EFFECT OF SELECTED MACROECONOMIC VARIABLES ON EXPORTS IN KENYA

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DECLARATION AND RECOMMENDATIONS

Declaration
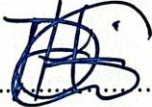
This thesis is my original work and has not been presented for an award of a diploma or conferment of a degree in any institution.

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Recommendations

This thesis has been submitted for examination with our approval as the University Supervisors.

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DEDICATION

This work is dedicated to my loving parents Mr and Mrs Owen Micheni and my daughter, Angel Tamara Amani.

ACKNOWLEDGMENTS

ABSTRACT

The Government of Kenya has formulated several policy interventions over the years to encourage exports and promote economic growth. These efforts resulted in steady export growth in the last two decades. However, exports' percentage of GDP has gradually fallen from 21.5% in 2011 to 12% in 2022. This research aimed to analyze how selected macroeconomic factors influence exports in Kenya. The study was structured around four key objectives: assessing the effects of exchange rates, inflation, and foreign direct investment on exports, alongside evaluating the moderating influence of terms of trade on the link between exports and macroeconomic variables. Grounded in theories of comparative advantage, relative pricing, purchasing power parity, the product life cycle, and terms of trade, this study employed a causal research approach. Using purposive sampling, it selected annual time series data spanning 33 years (1990–2022) to focus on exports and the macroeconomic indicators in question (N=33). Data were sourced from the World Bank, World Development Indicators, and the Kenya National Bureau of Statistics. Exchange rates were found to affect exports negatively, a one-unit rise in exchange rates led to a 91.47 unit decrease in exports. The inflation rate was found to lower exports where inflation negatively affected exports by 0.12, however, it was statistically insignificant. FDI was found to positively affect exports where a one-unit increase in FDI increases exports by 4.142. With an adjusted R-squared of 85.75%, terms of trade have a strong effect on the association between macroeconomic factors and exports in Kenya. The study's results will help in policy formulation towards increasing the value and volume of exports relative to Kenya's GDP for economic growth and development.

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ABBREVIATIONS AND ACRONYMS

ARDL	:	Autoregressive Distributed Lag
BOP	:	Balance of Payment
BOT	:	Balance of Trade
CBK	:	Central Bank of Kenya
EPZ	:	Export Processing Zone
FDI	:	Foreign Direct Investment
GDP	:	Gross Domestic Product
GOK	:	Government of Kenya
IMF	:	International Monetary Fund
IS	:	Import Substitution
KES	:	Kenya Shilling
KenInvest	:	Kenya Investment Authority
KNBS	:	Kenya National Bureau of Statistics
LDC	:	Least Developed Countries
MUB	:	Manufacturing Under Bond
MPC	:	Monetary Policy Committee
NACOSTI	:	National Commission for Science, Technology and Innovation
NARDL	:	Nonlinear Autoregressive Distributive Lag
NEMA	:	National Environment Management Authority
NIP	:	National Industrial Policy
PPP	**:**	Purchasing Power Parity
ToT	**:**	Terms of Trade
UNDP	:	United Nations Development Program
USD	:	United States Dollar
VAR	:	Vector Auto Regressive
VECM	:	Vector Error Correction Model

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Exports play a significant role in steering economic growth. Globally, national economies have been driven by international trade, especially exports. Exports establish the basis for industrialization and economic growth by facilitating raw materials for industries, creating employment opportunities for citizens, and benefiting from foreign exchange, therefore improving the population's standards of living (IMF Report, 2020).

Export-generated foreign exchange is utilised to support domestic economic development and to cover import expenses (Euis, 2020). Exports are vital in driving domestic economic development by generating revenue, creating jobs, and fostering technological progress (Pablo et al., 2020). Also, exports attract foreign investment, enhance skills, and stimulate infrastructure growth (IMF Report, 2020), contributing to improved living standards and economic stability.

