

**T.R.
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DEPARTMENT OF ECONOMICS**



**THE RELATIONSHIP AMONG INCOME INEQUALITY,
ECONOMIC GROWTH AND TRADE OPENNESS: KUZNETS
CURVE APPROACH FOR THE CASE OF KENYA**

Master's Thesis

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ACCEPTANCE AND APPROVAL OF THE THESIS

The study entitled “**THE RELATIONSHIP AMONG INCOME INEQUALITY, ECONOMIC GROWTH, AND TRADE OPENNESS: KUZNETS CURVE APPROACH FOR THE CASE OF KENYA**” prepared by **Mariama NYANG**, and supervised by **Asst. Prof. Dr. Özgür ÖZAYDIN**, was found successful and unanimously accepted by committee members as Master thesis, following the examination on the date 27.3.2023 .

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ÖZET

GELİR EŞİTSİZLİĞİ, EKONOMİK BÜYÜME VE TİCARİ AÇIKLIK İLİSKİSİ: KENYA ÖRNEĞİ İÇİN KUZNETS EĞRİSİ YAKLAŞIMI

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Bir ulusun kalkınmasını etkileyen temel ve önemli bir faktör olarak gelir eşitsizliği olgu kıstası, küresel ekonominin en önemli sakıncalarından biri olmuştur. Ekonomik kalkınma stratejilerinin ortaya çıkışından bu yana, zengin ve fakir oranı arasındaki fark, dünyanın her yerindeki ekonomistler tarafından geniş bir şekilde tartışıldı ve Kenya'da, nüfuslarının bir yüzdesinden daha azı, %99'dan daha fazla servet edindiği için açıkça şiddetli olduğunu göstermektedir.

Bu nedenle, bu tez, Kuznets eğrisi çerçevesini ve hipotezini kullanarak Kenya'daki gelir eşitsizliği, ekonomik büyüme ve ticari açıklık arasındaki temel ekonomik ilişkiyi gözlemlemek ve incelemek için 1976' dan 2015'e kadar olan yıllara ait zaman serisi verilerini kullanmaktadır. Bu çalışma, Kuznets hipotezinin Kenya ekonomisinde gerçekten geçerli ve uygulanabilir olup olmadığını belirlemeyi amaçlamaktadır. Bu amaçla, makro değişkenler arasındaki uzun dönem korelasyonunu analiz etmek için ticaretteki açıklıkları içeren ve dışlayan iki farklı Oto Regresif Dağıtılmış Gecikme (ARDL) modeli ve kısa dönem ilişkisi için Hata Düzeltme Modeli (ECM) kullanılmıştır. Net gelir için Gini katsayısı, kişi başına düşen GSYİH ve dışa açıklık gibi temel göstergeler kullanılarak, bulguların sonuçları, bağımlı ve bağımsız değişkenler arasında uzun vadeli bir eşbütünleşme olduğunu göstermiştir. Ticarete açıklık değişkeninin dahil edilmesiyle elde edilen bulguların daha ileri ve ek değerlendirmesi, gelir eşitsizliği ile ekonomik büyüme arasında anlamsız bir ilişki tespit etti, ancak ticarete açıklık değişkeni çıkarıldığında, ilişki hem uzun vadede hem de kısa vadede istatistiksel olarak anlamlıydı. Sonuç olarak ticaret açıklık değişkenini kapsamayan sonuçlardan elde edilen kanıtlar, Kuznets eğrisi hipotezi ile uyumlu hale geldi ve böylece Kenya ekonomisindeki kullanımını doğruladığını bulmaktadır.

Anahtar Kelimeler: Gelir Eşitsizliği, Kuznets Eğrisi, Ekonomik Büyüme, ARDL, Gini Endeksi, Açıklık.

ABSTRACT

THE RELATIONSHIP AMONG INCOME INEQUALITY, ECONOMIC GROWTH, AND TRADE OPENNESS: KUZNETS CURVE APPROACH FOR THE CASE OF KENYA

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The phenomenon yardstick of income inequality as an essential factor affecting a nation's development has been one of the critical drawbacks of the global economy. Since the emergence of economic development strategies, the divergence between the wealthy and poor ratio has been broadly discussed by economists and is evidently drastic in Kenya as less than a percentage of their population acquires more wealth than the 99%.

This paper, therefore, uses time series data between 1976-2015 to observe the fundamental relationship among income inequality, economic growth, and trade openness in Kenya by employing the Kuznets curve framework. The study aims to determine whether the Kuznets hypothesis is valid and applicable in Kenya. For this intent, two different Auto Regressive Distributed Lag (ARDL) models are examined; one involving the trade openness variable and the other excluding it. The models are further used to analyze the long-run correlation among the macro variables and the Error Correction Model (ECM) for the short run relationship. By using core indicators such as the Gini coefficient for net income, GDP per capita, and trade openness, the results of the findings suggested a long-term cointegration between the dependent and independent variables. Further evaluation of findings with introducing trade openness detected an insignificant relationship between income inequality and economic growth. However, their relation was statistically significant in the long and short run when openness was omitted. Obtained evidence from results not encompassing the openness variable aligned with the Kuznets dynamics thus validating its usage in the Kenyan economy.

Keywords: Income Inequality, Kuznets Curve, Economic Growth, ARDL, Gini Index, Openness.

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Mariama NYANG

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SYMBOLS AND ABBREVIATIONS

ADF	: Augmented Dickey-Fuller
ARDL	: Autoregressive Distributed Lag
ECM	: Error Correction Model
EKC	: Environmental Kuznets Curve
EU	: European Union
FD	: Financial Development
FDI	: Foreign Direct Investment
GARCH	: Generalized Autoregressive Conditional Heteroskedasticity
GDP	: Gross Domestic Product
IMF	: International Monetary Fund
KPSS	: Kwiatkowski Phillips Schmidt Shin
LS	: Lee and Strazicich
NARDL	: Nonlinear Autoregressive Distributed Lag
OECD	: Organization for Economic Cooperation and Development
PP	: Phillips Perron
SWIID	: Standardized World Income Inequality Database
WDI	: World Development Indicator

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1. INTRODUCTION

The structural change in economies due to income inequality, economic growth, and trade openness is a fundamental global issue that improves or degrades economic development. Policymakers and economists have had great concerns regarding the distribution of income particularly in underdeveloped and developing nations. Scholars including Branko Milanovic (2010) have clearly revealed that all incomes were mobilized together in the early 18 century until the industrial revolution came through which was the beginning of a massive difference in the income brackets and caused nations to be further off instead. A nation's income should be equally distributed throughout the population (Conrad, 2016) but some elites have denounced his argument as a feasible cause of a diminishing capacity in society. However, there is an inadequacy in the general research concerning how income inequality as a link between economic growth and openness affiliates with the income distribution in Kenya.

This research aims to identify the integration among income inequality, trade openness, and growth and evaluate if the Kuznets dynamic is valid for the economy in Kenya. This chapter will thus lay down an introduction and background in context, and the research aims, objectives, problems and questions, and finally limitations and importance.

Global Income inequality is an unfair and unequal distribution of income that has been accelerating lower since the nineteenth century but rapidly accelerated high in the early 20th century (IMF). It manages to seize the recognition of all the key economic development works such as Kuznets (1955) which according to Shahbaz (2010) is both controversial and significant. Topuz and Dağdemir (2020) on their discovery of the Kuznets inverse U hypothesis in Türkiye evaluated the per capita GDP growth and trade openness as positive aftermath for income distribution in Türkiye. (Panizza 2002; Nissan and Carter 2001) conducted prominent research on the link found between economic growth and income inequality. A negative relationship between the variables may be caused by political economic fluctuation and the imperfection of the financial market (Panizza, 2002). Regardless of the possible obstructive reasons, Nissan (2001) found some town centers in the US encountering a quick rate of growth in their communities than others.

However, studies in this field have mainly focused on the Gini index for disposable income as a critical factor in measuring income inequality. This, therefore, presents an issue for high-income inequality economies like Kenya as the net income of individuals after taxes and transfers is not covered. Additionally, numerous studies in Kenya focused on the relevance of the Environmental Kuznets Curve (EKC) rather than the Kuznets Curve. Henceforth, given the preliminary research based on the validity of the Kuznets hypothesis in Kenya and the minimal to no use of the Gini market income, the proposed study will aim to evaluate whether the Kuznets curve hypothesis is valid for Kenya by using the Gini market as an explained variable between (1976-2015) and if it is, what will be the shape of the curve.

Kuznets (1955) claimed that there is an inverted U- shaped curve correlation between economic growth and income distribution. Therefore, the main objective of this paper is to determine what happens to the Kuznets curve as income increases or decreases based on the economic development situation in Kenya between 1976-2015. The causes and factors regarding income inequality in Kenya will be examined, the effects of trade openness on income will be discussed, and the study's estimation and policy application method will also be explained. Kenya has been chosen for this study because of its poor record of extreme income inequality over the years.

