.1	-9.2		14.5	54.9	5.15	876.4	2.99	0.1
TANZANI A	4	2002		14.14	27	2.800	5.2	-2.0		8.5	58.3	5.32	966.6	3.13	0.1
TANZANI A	4	2003		15.22	30	2.090	6.2	-3.4		5.6	56.9	5.3	1038.4	3.23	0.1
TANZANI A	4	2004		16.65	34	2.650	7.1	-2.3		6.8	60.1	4.74	1089.3	3.19	0.1
TANZANI A	4	2005	40.3	18.4	36.96	5.080	7.4	-3.2		8.327	56	5.035	1128.9	3.18	0.1
TANZANI A	4	2006		18.65	42.77	2.160	9.79	-2.7	20.2	9.612	59	7.251	1251.9	3.30	0.1
TANZANI A	4	2007	40.3	21.84	48.06	2.660	11.47	-4.3		6.39	57	7.026	1245.0	3.02	0.1
TANZANI A	4	2008		27.94	49.06	4.950	11.91	-1.8	36.2	-1.202	57	10.278	1196.3	2.78	0.1
TANZANI A	4	2009	37	29.08	43.53	3.280	11.27	-3.5		5.492	58	12.142	1320.3	2.50	0.1

TANZANI A	4	2010	36.4	32.01	47.64	5.660	11.72	0.0	30.6	4.675	58	6.2	1395.6	3.05	1.1
TANZANI A	4	2011	37.3	34.66	57.17	3.550	12.36	-11.3	33.6	2.464	57	12.691	1557.4	3.47	1.2
TANZANI A	4	2012	37.8	39.65	54.37	4.540	12.82	-6.1	31.7	4.591	57	16.001	1571.7	3.23	1
TANZANI A	4	2013		45.68	48.63	4.570	12.54	-4.5		5.649	58	7.871	1597.6	2.93	0.8
TANZANI A	4	2014		49.96	45.36	2.830	13.3	-11.5	30.7	9.656	58	6.13	1653.2	2.12	0.8
TANZANI A	4	2015	37.8	47.38	40.76	3.180	14.61	-27.6	27.1	7.913	58	5.588	1991.4	2.13	0.8
TANZANI A	4	2016		49.77	35.42	1.740	13.67	5.0	26.7	7.896	59	5.175	2177.1	2.19	0.8
TANZANI A	4	2017	31.7	53.32	32.24	1.760	13.07	53.0	27.3	14.674	59	5.319	2225.9	2.34	0.8
TANZANI A	4	2018	40.5	57	32.64	1.700	12.7	-7.0	29.4	12.061	60	3.494	2363.8	2.44	0.7
TANZANI A	4	2019	48.6	61.14	32.96	1.990	12.66	-199.5	30.8	11.794	60	3.464	2288.2	2.78	0.7
TANZANI A	4	2020	48.6	62.41	29.6	1.100	12.4	-18.4	31.4	9.8	61.7	3.29	2294.2	2.87	0.6
TANZANI A	4	2021		67.84	31.38	1.360	12.4	0.0	28.7		61.3	3.69	2297.8	2.65	0.8
UGANDA	5	2000	43	6.19	33	2.590	5.67	0.0		10.6	58.2	3.39	1644.5	3.55	3.8
UGANDA	5	2001		5.84	35	2.590	6.62	0.0		17.3	60.4	1.87	1755.7	3.54	6
UGANDA	5	2002	45.2	6.18	36	2.990	7.7	-1.9	17.7	23	61	-0.29	1799.6	3.50	7.2
UGANDA	5	2003	43	6.61	37	3.060	8.27	-16.0		10.3	60.1	8.86	1963.7	3.60	4.5
UGANDA	5	2004		7.94	35	3.720	7.61	-6.2	15.4	4.3	64.1	3.72	1810.3	2.69	3.9
UGANDA	5	2005	42.9	9.24	38.99	4.110	8.62	13.4	19.6	21.766	62.9	8.449	1780.5	1.90	3.5
UGANDA	5	2006	42.6	9.98	43.63	6.460	10.11	-21.7	19.4	15.909	64	7.311	1831.5	2.25	4.1
UGANDA	5	2007		11.9	46.78	6.060	10.23	-67.7	21.7	10.981	63	6.139	1723.5	2.65	3.8
UGANDA	5	2008		14.44	57	5.050	13.9	-17.6		13.243	64	12.051	1720.5	3.01	5
UGANDA	5	2009	44.2	25.09	47.27	3.350	11.39	-28.7	27.4	-34.462	64	13.017	2030.5	3.00	3.1
UGANDA	5	2010	44.2	26.56	38.43	2.040	13.34	110.5	27.4	13.761	62	3.977	2177.6	3.63	2.9
UGANDA	5	2011		27.75	39.93	3.210	16.1	-259.3	26.3	11.373	62	15.125	2522.8	3.51	2.9
UGANDA	5	2012	41	27.19	43.69	4.410	14.36	-3.1	26.4	21.488	62	12.679	2504.6	3.55	3.3
UGANDA	5	2013		28.79	43.3	3.790	14.39	14.5	27.9	19.015	61	4.903	2586.9	1.90	3.3
UGANDA	5	2014		32.47	36.17	3.250	15.44	-33.1	27.7	15.677	60	3.075	2599.8	2.43	2.7
UGANDA	5	2015	41	32.25	37.85	2.280	16.51	212.1	26.7	16.555	60	5.41	3240.7	2.79	2.8
UGANDA	5	2016	42.8	29.08	31.34	2.140	16.51	66.7	24.2	18.233	59	5.446	3420.1	3.15	3.9
UGANDA	5	2017		30.76	36.84	2.610	15.95	442.4	27.0	16.152	61	5.641	3611.2	3.64	3.8
UGANDA	5	2018	37.6	32.92	36.65	3.210	13.64	80.3	24.0	14.646	62	2.624	3727.1	3.38	4.1
UGANDA	5	2019	45.5	35.35	39.57	3.600	13.8	281.9			60	2.869	3704.1	3.11	4
UGANDA	5	2020	48.5	37.6	37	2.320	14.6	192.4			59.6	3.31	3718.3	3.81	2.8
UGANDA	5	2021		40.53	41.37	2.820	14.8	-85.5			58.6	2.2	3557.1	3.42	2.9