Macroeconomic variables are indicators that measure the general economic performance. They include; exchange rates, GDP, inflation rates, FDI, interest rates, trade policies, political stability, global demand, transportation infrastructure, technology and innovation, labor market conditions, energy prices, and market access. These macroeconomic variables are interconnected and can collectively shape a country's export performance. The impact of these variables can differ based on particular economic circumstances, policy actions, and the prevailing global economic environment (Helpman & Krugman, 2019). The choice of (FDI) as the macroeconomics variables was due to the significant relevance to the export economy and the existence of primary data for analysis for research purposes. This makes the country more attractive for investments from foreign companies (Usman & Ahmad, 2018; IMF Report, 2019; Ndagara et al, 2020).

These variables are significant in enhancing the export environment by fostering stability, competitiveness, and growth. Furthermore, robust macroeconomic policies that enhance

trade liberalization and reduce tariffs facilitate easier access to international markets, thereby enhancing export performance.

According to a 2019 study by Vinh and Duong, exports are significantly and permanently harmed by exchange rate movements. Export volumes may increase if a country's exports become more inexpensive for foreign consumers due to a reduced exchange rate (Cheung et al., 2019). Conversely, a growing exchange rate can lead to greater export costs, which might reduce demand for exports (IMF, 2019).

There are two possible effects on exports when a nation's currency depreciates, meaning its value drops relative to another currency. First, it lowers the cost of exports by making domestic goods and services more affordable in comparison to those sold abroad. Second, it boosts foreign direct investment (FDI) since the depreciating real currency makes the economy more desirable as a place to invest in productive capacity (El-Diftar, 2023).

Higher inflation in a country compared to its partners can erode its export competitiveness in the global markets, as its products become more expensive (IMF, 2019; Paul & Sharma, 2019). Conversely, lower inflation than trading partners can enhance a country's export competitiveness, possibly enhancing demand for its exports (IMF, 2019; Njegovan, 2020; Ochieng & Shitundu, 2020).

Foreign Direct Investment, as cited by Gamariel (2019), is when a foreign national invests in a firm in another country in which he/she owns 10% or more of the firm's shares giving her/him control of the company. According to Naptania et al., (2022) such enhancement in the export capabilities of the country enjoys growth from FDI inflows, as is often the case. FDI often brings in new capital, advanced technologies, and managerial expertise, which can improve production efficiency and product quality, ultimately boosting a country's export competitiveness (UNCTAD, 2019; Kim, 2018).

Furthermore, FDI-created foreign-owned subsidiaries can act as export platforms, opening up global markets and boosting export volumes (Hansen & Rand, 2019).

Specialisation and the division of labour are encouraged by increased capital, technology, and skills transfer. This aligns with the comparative advantage hypothesis, which stresses specialisation based on opportunity cost and comparative advantage.

1.1.1 Macroeconomic Variables

Globally, the exchange rate trend is characterized by significant volatility and fluctuations. In recent years, many currencies have encountered depreciation against the US dollar, particularly in emerging markets, driven by higher inflation rates and tightening monetary policies in developed economies (El-Diftar, 2023). US Dollar Index (DXY), has been observed moving in the figure range of 95 to 105 in the past twelve months, indicating the dollar's volatility (World Bank, 2024).

The Kenyan shilling (Ksh) has experienced significant fluctuations against the USD over the past two decades, driven by various macroeconomic factors. In the early 1990s, the Ksh was relatively stable, trading at 20-30 Ksh per USD, but gradually depreciated to 80 Ksh per USD by late 2000s due to economic challenges such as political instability and inflation. During this period, the Ksh continued to weaken, trading at 100 Ksh per USD in 2015 due to pressure from external debts, trade deficits, and high inflation rates despite economic reforms and increased investment. The Ksh depreciated further in 2023, reaching 137.24 Ksh per USD, largely influenced by global economic environments, with rising oil prices and the COVID-19 pandemic, but has since shown signs of stabilization and recovery, trading at 128.9 Ksh per USD in 2024.

According to the CBK (2024), the government steps in at times in order to manage extreme fluctuations in the exchange rate. These interventions help in maintain economic stability by managing pressures resulting from inflation and fostering export competitiveness (Ochieng & Shitundu, 2020). The IMD (2020) also notes that the Kenya Exchange-Rate Policy focuses on macroeconomic stability through monitoring of foreign exchange reserves and the overall economic performance.