The proposed study will therefore attempt to answer the following research questions;

1. Based on the Kuznets theoretical framework outcome, is the hypothesis applicable in Kenya?
2. What has happened to Kenya's economic growth and inequality with the presence and absence of openness over time?

This study will add to the literature in this area by covering the research gap that no study has used the Gini market for net income coefficient to estimate this topic in Kenya to my knowledge and only a few investigations of the rationality of the Kuznets curve were made. Nevertheless, due to the limited access to data resources in recent years and some more other viable indicators, the scope of the study became narrow hence further investigation with data layout can be made.

As this segment already introduced and discussed the context of this study, the next will discuss the fundamental concepts behind the thesis topic, then review the

existing pieces of literature, then the econometrics analysis regarding methodology and data, empirical results and finally the discussion and conclusion chapter.



2. FUNDAMENTAL CONCEPTS

2.1. Kuznets Framework

The Kuznets curve is a theoretical framework that shows the relationship between income and income distribution throughout economic growth. Simon Kuznets' (1901-1985) hypothesized that market forces increase as economic development occurs and then decrease over time which causes economic income inequalities in the nation illustrated by the inverted U Shaped of the Kuznets curve. The rationale was that nations have to shift from Agricultural to Industrial sectors to experience growth.

His hypothesis claims that in the early stages of economic growth, many investment opportunities arise for the wealthy, causing a massive gap between income and wealth assembled by various societal groups. The figure below shows the relationship.

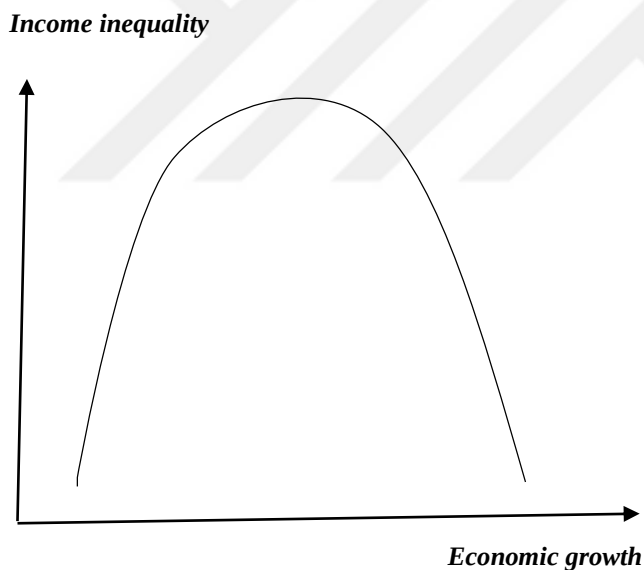


Figure 2.1. Kuznets Inverted U-Curve

Source: (Weil, 2016: 389).

The inverted U-shape curve indicates the elements of the Kuznets hypothesis with economic growth on the horizontal axis and income inequality on the vertical axis. The graph conveys that income inequality rises and then falls at the peak as economic growth increases over economic development.

According to Kuznets's hypothesis the long-term extreme inequality gap in the personal distribution of income in the early stage of growth it's due to two driving

forces. 1) only the upper-income earners can save based on the allocation of income between consumption and savings and 2) The industrial structure of income distribution; where he highlighted that income distribution is less in the rural society than in the urban society even when based on annual income. Additionally, concerning the first reason, Kuznets gave an example that indicates that the top 5% of high-income earners in the US earn more than 2/3 of the population and the poorest 20% could barely make any savings. (Kuznets, 1955, p. 7,8)

In 1963 he conducted another research where he gave supportive conclusions of his first work. One of the few things he highlighted was that, due to the pre and post-income taxation, inequality tends to be vast in under-developing nations compared to developed countries. He further mentioned that wealth inequality is relatively more common in the agro sector than in other sectors and income inequality in developed economies is decreasing in the long run. (Kuznets, 1963: 68)

Analytically, the scope of Kuznets' theory is limited in nature as various nations have undergone rapid economic growth that did not match his hypothesis, and quite a number of researchers have come up with different frameworks involving more elements. In his paper, he highlighted that he is "conscious of the meagerness of reliable information presented that the paper is perhaps 5% empirical information and 95% speculations" (Kuznets, 1955, p. 26).

2.1.1. Functions in Kuznets Hypothesis

Different forms of functions were developed in order to examine the Kuznets dynamics. Ayhan (2018) proposed quadratic and cubic equations which were highly operated in pieces of literature for testing the Kuznets theory. Below are the given equations:

$$Gini = \omega_0 + \omega_1 gdp + \omega_2 gdp^2 + u \dots\dots\dots (2.1)$$

$$Gini = \omega_0 + \omega_1 lngdp + \omega_2 lngdp^2 + u \dots\dots\dots (2.2)$$

$$lnGini = \omega_0 + \omega_1 lngdp + \omega_2 lngdp^2 + u \dots\dots\dots (2.3)$$

$$Gini = \omega_0 + \omega_1 gdp + \omega_2 gdp^2 + \omega_3 gdp^3 + u \dots\dots\dots (2.4)$$

$$Gini = \omega_0 + \omega_1 lngdp + \omega_2 gdp^2 + \omega_3 lngdp^3 + u \dots\dots\dots (2.5)$$

Following previous studies that used the Kuznets hypothesis to determine the relationship between variables, an exceptional amount of them used the quadratic

function which brings out an output of a U or inverted U curve. To meet the Kuznets theory of inverted U-curve, the coefficient of the logarithm of GDP and GDP squared must be less and greater than zero respectively, i.e. $\omega_1 > 0, \omega_2 < 0$.

The cubic equation is formed S-shaped lined horizontally which is scarce base on literature. However, a researcher such as Shahbaz (2010) is one of the few that extended his model specification to a cubic form to investigate GDP per capita on income inequality. He found evidence that manifests the existence of the S curve.

2.2. Income Inequality

Income inequality is the center of crucial global problems in different socioeconomic groups. It refers to the manner in which income is unevenly distributed among the population by highlighting the gap between those with the highest and lowest earnings in an economy. Income inequality has been existing since the beginning of time and has been researched since the period of the classical economist (Jensen, 2001). The World Inequality Report 2021 reported that, 10% of the wealthiest population earn 52% of the worlds' income making the poorest half own 2% of the global wealth and 76% of it is acquired by the richest 10%. A bar chart representation is given in figure 2.2.

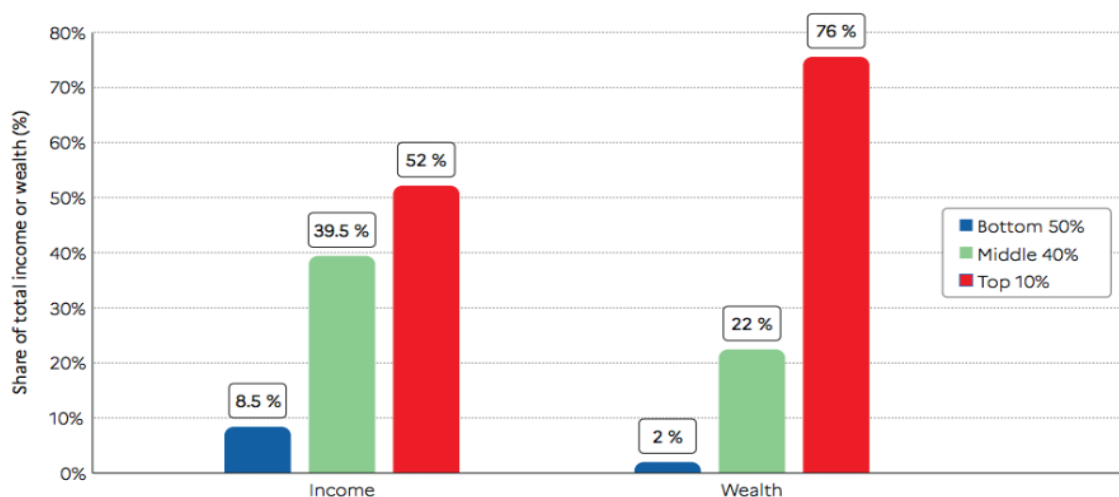


Figure 2.2. Global wealth and Income Inequality

2.2.1. Measuring Global Inequality

2.2.1.1. Gross Domestic Product (GDP) per Capita

In his article titled Global inequality by the numbers, Milanovic (2012) remarked that income inequality globally has a much more effect than any form of inequality in one economy. Milanovic (2006) highlighted that initially, a wide range of studies on

income inequality was analyzed by employing GDP per capita conveyed in similar legal tender because data were unavailable or unreachable in many developing countries.

Per capita GDP is a key factor in this study and a variable commonly used to measure universal income inequality and distribution. It is calculated by dividing the Gross Domestic Product of a country by its total population. Figure 2.3 demonstrates GDP per capita worldwide selectively.