According to Adam (2023), there are several factors contributing to Kenya's inflation. One of the main causes has been recognised as expansionary monetary policies that lead to rapid increases in the money supply (African Development Bank, 2020). These policies can lead to excess liquidity in the economy, triggering demand-pull inflation by increasing consumers' purchasing power and thus driving up overall demand. Supply-side factors such as fluctuations the cost of commodities worldwide, especially food and fuel, have also contributed to inflationary pressures (Central Bank of Kenya, 2024). This agrees with a study conducted by Okpe and Ikpesu (2021) that revealed that inflation negatively impacted inflation, suggesting that inflationary pressures raise the price of local goods, making exports less competitive.

Globally, the rate of inflation has been characterized by significant volatility in current years. The Council on Foreign Relations' Global Inflation Tracker reported that median global inflation rose from 1.9% in 2020 to 8.8% in 2022 due to factors such as the Russia-Ukraine conflict, supply chain interruptions, and the COVID-19 pandemic. The global inflation rate was 7.97% in 2022 (Council on Foreign Relations, 2024).

A key economic indicator of the general slow price increase of services and commodities in Kenya is inflation, which the (CBK) seeks to keep within a target range of 2.5% to 7.5% as stipulated in its Monetary Policy Committee (MPC) framework. This target range is considered conducive to economic stability, as it allows for moderate price adjustments without excessive volatility that could disrupt economic planning and decision-making (Central Bank of Kenya, 2019).

Inflation patterns in Kenya, measured by the Producer Price Index (PPI), have demonstrated considerable variability from the 1990s to today. In the early 1990s, Kenya experienced high inflation rates, often exceeding 20%, driven by economic liberalization and external shocks (Berg, 2021). By the late 1990s and early 2000s, inflation began to stabilize, though it remained in double digits due to ongoing structural challenges. The early 2000s saw inflation rates between 10% to 15%, however, the worldwide monetary crisis of 2008 caused inflation to rise to about 26.2%. The CBK (2024) and the Kenya

National Bureau of Statistics (2024) both show the consequences of rising food and fuel prices.

In the 2010s, Kenya's inflation rates became more stable, typically ranging between 5% and 8%. This stability was a result of improved monetary policies and fiscal discipline (Adam, 2023). The current price increase trends continue to be closely monitored by the CBK, particularly considering global economic uncertainties (World Bank, 2024; CBK, 2024; KNBS, 2024).

Global FDI has seen both recovery and decline in recent years. In 2023, global FDI reached an estimate of $1.37 trillion, reflecting a 3% increase from 2022 (UNCTAD, 2024). However, this increases masks significant regional disparities. Except for a few European economies, the global FDI actually declined by 18%. The manufacturing sector's 6% value growth in spite of these obstacles suggests a chance to boost manufacturing investments.

Kenya has not established specific thresholds for FDI but relies on a comprehensive regulatory framework and various incentives to attract and manage FDI effectively. The Kenya Investment Authority (KenInvest) facilitates investment in key sectors, including manufacturing, agriculture, and infrastructure, by offering incentives such as tax holidays, capital allowances, and exemptions from import duties (Kenya Investment Authority, 2023).

In general, minimum capital requirements are absent in most sectors, however, industries such as banking and telecommunications are subject to specific regulations, including ownership caps and capital requirements (CBK, 2022). Additionally, foreign investors are required to conduct environmental and social impact assessments, particularly in sectors like mining, to ensure the sustainability of their investments (National Environment Management Authority (NEMA), 2023). This regulatory approach is designed to align FDI with Kenya's Vision 2030, promoting investments which

contribute to balanced regional development and economic growth in general (GoK, 2021).

In certain sectors, the GoK has implemented guidelines that both regulate and encourage foreign participation. For instance, in the telecommunications sector, foreign ownership is capped at 80%, with the requirement that 20% of ownership be transferred to Kenyan nationals within three years of licensing (Communications Authority of Kenya, 2022).

Land ownership by foreigners is also restricted to leaseholds of up to 99 years, reflecting a policy designed to balance foreign investment with local interests (Lugogo, 2021). Furthermore, Public-Private Partnerships (PPPs) are strongly encouraged, particularly in infrastructure projects, allowing for significant foreign involvement without explicit FDI thresholds (Public Private Partnership Unit, 2023). Together, these measures seek to protect national interests while ensuring that FDI favorably impacts Kenya's sustainable economic growth.

FDI trends in Kenya have evolved significantly from the 1990s to the present, largely influenced by economic reforms, political dynamics, and global economic conditions. During the 1990s, FDI inflows were minimal, averaging less than USD 50 million annually, due to political instability, economic mismanagement, and an unwelcoming investment climate (Kinyanjui, 2020).

In the early 2000s, With the introduction of infrastructure projects and economic reforms, things started to get better, which enhanced Kenya's attractiveness to foreign investors. By 2013, FDI inflows had increased to over USD 500 million, boosted by discoveries such as oil in Turkana and major projects like the Lamu Port and the Standard Gauge Railway (World Bank, 2023; UNCTAD, 2020).

From 2015 onwards, Kenya continued to attract significant FDI averaging to USD 1 Billion annually, particularly in industries including technology, real estate, and energy.

However, challenges such as corruption, regulatory inefficiencies, and security concerns have intermittently hindered FDI potential (Kinyanjui, 2020).

The global COVID-19 pandemic also temporarily reduced FDI flows in 2020 to around USD 800 million. Kenya's strategic position as a regional hub and the ongoing infrastructure developments contributed to a recovery trend in the following years with 2022 recording an average of USD 1.1 billion (CBK,2024; UNCTAD, 2021; IMF, 2022). FDI in Kenya remains robust, with investors' ongoing interest, particularly in the green energy and technology sectors (World Bank, 2023).

According to the theory of the product life cycle put forward by Raymond Vernon, products go through stages of innovation, growth, maturity and decline hence influencing how people invest. This tendency is reflected in Kenya's FDI trends, which are evident in the manufacturing and technology sectors. For instance, the primary drivers of the growth in FDI in 2022 were the need to be present in new markets and the expansion of domestic markets.

1.1.2 Exports

Global export trends have experienced notable changes due to various economic and geopolitical factors. Globalization has greatly expanded the volume of trade between countries since the late 20th century., driven by technological advancements and liberalized trade policies (World Trade Organization, 2023). Emerging economies, especially in Asia, have seen remarkable growth in export activities, with China becoming the world's largest exporter.

The World Trade Organization (2023) asserts that China accounted for 15.5% of global merchandise exports in 2022, reflecting its dominant role in international trade. Additionally, the composition of exports has shifted, with services and high-tech products like electronics and pharmaceuticals gaining prominence (International Trade Centre, 2022). This shift underscores a broader trend towards enhanced technological innovation and diversity of exports.

Export trends are also influenced by the results of trade policies and current world events. By lowering trade barriers and opening up new markets, regional trade agreements like the USMCA and the Regional Comprehensive Economic Partnership (RCEP) have impacted global trade flows (World Trade Organization, 2023). Conversely, recent trade tensions and protectionist measures have introduced uncertainties and disruptions in global supply chains (International Trade Centre, 2022).

The COVID-19 pandemic further impacted global exports, causing significant disruptions but also leading to a recovery as economies adapted to new conditions (World Trade Organization, 2023). These dynamics illustrate the complex and evolving nature of global export patterns.

In Kenya, exports have been a significant driver of economic development, contributing to revenue generation, employment creation, and technology diffusion (Kenya National Bureau of Statistics, 2019). Export-oriented industries attract foreign investment, promote skills development, and stimulate infrastructure improvements, supporting poverty reduction and economic growth (World Bank, 2019). However, Kenya needs to address challenges such as export diversification, trade facilitation, and value addition to fully harness the potential benefits of exports (Ministry of Industry, Trade and Cooperatives - Kenya, 2018). Generally, export transactions strengthen national economies if they positively affect markets such as the monetary, fiscal, goods, and labour markets. All these markets are subject to macroeconomic factors.