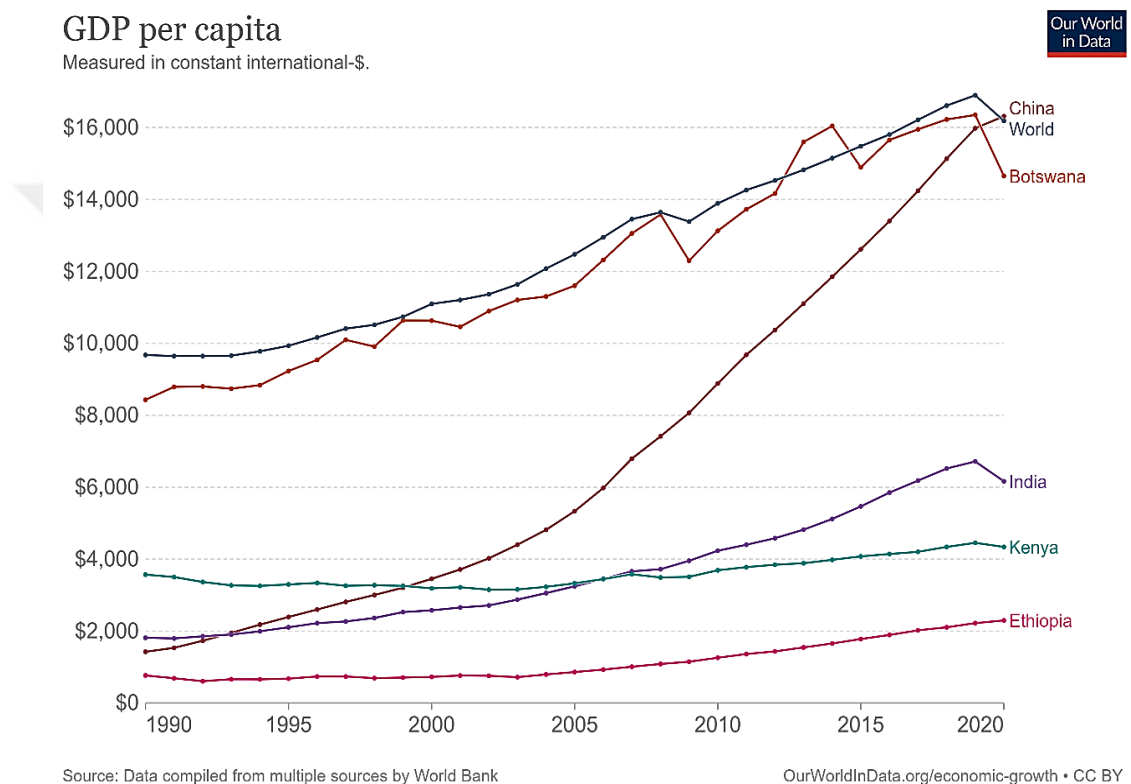


Figure 2.3. Per capita GDP across the world from OurWorldInData

Note: This data was assembled from a variety of sources and published by the World Bank (WDI).

By examining the GDP per capita of the countries above, a considerable gap in the global distribution of income can be seen. As the year goes by, the relative difference between the economies becomes higher. The per capita GDP of Kenya was slightly stable and increased at a decreasing rate but expressed a tiny increment in 2007 and 2019. However, considering the gap presented on the graph, developed countries are observed to secure double the amount of the per capita income of developing and underdeveloped nations but at the same time, the indifferences can be based on the population of the countries as it is measured by dividing the GDP of a country with its population. This, therefore, exhibit how per capita GDP as a dependent variable is not

the finest way to determine a country's performance on income inequality. Gross Domestic Product per capita on average is negatively significant with income inequality in the long run (Brueckner and Lederman, 2015).

2.2.1.2. Gini Coefficient

The Gini coefficient shows a country's aggregate fraction of the population against the aggregate fraction of its total income (OECD). It is the most exceeding used index to estimate income inequality and was obtained from the Lorenz curve which represents an illustration of income and wealth inequality (EU). The index has two forms of measuring a society's inequality, the Gini for disposable income which shows growth income and operated before taxes and the Gini market which is employed after taxes and transfers and shows net income.



Figure 2.4. Lorenz Curve

Source: IMF report, Gini coefficient of inequality

With the vertical axis representing the cumulative income share and the horizontal axis cumulative population both in percentages, wealth distribution in an economy is presented. Following the graphs above, the Lorenz curve is circulated between zero and one where zero expresses perfect income equality and one denotes perfect income inequality. The difference between the Lorenz curve and the slope line is the measure of income inequality. Also, the percentage of the area from the line to the curve where $Gini < 0 < 1$ or everything below the slope is referred to as the Gini coefficient. Thus, the smaller the coefficient the better the income distribution. A very high Gini index indicates excessive income inequality in a nation but this does not necessarily show what average income is in a given economy or how prosperous individuals are in a nation especially when Gini disposable income is used.

2.2.2. Income Inequality in Kenya

Alleviating economic inequality has been one of the most vital issues in developing countries such as Kenya over the years. Due to the adapted nature of the economic system, Kenya has been financially imbalanced despite its immaculate record of economic growth since 2005.

It is reported that Kenya is among the top 10 countries in Africa fighting to progressively reduce economic inequalities yet approximately 0.1% of Kenyans own more wealth than 99.9% of the population (Oxfam international). The income distribution in Kenya is one-sided hence resources are in the hands of few people which accounts for generational poverty.

2.2.2.1. Assessing Wealth Inequality in Kenya

In an array of investigating the income inequality that transpired between 1976-2015 in Kenya, a breakthrough in income distribution in light of average income and tax formation is given in (figures: 2.5, 2.6) below.

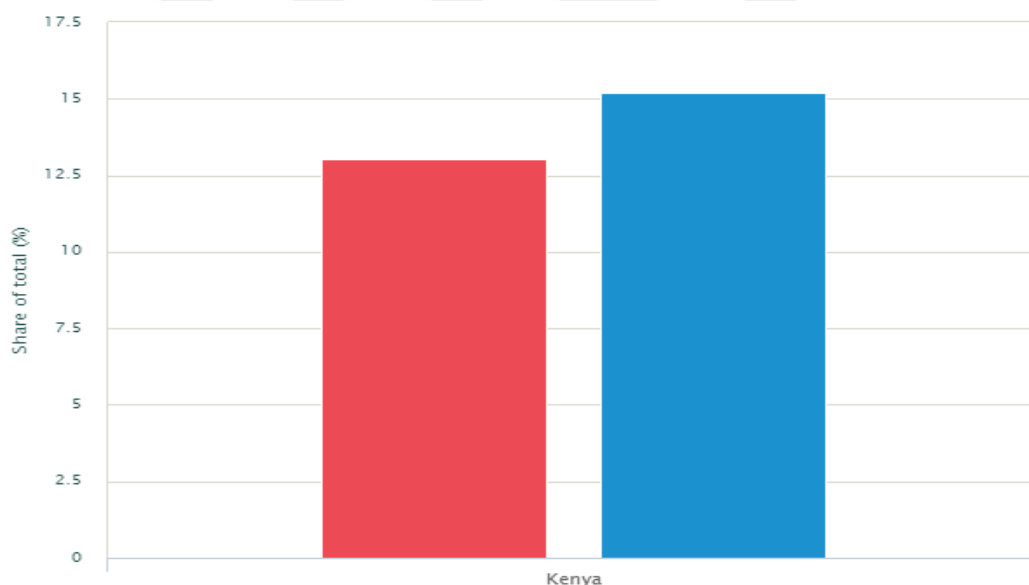


Figure 2.5. Income inequality, Kenya, 2015

Source: WID (World Inequality Database, Accessed on 29 November 2022)

- Pre-tax national income – top 1% share
- Pre-tax national income – bottom 50% share

The chart shows income inequality's impact on earnings before taxes in Kenya in 2015. The top 1 percent represents the rich and the bottom 50 the poor. However,

although high-income earners pay more federal taxes than low-income earners in Kenya, the poor contribute approximately 15 percent of the pre-tax national income, implying that the rich contribute or pay less than the poor. As the gap between the poor and the rich continues to widen, income inequality will increase drastically but federal taxes still tend to decrease inequality at some macro level. The dispersion of personal income pre-taxes through a central flow of economic factors of production only takes place before transfer payments and taking into account after pensions.

Nevertheless, due to the progressive nature of federal taxes, income distribution after tax is more accurate and equal than the distribution before tax. Therefore, the wealthy have a smaller portion of total income after tax than the portion they receive before taxes. Hence pre-taxes on income only favor the rich which increasing the income inequality gap in Kenya in 2015.

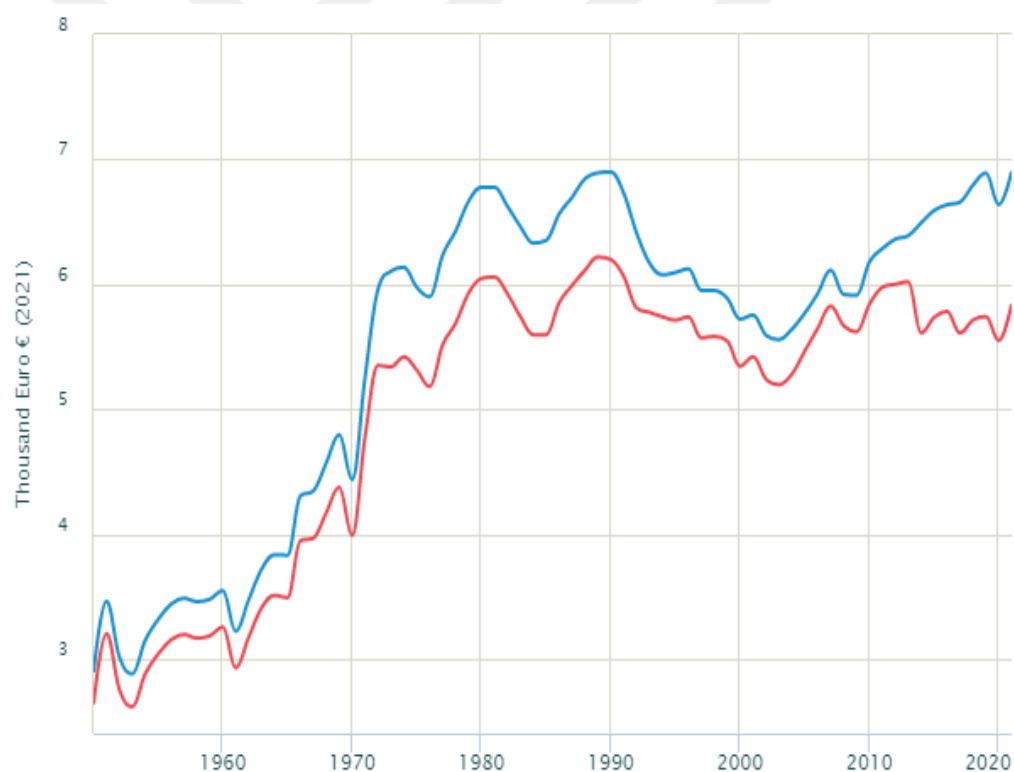


Figure 2.6. Evolution of average income, Kenya, 1950-2021

Source: WID (World Inequality Database, Accessed on 29 November 2022)

- GDP - average income – total population
- National income – average income – total population

The evolution of income has diversely shown how growth and development in Kenya appreciate and depreciate in an economical time frame. Figure 2.6 examines the average income in Kenya between 1950 to 2021 by explaining the movements of the trends between Gross Domestic Product (GDP) and National Income which is the GDP minus fixed capital plus net foreign income earned by residents in other countries. The fluctuation of the trends shows how income was unequally distributed in Kenya within a given period. Both the macro variables were moving in the same direction until a specific year (2010) where a breakage with the average income in relation to the national income accounts occurred due to some economic heterogeneity issues as the GDP was increasing, national income drastically fell.

2.2.2.2. Causes and Effects

According to Obiero and Topuz (2021) in the questionable study of whether internal and public debt caused income inequality in Kenya between 1970-2018, it was found that both public and internal debt are significant in the long run after examining the empirical analysis. Findings further show that Kenya's unrestrained public debt as a source of financing for its nation has caused abundant debt in recent decades. Moreover, as the rich purchase government bonds, internal debts rise, but in the course of the refund, everybody is equally taxed including the poor who are unable to afford government debt instruments. Therefore, the results obtained from empirical studies clearly indicate that debt (public or internal) widens the gap in income inequality between the wealthy and the poor in Kenya.

In light of the above conclusive study, several Kenyan political economic analysts and lawyers had a quality discussion on the income inequality report that was aired on Oct 2018, Ebru TV Kenya. Lawyer/Political Analyst Ben Kinuthia mentioned how the issue of policy and mishandling of the economy causes income inequality in Kenya. Mr. Kinuthia gave a scenario about the wealth inequality ratio. He said if all the wealth in Kenya was accumulated, put in a basket and sold, then distributed that money equally to each and every Kenyan, after precisely 10 years, those who are rich would be rich and those who were poor would be poor.

Kenyans are crying about the detrimental act of mismanagement of public funds, corruption, and bad governance which are big loopholes where the country lost a lot of cash thus, causing extreme income inequality said Lawyer Seth Kamanza.

3. REVIEW OF WORKS OF LITERATURE

3.1. Objective and Definition

There have been numerous studies about income inequality and economic growth or income inequality and trade openness on the Kuznets curve framework. Most of these studies focused on the Environmental Kuznets curve, financial development, poverty, structural change, etc. The studies on income inequality in Kenya mostly focus on hypothetically analyzing the relationship between income inequality and economic growth. Additionally, quite a number of researchers usually use the Gini disposable income which is a sufficient way to measure income inequality but it does not apprehend all the income distribution data of an economy. Only a limited number of studies used the Kuznets theoretical framework to examine their relationship without trade openness.

Related reviews on empirical studies analyzing income inequality and economic growth have been a growing interest over the past five decades. Existing pieces of literature such as List and Gallet (1999), Ayhan (2018), Can, Kılıç, & Kurt (2022), Deininger and Squire (1996-1998), Cakmak and Tosun (2017), Rangel, Andrade, and Divino (2008), Shabaz (2010), Banerjee and Duflo (2003), Kiatrungwilaikun, & Suriya (2015), etc. discuss shreds of evidence regarding the repercussions and influence of income inequality on economic growth and vice versa.

International trade has increased over the decades both in advanced and developing economies. It is a major driver of economic growth that fuels prosperity and enhances poverty and inequality reduction in the modern world. In light of Kuznets's (1955) hypothesis, several empirical studies have been made on the concern of the effects of openness on income inequality. Researchers such as (Topuz and Dağdemir 2020; Dobson & Ramlogan 2009; Jalil 2012; Neagu, Dumiter, and Braica 2016) made conclusive studies on the impact of trade openness on growth and income inequality.

3.2. ARDL Approach

Topuz and Dağdemir (2020) investigated the effect of trade openness on income inequality under the Kuznets inverse U curve hypothesis using the ARDL approach within the period 1987-2016. The study found a nonlinear U connection between the macro variables by using annual data of variables such as the Gini coefficient, financial

development, openness, and agricultural terms of trade. They also found evidence that during the beginning of trade liberalization in Türkiye, trade openness rose while income inequality fell. However, a drastic rise in income inequality occurs in the later stages. Similarly, (Can, Kılıç, & Kurt 2022; Disbudak and Suslu 2009) investigated whether the Kuznets (1955) hypothesis was valid in the Turkish economy and found that there is a negative correlation between economic growth and income inequality in which the results indicated that the Kuznets theory of inverted U shaped curve is not valid and the relationship was somewhat similar to a U shape. However, capturing time series data from 1963 to 1998, Disbudak and Suslu (2009) empirical findings observed that, in Türkiye, distribution in the early stages of growth enhances better than in the later phase. Nonetheless, according to the examined results shown by the quadric model that Can, Kılıç, & Kurt (2022) created utilizing data from 1987 to 2019, growth in Türkiye initially lessens income inequality and increases it in the later stages of economic development after a threshold value.

Additionally, Shahbaz, Loganathan, Tiwari, and Sherafatian-Jahromi (2015) explored the long and short-term correlation between income inequality and financial expansion in Iran. Using the ARDL test approach to evaluate the long-run relationship and error correction framework for the short-run variation, they discovered that both financial development and economic growth reduce income inequality but globalization and inflation enhance income distribution in the most significant ways in which the U-shaped relationship was also found between the two variables. With an annual dataset from 1952 to 2009 in China, Jalil (2012) also used ARDL dynamics to analyze the relationship between income inequality and openness in the Kuznets framework. A curvilinear relationship between the variables was found implying that income inequality will rise as trade openness rises to a critical point and then falls. Thus, their evidence fits the classic Kuznets curve. Findings further argued that per capita GDP growth and financial development eliminate income inequality.

Wolde, Sera & Merra (2022) used annual time series data in Ethiopia from 1980 to 2017 to assess whether there is a long-term relationship between economic development and income inequality. They suggested a negative relationship between the variables in their findings. Nevertheless, a positive was found in the short term. Consequently, using the ARDL estimator Ifeakachukwu (2020) observes that economic growth and globalization have an essential impact and a huge contributing

factor to income inequality in Nigeria. Annual data from 1981 to 2018 was used for the examination of the intercorrelation between economic growth, income inequality, and globalization. A similar investigation was made by Abakumova and Primierova (2018) covering the years from 1995-2016 in Ukraine. On estimating the Gini and GDP variable, empirical findings reported a disguised relationship between the variables and a positively parallel cointegration between income inequality and globalization.