The advancement of the export industry is essential for international trade and economic stability. A nation's ability to thrive economically depends on how stable its balance of payments is. Export earnings fluctuations present economic uncertainties that affect the level and efficiency of investment and could cause declining economic growth (Odhiambo, 2022). The hindrances to the steadiness of exports in LDCs may hinder growth and development as it infringes on investment and increases the costs of

borrowing, due to BOP complexities caused by export fluctuations (Abdelhadi et al., 2019).

Kenya is highly dependent on agricultural exports like tea and horticulture products. These agricultural products are subject to fluctuations in the world price, erratic rainfall and rapid population expansion rates that exceed the rate of economic growth, obsolete infrastructure and machinery, and income inequalities amongst other challenges. The export sector is also faced with other administrative challenges like bribery, fraud and corruption cases (Mwatu, 2021). Kenya being a heavy borrower needs to invest in export growth to service its debts.

Kenya lacks any particular thresholds for exports but instead focuses on strategic targets and policy frameworks to enhance export performance. Under the Vision 2030 development blueprint, The government of Kenya wants to raise the contribution of exports to the national GDP by promoting the growth of value-added products and diversifying the export base beyond traditional commodities such as tea and coffee (Government of Kenya, 2021).

Kenya's trade policy emphasizes expanding market access through bilateral and multilateral agreements while maintaining high export quality standards to ensure global competitiveness (Ministry of Industrialization, Trade and Enterprise Development, 2022). Furthermore, the establishment of EPZs offers incentives such as tax holidays and duty exemptions to stimulate investment in export-oriented businesses; however no specific export volume requirements are imposed (Export Processing Zones Authority, 2023). According to Bigsten, Kimuyu, and Söderbom (2010), Kenya's export strategy is driven by targeted growth and diversification efforts aligning with broader economic objectives.

Kenya was added to the list of recipients of the African Growth and Opportunity Act on October 2, 2000, providing Kenyan exporters with special access to the US market (USAID, 2018). The Kenyan government developed the National Industrial Policy (NIP), which was completed in 2007, to improve the export industry's performance. In the

2000s, the average export value fell to 23.623% of GDP. Ken-ya's export sector proportion of GDP has decreased over time, despite GOK's efforts to develop policies and plans that would grow the export industry (Orindi, 2011).

Kenya's export industry showed resilience in 2020 by reaching an aggregate export figure of $9.7 billion, despite the detrimental effects of the COVID-19 pandemic. Due to increased need for Kenyan coffee, tea, vegetables, as well as a rebound in the demand for clothing, the goods market climbed by a noteworthy 3.3%. However, the service industry encountered a substantial setback, experiencing a 34.9% decline to $3.9 billion. The different outcomes highlight how the pandemic affected various types of exports differently. Some products managed to keep their demand steady despite the pandemic's effects globally, while the service sector faced difficulties due to limitations on travel and reduced mobility (Raga et al., 2021).

Balance of payment (BOP) registers all the international and financial transactions a country makes in a given period. When a nation has a BOT deficit, it means that its imports exceed its exports, necessitating borrowing by the government to cover import expenses. A surplus, however, indicates that a country is exporting more than it is importing and, therefore, can pay for imports and cater for domestic production.

An equilibrium in BOT and a BOT surplus are desirable for any economy. But in the event of a BOT surplus, the country will also need to stimulate a larger domestic market to avoid overreliance on export-driven growth, which poses a problem due to exchange rate fluctuations. Since 1975, Kenya has been experiencing a deficit in BOT except for the years 1977 and 2003, which recorded a surplus (World Bank, 2021 & CBK, 2021). 2020 the deficit reduced by 1.4% to $-4.8 billion, compared to $-5.2 in 2019. This resulted from an improvement in performance from a 7.9 % rise in total exports and a 9.0 % decline in the worth of imports in 2020 (Kenya National Bureau of Statistics, 2021). The declining trends can partly be accredited to the selected macroeconomic factors.

In conclusion, the connection between macroeconomic factors and Kenya's export sector has proven pivotal, as proved by the varying trade dynamics over the last decades. While exports have increased, the proportion of exports relative to GDP has declined. This analysis requires a thorough investigation into the macroeconomic influences governing export trends.