On the other hand, Shahbaz (2010) employed the ARDL bounds testing approach on annual time series data to investigate the linear and nonlinear relationship between income inequality and economic growth. Shahbaz's findings are unique in the literature. He found empirical evidence proving the existence of the Kuznets U and S-shaped curve on the relationship between income inequality and economic growth in Pakistan between 1971-2005. The unpredictability of economic growth on income inequality in Indonesia, Malaysia, Singapore, Thailand, and The Philippines ranging from 1980 to 2015 was assessed by Ghosh (2020). He used annual time series data on selected variables (Gini, GDP, CPI, fiscal policy, FD) for his observation and found a positive statistically significant effect between income inequality and growth instability in the long run. Sehrawat & Giri (2015) investigated India's economy and its relation to financial development and income inequality from 1982 to 2012 operating on annual data. Empirical findings after employing the ARDL dynamic suggested that income inequality is worsened by inflation, growth, and financial development but the wealthy and poor ratio is decreased by trade openness.

Moreover, Yameogo & Dauda (2022) made a relative analysis between Burkina Faso and Nigeria about the link between economic growth, carbon emission, and income inequality. Covering annual data from 1980 to 2016, their findings reported a U-shaped relation between inequality and environmental deterioration in Burkina Faso while a U curve was discovered in Nigeria. However, both economies were reported to possess a positive relationship between environmental damage and income inequality.

3.3. Other Econometric Approaches

Ayhan (2018) in her research about the relationship between economic development and income inequality covering 45 countries between 1995 to 2014, uses

the Kuznets inverted U hypothesis to argue that there is a U-shaped relationship between income inequality and economic development as opposed to the Kuznets inverted U hypothesis. In her study, she examines the relationship between the variables using the panel data method and measures economic development with two macro tools, GDP and the human development index. Her findings further showed that the human development index expresses the relation between income inequality and economic development better than GDP. The 45 investigated countries include 30 developed, 11 developing, and 4 underdeveloped economies. Henry and Panotani's (2019) study on national income per capita's influence on income inequality also provide findings that validate the Kuznets U shape in Nigeria. Their study employed the Vector Error Correction Model and the Granger causality to examine the relation among variables such as GDP per capita, and Gini as a proxy for inequality and gross national savings ranging from 1981-2017 in Nigeria. Using Panel data analysis, the same conclusion was made by Cakmak and Tosun (2017) after examining 25 economically inclined and middle-income countries from 2002-2013 to investigate the relationship between the variables of economic growth and income distribution.

Of similar econometric method, Doğan and Cafri (2016) also used the dynamic panel data technique operating on system GMM to analyze 34 OECD countries including the U.S, U.K, Türkiye, Germany, etc. from 2000-2012 to estimate the validity of their hypothesis using the Kuznets U curve or the great U-turn. After exploring 10 variables including GD, unemployment, technology, and education, research findings revealed that the relationship between wealth inequality and growth supports the Great U-turn. In addition, Kiatrungkilaikun,& Suriya (2015) in examining the existence of the Kuznets curve by observing 91 countries covering the years between 2000 to 2012 found that the relationship between the Gini index and economic growth is a U and not an inverted U curve. The study estimated its variables using random and fixed effects and employed the Hausman test to adopt a convenient model. They further mentioned that the reason for that outcome was caused by the movement of labor from Agriculture to the industrial sector. Mercan and Azer (2013) covering the period 1995 to 2009, evaluated the effects of income distribution and economic growth with some data from six Central Asia and Caucasian nations. In their analysis using panel data analysis with structural breaks, a long-term negative effect between the variables was observed but created a positive effect on income distribution

given the rapid growth of the economy in two of the evaluated countries, Turkey and Azerbaijan.

Authors like (Deininger and Squire 1996; Li, Squire and, and Zou 1998; Altunoz 2021) questioned the validity of Kuznets (1955) hypothesis by establishing proof that an increment in income inequality was predetermined in the last stages of economic development. Altunoz (2021) 's findings further observed that economies with higher public spending and literacy have fewer income inequality problems following his examined dataset of 16 years from 2000 to 2016 of developing and changing nations. His study was distinctive in nature as several econometric approaches are used, namely; ARDL, NARDL, GARCH, and Markow Chain. However, none of them shows statistical significance which is why an OLS model was selected for the observation of the variables. Succeeding the use of the Stochastic optimal growth model, Shin (2012) empirical evidence suggested that an increase in inequality can cause growth to be slower in the first stages of development, stimulate growth in the steady stage, and can be decreased by high-income tax in the near steady stage.

Contrary to the previous findings, some studies uphold the validity of the Kuznets inverted U hypothesis. List and Gallet (1999) used panel data estimates for 71 countries from 1961 to 1992 and found that developing and underdeveloped countries employ the Kuznets inverted U-shaped. They reveal that there is a positive relationship between per capita income and income inequality in the economic growth process and a change in production from the industrial to the service sector was one of the great contributors. However, due to the limited nature of their data, they stated that the relationship between income and income inequality as to how and why it came into existence remains uncertain creating a gap in their research. However, an empirical study by Banerjee and Duflo (2003) used Kernel regression of a nonparametric approach on a cross country dataset and concluded that the Kuznets inverted U curve exists and it is stable in the political economy framework. An overlapping nonparametric regression was also used by Frazer (2006) to analyze the evolution of income inequality and development across and within counties. Despite the poor level of income inequality in Korea, he found that a classic Kuznets curve process occurred when analyzed. Frazer operated the Gini coefficient as a dependent variable and GDP per capita as an independent variable for his analysis.

Inequality is negatively correlated to economic growth Wahiba and Weriemmi (2014). They identified that the negative correlation between the variables became more apparent after the openness exchange process in the Tunisian economy between the period 1984 to 2011. A two-way causality was used to investigate the correlation between growth and inequality using indicators such as the Gini index, annual growth, money supply, etc. A cross-sectional examination of industrial Sub-Saharan African economies was done by Gelan and Price (2003) to study the relationship between income inequality and economic growth in 73 nations over the years 1960-1985 where skilled and unskilled labor are determinants. Using OLS estimates, results were found that due to the dualistic nature of sub-Saharan African countries, they are reported to be situated on the side of the Kuznets inverted U curve where income inequality rises with respect to economic development. Rangel, Andrade, and Divino (2008) tested two ways in which income inequality and economic growth can correlate. Using the Akaike information criterion, they analyzed a linear and inverted U shape relation and concluded that the inverted U is the most accurate form to represent the relationship between income inequality and economic growth. Their research covers the years between 1991 to 2000 for the income per capita variable but only focuses on the data in 1991 for the minimum comparable areas in Brazil.

In their experiment as to whether there is an openness in the Kuznets curve or not, ranging from 1982 to 2000, Dobson & Ramlogan (2009) observe annual data from 18 Latin American regions to examine if using the Kuznets theory approach will make an impact of trade openness on income inequality more understandable. Operating panel estimates approach, and their findings reported that income inequality rises with openness and then falls after a critical point. Günaydın and Çetin (2015) studies showed empirical evidence that in the long run, trade openness reduces income inequality in Türkiye. They analyze the relationship between the macro variables using the Johansen Juselius cointegration method and the Granger causality test.

Moreover, according to a study by Neagu, Dumiter, and Braica (2016), a panel data analysis from 10 countries in Eastern and Western Europe covering the period 2000-2014 was used to inspect the ramifications of trade openness and other vital factors on income inequality. With annual data of the Gini and openness variables, the Results of their studies highlighted that an intense increment in income inequality was recognized because of trade openness and other key elements such as market

capitalization and income distribution from the labor force. Further studies on trade openness and economic growth such as Meschi and Vivarelli (2007) concluded that trade flow has little or less relation to income inequality. They employ dynamic specification to explore the effect of trade on 70 developing countries with income inequality over the period 1980-1999 and found that trade with developed economies drastically reduces income distribution in developing nations. Their hypothesis was that in relation to wealth inequality, trading with more advanced nations is more important than just trading in general but empirical results found the opposite. A similar study was made with relevant data between 1991 to 2013 by Mahesh (2016) investigating the influence of trade openness on inequality in four nations, namely, India, Brazil, Russia, and China. He used the system GMM for the dynamic panel model for his analysis. His results suggested that a positive and significant relationship occurs between trade openness and income inequality in those mentioned countries but trade increment as a percentage of GDP somehow worsens income distribution.

Alternatively, annual panel data was used from 42 countries from 1992 to 2007 to estimate the link between trade openness, the Gini index, and FDI by Lim and McNelis (2014)'s research. Results found that, in developing countries, financial and trade openness is one of the effective ways to reduce income inequality. Additionally, econometric findings also discovered that economic growth decreases income inequality at the same time a rise in trade openness either increases or decreases the Gini coefficient.

4. METHODOLOGY, MODEL, and DATA SET

4.1. Definition

This research investigates whether the Kuznets curve hypothesis is valid for the case of Kenya between 1976-2015 using time series econometric data type for the analysis.

4.2. Methodology Framework

This paper employs the Autoregressive Distributed Lag model (ARDL) bounds test approach on the Eviews program to investigate the long and short-run relationship between income inequality, economic growth, and trade openness in light of Simon Kuznets's (1955) hypothesis. A unit root test was made using ADF, PP, and LS break points to verify the static nature of the variables before the ARDL analysis. According to the unit root test results, variables can be stable at level or at logarithm differences. The period in this analysis is long, ranging from (1976-2015) which covers 39 years. A stationary test was essential to examine a structural break in the series. The study proceeded to apply the autoregressive distributed lag (ARDL) bounds testing approach among the primary variables and the equations 4.1 and 4.2 were chosen to be the most suitable model due to its numerous stability results.