Key variables, including exchange rates, inflation, and foreign direct investments, considerably influence Kenya's export performance. Exchange rate shifts significantly affect export competitiveness, and inflation rates affect production costs (Nyang'au et al., 2021). This is in agreement with the relative price theory, which explains how exchange rates impact the competitiveness of a country's exports.

Additionally, Kenya's consistent trade deficit emphasizes the need for a balanced strategy to trade and reduce overreliance on export growth, which could increase exposure to exchange rate volatility (Chileshe et al., 2018). Moreover, policymakers need a comprehensive understanding of these macroeconomic variables to develop strategic initiatives. This strategic understanding is essential for policymaking, that not only enhances export competitiveness but also results in sustainable development, as evidenced by the impact of these variables on regional trade.

1.2 Statement of the Problem

Despite the Kenyan government offering various incentives, subsidies, and policies to boost export growth, the export contribution to the nation's GDP continues to decline (World Bank, 2021; CBK, 2021). Export proportionate to GDP is used to assess the significance of international trade overall economic output of a country. Increasing exports propels economic growth, lowers poverty, and raises residents' quality of living, all of which contribute to sustainable development (IMF Report, 2020). The government has strived for an export-led economy to facilitate inclusive development by establishing institutions and developing policies to expand exports (Bigsten et al., 2010; USAID, 2018). Although these initiatives have resulted in a steady increase in the nominal value of exports their effect on the economy as a whole over the last two decades, as reflected

by the GDP proportion, has not met expectations. These challenges pose far-reaching consequences, such as reduced national income, slow creation of jobs, and reduced investment in various sectors of the economy. Rahman (2017) used linear regression models to analyse the effects of a few macroeconomic variables on Bangladesh's export performance and discovered that these variables only explained a small percentage of the total. Because Orindi (2010) and Kiganda et al. (2017) used different models to study the effects of several macroeconomic variables on Kenyan exports, their findings differed because of their different areas of emphasis. To bridge the gap thorough examinination of the relationships and contributions of foreign direct investment, inflation, and currency rates to export volumes and their proportion of Kenya's GDP using the Vector Error Correction Model was observed. By comprehending how these variables interact, the study hopes to offer insights that could support policymaking to strengthen Kenya's export sector and, consequently, the nation's larger developmental objectives.

1.3 Objective of the study

The general objective of the study was to examine the effect of macroeconomic variables on exports in Kenya.

1.3.1 Specific Objectives

   i.   To examine the effect of the foreign exchange on exports in Kenya
  ii.   To evaluate the effect of the inflation on exports in Kenya
 iii.   To analyze the effect of Foreign Direct Investment on exports in Kenya
 iv.   To examine the moderating effect of terms of trade on the relationship between macroeconomic variables and exports in Kenya

1.4 Hypothesis of the Study

H01: The foreign exchange rate has no statistically significant effects on Kenyan exports.

H02: Inflation has no statistically significant effects on Kenyan exports.

H03: Foreign direct investment has no statistically meaningful effects on Kenyan exports.

H04: There is no statistically significant moderating influence of terms of trade on the association between Kenyan exports and macroeconomic factors.

1.5   Significance of the Study

This study is important to stakeholders such as government policymakers, investors (foreign and domestic), and other researchers. To policymakers, the study offers solutions precisely through statutory measures, policies, and initiatives to stabilize the country's balance of payments for sustained economic growth in Kenya. The findings of the research will serve as a guide for investors as they make investment decisions. This study will serve as a valuable resource for scholars and researchers, offering a solid basis for evaluating the gaps in the current corpus of understanding.

1.6 Scope of the Study

This research utilized time series data sourced from the World Bank, KNBS, and the World Development Index to investigate how macroeconomic factors affected Kenyan exports between 1990 and 2022. The study's timeline is perfect since it makes it possible to identify the macroeconomic factors affecting Kenyan exports. The decision to focus on data for this period is premised on the fact that major GOK interventions to divert the economy from import substitution to export substitution were made during this period. Kenya's diversified exports, export dependency, availability of data, and policy relevance additionally offered insightful information about how macroeconomic factors affect export volumes within this time frame. The key variables studied are the inflation rate, FDI, and exchange rate.