4.2.1. Model

The Autoregressive Distributed Lag model's most predominant feature is that it can be applied even when variables are stationary at different levels. Two econometric models are established including trade openness and the other without openness to examine the relationship between income inequality, growth, and trade openness by assessing whether the Kuznets U-shaped theory is relevant in Kenya.

$$G_t = f(Y_t, Y_t^2, O_t) \dots\dots\dots (4.1)$$

$$G_t = f(Y_t, Y_t^2) \dots\dots\dots (4.2)$$

In accordance with the model generated above, the study uses the Gini coefficient market (G) as a dependent indicator for income inequality. It shows the Gini index for the net income. Y and Y^2 represent Gross Domestic Product per capita (square) and the O variable signifies Trade Openness which illustrates the total trade share in GDP.

Converting eq. (4.1) and (4.2) into a logarithm expression we have;

$$g_t = a_{a0} + a_{a1}y_t + a_{a2}y_t^2 + a_{a3}o_t + \varepsilon_{at} \dots\dots\dots (4.3)$$

$$g_t = a_{b0} + a_{b1}y_t + a_{b2}y_t^2 + \varepsilon_{bt} \dots\dots\dots (4.4)$$

Where α_0 is a constant term and ε_t is a residual. $\alpha_{1,2,3}$ are coefficients of the independent variables GDP per capita square, GDP, and Trade Openness.

4.3. Data and Variables

In this study, annual data of the variables were extracted from two different sources. The explanatory variables; GDP per capita and Trade openness (trade as a % of GDP) in Kenya from the year 1976 to 2015 were acquired from the World Bank database (WDI) and the Gini market data which serves as a dependent factor of this paper was obtained from the Standardized World Income Inequality Database (SWIID).

The econometrics strategies and analysis of this research were examined by using the Eviews program and in the table below the variables are explained.

Table 4.1. Variables of this study

Abbreviation	Variable name	Description	Source
G	Gini coefficient Market	Measures income distribution after taxes and transfers	SWIID
Y	GDP per capita	Measures economic growth and income per capita	WDI
Y ²	GDP per capita square		WDI
O	Trade Openness	Summation of imports and export divided by GDP	WDI

The Gini coefficient market annual data is the primary data of this study and serves as a proxy for income inequality. It is used as an index to measure income inequality in Kenya for the given years. The Gross Domestic Product per capita is used as an indicator of economic growth and development and the trade openness parameter as an indicator of international trade.

Table 4.2. Descriptive statistics of the variables

Parameter	<i>G</i>	<i>Y</i>	<i>Y</i> ²	<i>O</i>
Mean	50.08750	1228.555	1516379.9	56.45198
Max.	52.00000	1464.554	2144918.4	72.85848
Min.	47.90000	1089.831	1187732.9	40.32738
Standard Dev.	1.278859	84.92229	216528.8	7.446639
Skewness	-0.121362	1.079449	1.229725	0.396290
Jarque-Bera	2.864396	8.560028	11.87017	1.077914
Probability	0.238783	0.013842	0.002645	0.583356

Using the raw data of the variables, a summary statistic is made to convey the essentiality of the dataset before regression and empirical are made. The null hypothesis for the Jarque-Bera statistics is that the distribution is normal and in light of table 4.3. statistics, the Gini coefficient is negatively skewed, GDP per capita and GDP per capita square are positively skewed and Trade openness has a normal skewness. Therefore, with respect to (*O*) having a probability value of 0.58 which is above the significant level of 0.05, we cannot reject the null hypothesis. Thus, Trade openness (*O*) is detected to have a normality distribution curve, unlike other variables that do not meet the null hypothesis.

5. EMPIRICAL RESULTS AND INTERPRETATIONS

5.1. Unit Root Test

The paper identifies a time series analysis to examine the regression of the constraints. With the purpose of this investigation, a unit root test was performed on the series using Augmented Dickey-Fuller (ADF), Phillips Perron (PP), and Lee and Strazicich (LS). These tests are done to inspect how static the variables are. Results will reveal that, some variables will be stable at level, and others will be stable at logarithm differences. The ARDL test will therefore analyze those variables with a different degree of stability in LS breakages.

Table 5.3. Unit Root Test Results 1

Test type	ADF		PP	
	C	C+T	C	C+T
Variables				
g_t	0.88(1)	-2.78(1)	1.34(0)	-2.14(0)
Δg_t	-4.45***(0)	-4.61***(0)	-4.45***(0)	-4.59***(2)
y_t	-0.65(1)	-1.41(1)	-0.79(2)	-1.23(2)
Δy_t	-3.71***(0)	-3.85**(0)	-3.76***(1)	-3.71**(4)
y_t^2	-0.62(1)	-1.38(1)	-0.75(2)	-1.19(2)
Δy_t^2	-3.70***(0)	-3.83**(0)	-3.74***(1)	-3.70**(4)
o_t	-2.33(0)	-2.98(0)	-2.33(0)	-2.98(0)
Δo_t	-6.84***(0)	-6.77***(0)	-7.18***(5)	-7.10***(5)

Notes: Akaike information criterion (AIC) for ADF and maximum lag is 4, and Bartlett Kernel spectral estimation method and Newey-West Bandwidth for bandwidth selection were used to establish the optimal lag length of the unit root test which are put in brackets. The variables are tested as Trend (C) and Trend & Intercept (C+T). The **, *** represents 5%, and 1% significant level respectively.

Table 5.4. Unit Root Test Results 2

Test type	Lee			
	Strazicich			
	Crash		Break	
	Test stats.	Break year	Test stats.	Break year
Variables				
g_t	-2.35(1)	2005	-3.93(3)	1984
Δg_t	-4.94*** (0)	1991	-5.35*** (0)	1994
y_t	-2.32(1)	2006	-3.66(1)	1996
Δy_t	-3.50** (0)	2001	-4.89*** (3)	2003
y_t^2	-2.32(1)	2006	-3.67(1)	1996
Δy_t^2	-3.52** (0)	2001	-4.91*** (3)	2003
o_t	-3.12(3)	1992	-5.08*** (3)	1991
Δo_t	-6.20*** (0)	1987	n/a	1989

The **, *** represents 5%, and 1% significant level respectively.

According to the unit root test result, all the variables are stationary at first difference, that is, they are integrated of order 1. Additionally, with the exception of Δy_t and Δy_t^2 in ADF (c+t), PP (c+t) and LS crash test, all the other variables are stationary at 1% significant level and hence fit a long-run cointegration test.

5.2. ARDL Model

This autoregressive model contains lag values of the dependent variable and both the current and lag values of the independent variables. The ARDL approach has been chosen for this study because of its massive advantages. Pesaran et al. (2001) approach does not require all variables to be integrated in the same order before further analysis is done; and the ARDL bounds testing approach provides unbiased estimates of the long-run model, even when the variables are endogenous (Odhiambo, 2009). It is therefore a union of the endogenous and exogenous variables, unlike the VAR model which is rigidly for endogenous variables. Using the ARDL bounds testing approach, Pesaran, Shin, & Smith (2001) examine the relationship between variables. This method is quite common in time series analysis. Jordan & Philips (2018) found that

despite the static nature of the variables, the approach can still be applied given that the degree of co-integration does not exceed I(1).

ARDL Model can be used if

- dependent variable is I(1)
- independent variables are also I(1)
- independent variables are I(0)
- independent variables are a combination of I(0) and I(1) variables.

ARDL Model cannot be used if

- dependent variable is I(0)
- any of the variables is I(2) or higher

In this study, the ARDL model is employed because the dependent variable is not I (0).