1.7   Limitations of the Study

The research employed secondary data from the World Bank, World Development Index, and KNBS. The reliability and validity of the results may be impacted by the data's constraints, which could include issues with accuracy, completeness, or consistency. By cross-referencing information from several sources and testing the data against other pertinent studies or reports, the researcher was able to mitigate data limitations and assure data accuracy and reliability.

1.8 Assumptions of the study

The time series data utilized in the study was assumed to be stationary. However, during analysis, some variables exhibited non-stationarity and were differenced to attain stationarity.

1.9 Definition of Terms

Balance of Payment   A record of a nation's international economic transactions over a specific time frame, generally a year

Exports   Products and services made in one nation and offered for sale to customers in another.

Exchange Rate   The value of one currency for conversion to another. It reflects the local price of currency of a foreign currency.

Foreign Direct Investment: Investment in assets or ownership of shares in a company based in another country.

Inflation: It is the steady rise in the average level of pricing for services and goods in a nation.

Inflation Rate   It is the percentage increase or decrease in the price level over a given time frame.

Macroeconomic variables: Indicators are used to evaluate the current trends in the economy and estimate economic performance in a country.

Terms of Trade: It is the ratio of exports unit value indexes to import value indexes

CHAPTER TWO
LITERATURE REVIEW

2.0 Empirical Literature Review

An empirical review is a systematic literature review that examines previous empirical studies to draw conclusions about the existing knowledge and knowledge gaps in the specific area of study.

2.1 Macroeconomic Variables and Exports

Inflation, rates of exchange, FDI, and terms of trade play a vital part in shaping a country's export dynamics. These factors affect the general economic climate for exports as well as competitiveness a country's services and commodities are on the international marketplace (Krugman & Obstfeld, 2022). Understanding how macroeconomic factors affect exports provides valuable insights into trade policies and economic strategies.

2.1.1 Exchange Rate and Export

Nguyen et al., (2021) used actual data from Vietnam that mainly focused on trade between the United States and Vietnam. The ARDL and NARDL models were applied to time series data from 2010 to 2020. The results indicate that while actual exchange rates have an effect on imports and exports, trade disputes have a bigger effect. This study concentrated on Kenyan exports, whereas the other study examined commerce and exports between Vietnam and the United States. These two studies may produce different results because they differ in areas like population and economic resources.

Similarly, Gor et al., (2020) conducted a study in Armenia, a developing country, to ascertain how exports and real exchange rates are related. Rolling regression was used in the study, which used quarterly data from 2001 to 2021. Exchange rates do not affect exports, according to the evidence. The rate of exchange, among the macroeconomic factors influencing Kenyan exports, was the main focus of this study. Different geographical location also poses a gap due to differences in governance policy, economic growth rate, and political environment (Titus et al., 2022).

Solomon (2020) conducted a study investigating whether exchange rates have an asymmetric effect on trade equilibrium with fresh insights from fresh cointegration. The Non-linear ARDL test and Bayer and Hanck (2013) test were conducted for cointegration testing. Bi-directional causality was tested using the Block Exogeneity Wald Tests. The results show an asymmetric exchange rate's impact on the BOT in Nigeria.

Rashid Moledina et al. (2023) study on how currency volatility rate influences Coffee exports in Kenya, employing a panel data analysis with firm-level data from key coffee exporters from 2001 to 2020. To evaluate the effects of rate of exchange fluctuations, particularly in the coffee industry, the study used econometric models. Both studies concluded that currency rate volatility significantly negatively impacted coffee exports in Kenya. The two studies differ in scope and methodology. The study focuses on the coffee sector and a different time frame. This study used VECM to time frame for analysis. This study also adopts a broader perspective by examining multiple macroeconomic variables and their cumulative effects on Kenya's export performance. Rashid Moledina et al. (2023), found a significant inverse relationship between fluctuations in currency rates and coffee exports in Kenya. Although the study focused specifically on the coffee sector using firm-level panel data from 2001 to 2020, their findings resonate with the broader finding that the volatility of currency rates undermines export performance.