5.2.1. ARDL Model with Appropriate Lag Length (Model 1)

The econometric Ardl model of both Eq. (5.5) and Eq. (5.7) follows the work of Dobson and Ramlogan (2009) and Lee (2010), which was proposed by Jalil (2012). This study implicates their empirical model to test if the Kuznets hypothesis is applicable in Kenya's economy but varies in the included variables.

$$\begin{aligned} \Delta g_t = & a_{c0} + \sum_{i=1}^j a_{c1} \Delta g_{t-i} + \sum_{i=0}^k a_{c2} \Delta y_{t-i} + \sum_{i=0}^l a_{c3} \Delta y_{t-i}^2 + \sum_{i=0}^m a_{c4} \Delta o_{t-i} + a_{c5} T \\ & + a_{c6} d2005 + \beta_{c1} g_{t-1} + \beta_{c2} y_{t-1} + \beta_{c3} y_{t-1}^2 + \beta_{c4} o_{t-1} + \varepsilon_t \\ & \dots\dots\dots (5.5) \end{aligned}$$

In equation (5.5) above, the Δ denotes changes or differences of the variables, a_{c0} is the constant, ε_t is an error term and $\beta_{c1,c2,c3,c4}$, $a_{c0,c1,c2,c3,c4}$ are coefficients. $d2005$ represents the dummy variable and T is the trend variable. The model is predicted by using ARDL to test for the long-run relationship between the variables by employing the cointegration bounds test for the F test. Pesaran, Shin, and Smith (2001) demonstrated that if the critical value is smaller than the calculated value, the null H_0 hypothesis regarding no integration between the indicators will be rejected. Where $H_0 = \beta_0 = \beta_1 = \beta_2 = \beta_3 = 0$ exhibit no cointegration between the variables and $H_1 = \beta_0 \neq \beta_1 \neq \beta_2 \neq \beta_3 \neq 0$ shows alternative hypothesis that predicts a

cointegration relationship between the variables. The error correction model is therefore evaluated in equation (5.6) below.

$$\Delta g_t = a_{c0} + \sum_{i=1}^n a_{c1} \Delta g_{t-i} + \sum_{i=0}^o a_{c2} \Delta y_{t-i} + \sum_{i=0}^p a_{c3} \Delta y_{t-i}^2 + \sum_{i=0}^q a_{c4} \Delta o_{t-i} + a_{c5} T + a_{c6} d2005 + \delta ECM_{t-1} + \varepsilon_t$$

..... (5.6)

ECM outcome stipulates the speed of adjustment of the short-run shock base on the long run.

5.2.1.1. Cointegration Bounds Test

This boundary test shows the long-run or long-term relationship among the variables. The F statistics test is used to evaluate the cointegration experiment by comparing the F test coefficient with the upper and lower critical values as done by Pesaran, Smith, and Shin (2001).

Table 5.5. Cointegration Bounds Test Output (M1)

F-statistics ARDL (6,3,6,4)		K = 3
23.23**		
Critical Values	Lower limit I(0)	Upper limit I(1)
1%	5.17	6.36
5%	4.01	5.07
10%	3.47	4.45

Note: SIC with a trend specification of unrestricted constant and trend was used to determine the bounds test. The K represents the number of independent variables in this model and ***, and ** denotes 1% and 5% significance level.

H_0 = no cointegrating equation

$H_1 = H_0$ not true

The test was performed on the logarithm transformation of the raw variables. Based on the decision criteria for the bound test; if the F statistics is greater than the 5% upper limit, we reject the null hypothesis which states that there is no integration. Therefore, compared to the results of this research where the F statistics value was calculated as 23.23 at a 0.05 significance level, we reject the null hypothesis (H_0 = no cointegrating equation). This implies that, among the log of the Gini coefficient

market, GDP per capita, GDP per capita square, and Trade openness, there is cointegration, i.e there is a long-term relationship between them. Consequently, the error correction (ECM) for the short run can also be estimated.

Table 5.6. ARDL model-based long-run predictions (M1)

Variables	Coefficient	Std. Error	t-Statistics	Probability
y	-60.4	109.8	-0.55	0.59
y^2	4.19	7.62	0.55	0.59
o	-0.29	0.51	-0.57	0.58

Critical value **, *** represents 5%, and 1% significant level respectively.

Table 5.7. ARDL model-based short-run and ECM (M1)

Variables	Coefficient	Std. Error	t-Statistics	Probability
$g(-1)^*$	-0.08	0.14	-0.58	0.57
$y(-1)$	-5.24	0.93	-5.60	0.00***
$y^2(-1)$	0.36	0.06	5.58	0.00***
$o(-1)$	-0.02	0.00	-6.91	0.00***
Δy	-2.70	1.58	-1.70	0.12
Δy^2	0.18	0.11	1.68	0.12
Δo	0.00	0.00	0.04	0.69
$D2005$	0.00	0.00	8.00	0.00
Adj. R-squared			0.89	
Sum sq. residual			1.90	
F-statistic			14.90	
Prob. (F-statistic)			0.00	
Durbin-Watson stat			2.50	

Critical values **5%, and ***1% represents significance level.

Table 5.8. Diagnostic Test (M1)

Test	Statistics	Probability
Normality	0.49	0.77
Heteroscedasticity	0.57	0.45
Serial Correlation	1.08	0.32
Model Misspecification	1.68	0.23

According to the results in tables 5.6 and 5.7, all the variables are insignificant in both the short and the long run. The GDP per capita coefficient was negative both in the long and short run. However, the squared GDP per capita is positive in both the long and short term but statistically insignificant. The trade openness variable was negative in the long run while it was and positive in short run estimates.

Additionally, figure 5.7 and 5.8 below shows the results of the CUSUM and CUSUMSQ analysis brought forward by Brown, Durbin, and Evans (1975). Table 5.8 and 5.12 successfully fulfilled the diagnostic tests which demonstrate if the outputs acquired from the ARDL long-term and short-term models are stable at a critical value of 5% significance level.

5.2.2. ARDL Model with Appropriate Lag Length (Model 2)

Unlike the first model, this model is presented with the exclusion of trade openness (o) as one of the dependent variables. Only y and y^2 are included.

$$\Delta g_t = a_{d0} + \sum_{i=1}^r a_{d1} \Delta g_{t-i} + \sum_{i=0}^s a_{d2} \Delta y_{t-i} + \sum_{i=0}^t a_{d3} \Delta y_{t-i}^2 + a_{d4} T + a_{d5} d2005 + \beta_{d1} g_{t-1} + \beta_{d2} y_{t-1} + \beta_{d3} y_{t-1}^2 + \varepsilon_t \dots\dots\dots (5.7)$$

Where Δ denotes the difference variables, a_{d0} is the constant, ε_t is an error term and $\beta_{d1,d2,d3}$, $a_{d0,d1,d2,d3}$ are coefficients. $d2005$ represents the dummy variable and T is the trend variable.

Using SIC criteria, the optimal lag length of this model is established as ARDL (1,6,6)

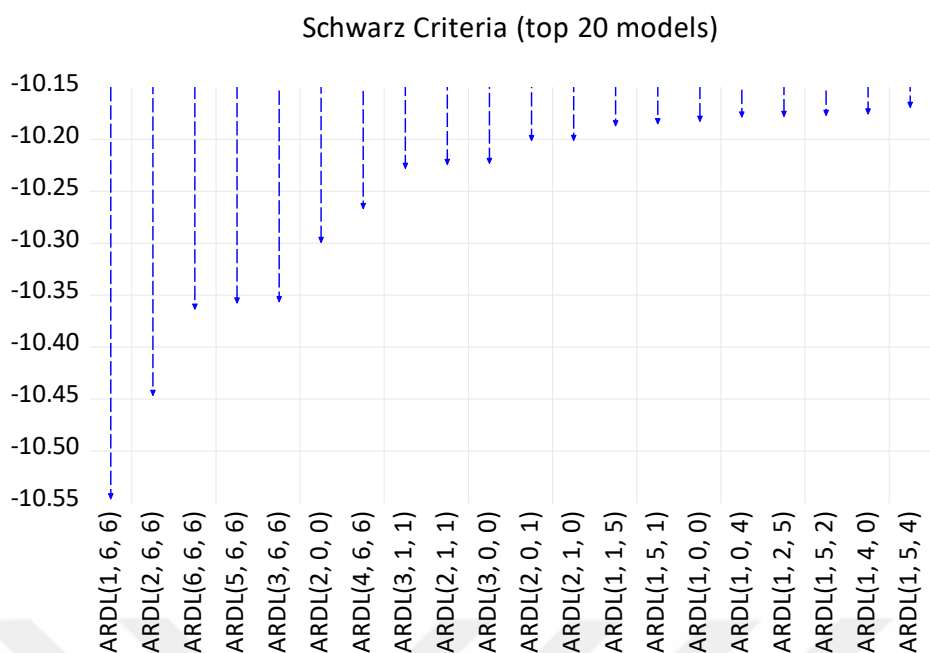


Figure 5.7. Alternative Lag Length Models

The graph shows different lag structures of the model estimates that could have been evaluated.

5.2.2.1. Bounds Test and Model Findings

Outcomes of the boundary test are demonstrated in the table 5.9

Table 5.9. Cointegration Bounds Test Output (M2)

F-statistics ARDL (1,6,6)		K = 2
	13.47**	
Critical Values	Lower limit I(0)	Upper limit I(1)
1%	6.34	7.52
5%	4.87	5.85
10%	4.19	5.06

The **, *** represents 5%, and 1% significant level respectively.

According to the table 5.9 above the null hypothesis that there is no integration is rejected because the F statistics is greater than the 5% critical value upper limit coefficient. Therefore, a cointegration occurs between the variables of GDP per capita income and the square of GDP per capita income.

Table 5.10. ARDL model-based long-run predictions (M2)

Variables	Coefficient	Std. Error	t-Statistics	Probability
y	6.23	2.73	2.27	0.02**
y^2	-0.44	0.19	-2.27	0.02**

Critical value ***1%, and **5% represents the significance level.

Table 5.11. ARDL model-based short-run and ECM (M2)

Variables	Coefficient	Std. Error	t-Statistics	Probability
$g(-1)^*$	-0.55	0.11	-4.93	0.00***
$y(-1)$	3.46	1.68	2.05	0.05**
$y^2(-1)$	-0.24	0.11	-2.06	0.05**
Δy	3.61	1.45	2.45	0.02**
Δy^2	-0.25	0.10	-2.24	0.02**
$D2005$	-0.00	-0.00	-1.44	0.16
Adj. R-squared			0.67	
Sum sq. residual			8.12	
F-statistic			5.03	
Prob. (F-statistic)			0.00	
Durbin-Watson stat			2.28	

Critical values **5%, and ***1% represents significance level.

Table 5.12. Diagnostic Test (M2)

Test	Statistics	Probability
Normality	0.68	0.71
Heteroscedasticity	0.05	0.8
Serial Correlation	0.69	0.41
Model Misspecification	2.56	0.13

According to the results presented in tables 5.10 and 5.11, in both the short and long term predictions, all the parameters are statistically significant. The per capita GDP is positive in both terms whiles its squared form is the contrary.



Figure 5.8. Cusums

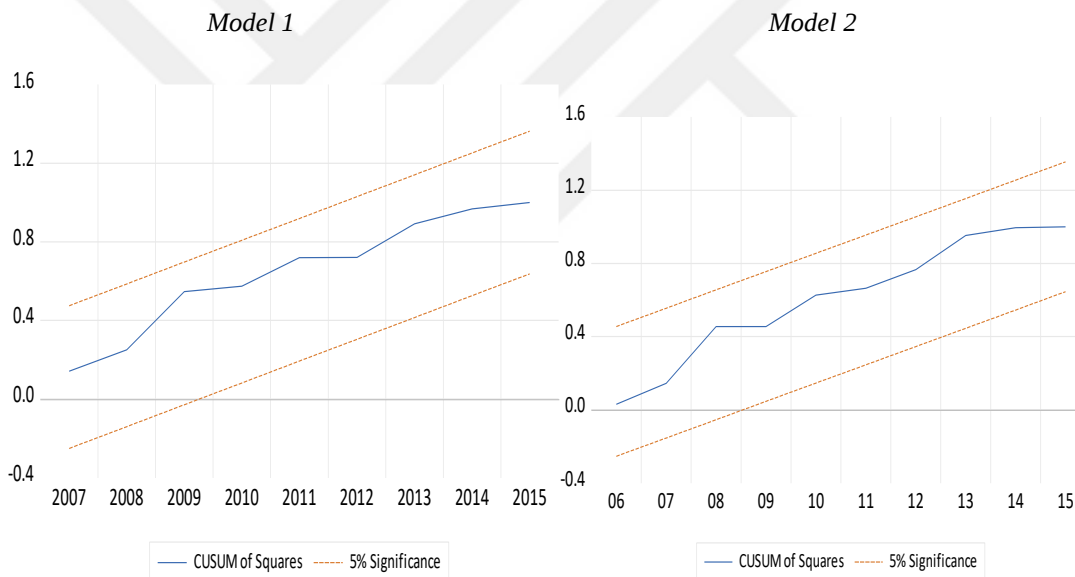


Figure 5.9. Cusum of Squares

The blue crooked line that lies between the 5% confidence interval proves the stability of the estimated variables in this study between the years 1976 to 2015 in Kenya.

5.3. Results & Findings

This study investigates the relationship between income inequality, economic growth, and trade openness in Kenya. Two models were used in which one exclude trade openness and the other includes it. Both the variables in model 1 and 2 were reported to have a long term correlation, i.e there is cointegration between them.

Rooted on the predictive results of this study over the years 1976-2015, considering the second model with no openness effect, the outcomes reported that there was a significantly positive relationship between GDP per capita income and income inequality both in the short and long-run which acknowledges the first stage of Simon Kuznets (1955) theory which hypothesized that in the early stages of economic development, income inequality will increase but eventually falls as the economy grows. The per capita squared GDP was equally significant in long and short term period but negatively which invalidates the standard Kuznets inverse U shape but possesses a parabola with a minimum. These results align with the findings of Can, Kılıç, & Kurt (2022) where the relationship between economic growth and income inequality was found to have a curve homogeneous to that of a U shape.

Unlike the second model, the first model encompassing trade openness reported that GDP per capita, and the squared GDP per capita which is a spectrum for economic growth was predicted to have a statistically insignificant relationship with income inequality in the long run as well as the short run.

Correspondingly, the final variable of this study, trade openness, was observed to have an insignificant and adverse relationship with the dependent variable in the long term. Considering that trade is a big stimulator of economic growth and development, its involvement and absence within the models made massive changes. The results of this research proved that the openness impact on the economy does not reduce or increase income inequality in Kenya unlike its absence which substantially cause the rise or fall of income inequality thus generating a U or inverted U curve. As a result, within the scope of this research, the findings and results fundamentally verified the validity of the Kuznets Curve hypothesis in Kenya over the given periods.

6. DISCUSSION

Reports of the findings identify that there is a Kuznets curve in Kenya's economy which answered the research question as to whether there is a Kuznets curve in Kenya. Moreover, the results of this research aligned with several studies.

Based on the findings of this study, the association between economic development and income inequality is highly positive thereby undertaking the Kuznets hypothesis. This implies that as the income per capita rises, wealth inequality falls. Nevertheless, income inequality will drastically increase afresh as the net income continues to rise to a higher level; this will therefore worsen income distribution in the nation.

The analogy behind the inverted U-shaped Kuznets is that when per capita income is low in economies, the wealthy population becomes less causing the Gini for net income to be exceedingly up. However, the Gini will be lifted down by an increment in income making the income distribution in Kenya better. The model 2 findings are in line with Henry and Panotani's (2019) study on national income per capita's influence on income inequality where the authors claimed that there was a positive relationship between GDP per capita and income inequality. Also, similar to the previous study by Mercan and Azer (2013) and based on Wahiba and Weriemmi (2014) analysis, at the initial stage of expansion, income inequality had a positive influence on economic growth which is comparable to that of this research findings.

The presence of trade openness in the first model however opposed the theory of the prime discovery in this study and adapted an insignificant specification in its data results. The trade openness data suggested an irrelevant related correspondence with income inequality denying the models demonstration of the Kuznets hypothesis. This suggestion draws a line back on the influence of openness in the economy of Kenya within the given period and hence does not follow Stolpher-Samuelson's assumptions which state that foreign trade in developing nations decreases or increases due to income differences within the community base on skilled and inefficient labor.

7. CONCLUSION

The section of this study will conclude and summarize the key findings pertaining to the research aims, objectives, and questions. It will further evaluate the research limitations, its contribution to the literature, and policy implications in order to put forward opportunities for future studies.

Using Kuznets curve approach, this study aimed to investigate the relationship among income inequality, economic growth, and trade openness. After analyzing two different models with the presence and absence of the openness indicator, the results suggested that without the existence of trade openness, there was a significant correlation between economic development and inequality in income and an inconsequential relation between them with the appearance of trade openness in Kenya. Further findings indicated that in the phase of development, the standard Kuznets u-shaped hypothesis is applicable in the second model both in the long and short-run relationship between economic growth and income inequality where GDP per capita as an economic growth factor has a linear equation. Yet link between trade openness and income inequality does not employ the Kuznets inverse U curve.

Empirical impact on findings manifested the validity of the Simon Kuznets theory in Kenya over the years 1976 to 2015. Results obtained can therefore be used to explain the income indifferences caused by a relatively high Gini index in Kenya over time. Outcomes of the relationship between the variables can show positive responses with the right implementations because it is objectified to fill the research gap that the Gini coefficient market for net income is not taken into consideration in studies on income inequality in Kenya. Nonetheless, it has been preferred in recent years as it is measured after taxes and transfers to achieve a net income that aids in the estimation of inequality explicitly.

Notwithstanding that the Gini coefficient is positively related to GDP growth and has little or no relation to openness, both results of the economic tools can be of great benefit in different stages of development in Kenya. However, it is paramount to consider the empirical suggestion on the time period between economic growth and income inequality as they are significantly positive when per capita income is linear and significantly negative in its squared form which means some factors that have a positive impact on economic growth can be the same factors worsening income

distribution and increasing income inequality because the variables are subjected to change. Further research with more or different time intervals is therefore recommended in this field of study.

On the subject of policy implications, the research finding shows that the relationship between per capita income and income inequality in the early stages of economic growth in Kenya caused income inequality to increase drastically. This therefore suggests that the Kenyan government should revise and recheck the economic decision of funds management as it is one of the critical reasons for the nation's income inequality problems. Additionally, given our existing variables and time period, the outputs of some analysis demonstrate how economic growth in Kenya remains unchanged when trade openness was an added factor. Kenyan policy makers should thus devote more resources on incentive programs toward employment, education, work, voluntary skills training, and also tax cuts in order to support and maintain a consistent approach towards economic development and inequality reduction strategies. Besides, having these mechanisms in place will help its citizens to have a sustainable standard of living, increase its per capita gross domestic product and hence achieve its goals of sustainable income equality.

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