2.1.2 Inflation and Export

According to the Granger causality theory, exports and inflation have a unidirectional causal relationship rather than the reverse, meaning that inflation drives imports (Sahoo and Seth 2020). A similar outcome was also shown by Toda Yamamoto's causality. Although they were unable to establish a direct link connecting exports and inflation, the findings showed show that they are related. The current research concentrated on how inflation affects exports in a different study location and database and examined the causality between inflation and exports. Furthermore, it's important to note that India has a significantly larger population than Kenya, potentially leading to variations in consumer culture and resource availability.

The impact of investment, inflation and openness on Kenya's export from 1997 to 2021 was examined by Kibet and Kiprop (2022) using the ARDL model. They found that openness and investment positively impacted exports, on the other hand inflation negativevely affected export in the long-term. The analysis made clear that real interest rates, inflation, and currency rates had a short-term negative impact on exports. This study also looks at how inflation affects exports, but it uses a larger dataset that covers the years 1990–2022 and incorporates a causal research approach. Additionally, this research emphasizes the moderating role of terms of trade, which provides a unique perspective on the potential effects of external variables on the connection between inflation and exports (Okpe and Ikpesu 2021)

In comparison, this study examines the impact of inflation on Kenyan exports from 1990 to 2022, focusing on macroeconomic variables like exchange rates and foreign direct investment (FDI) alongside inflation. Oduor et al. (2021) emphasise the manufacturing sector, while the present study looks at the broader export sector, encompassing a wider range of goods and services. Another distinction between the two studies is the period and scope. Oduor et al. used quarterly data from 2008 to 2017, whereas the present research made use of annual data. over a longer period (1990–2022), providing an analysis of inflation's long-term effects.

2.1.3 Foreign Direct Investment and Exports

Mukhtarov et al. (2019) conducted a thorough empirical investigation into the effect of foreign direct investment (FDI) on Jordan's export levels for nearly four decades, from 1980 to 2018. Utilizing the ARDL Bound Testing (BT) cointegration method, the study revealed a significant and enduring relationship between FDI and export performance. The analysis demonstrated that, in the long term, a 1% rise in FDI resulted in an approximate 0.13% increase in exports. Building on this, the present study used a Vector Error Correction Model (VECM) to assess the influence of specific macroeconomic variables on the export performance of Kenya.

Wamalwa and Were (2022) examined how openness, investment, and inflation affected Kenya's export performance, paying particular attention to the impact of FDI. The study examined annual data from 1997 to 2021 using a panel data technique and fixed-effects regression models. The study found that FDI greatly increases export performance, with a unit increase in FDI translating into a 0.376 rise in exports. This study was analyzed using time series data and the VECM model. This study also looks at the moderating effect of terms of trade in a new approach, providing information about how external factors could influence the connection between exports and FDI. Jana et al. (2020) used a changing parameter model using VAR specification to try and ascertain the significance of FDI to India's growth in foreign trade. A short-term bidirectional causal relationship between these variables was validated by the Granger causality test. There was significant exogeneity in international trade, according to an analysis of variance decomposition.

Zheng-Zheng et al (2019) conducted a study investigating whether Foreign Direct Investments promote exports in Slovakia. The study examines FDI and exports using the knowledge capital model, applying bootstrap rolling window subsample tests to accommodate for structural changes. Its main focus is on the relationship that exists between FDI and exports (EX) in Slovakia, offering insights for the Slovakian government to achieve mutual promotion amongst FDI and exports. There also exists a geographical context difference where the study is situated in Slovakia. This study additionally seeks an investigation into how to apply the knowledge capital model to the Slovakian context, while the current investigates the declining share of exports in Kenya's GDP.

2.1.4 Moderating Effect of Terms of Trade

According to empirical studies, moderating variables have an impact on how dependent and independent variables relate to one another. The research employed a multiple regression technique on 2011 monthly time series data to 2015, sourced from the CBK and other relevant financial databases. The findings showed that the rate of foreign exchange volatility negatively impacts export trade, while terms of trade significantly

moderate this relationship. Specifically, the results indicated that improved terms of trade can mitigate the adverse exchange rate volatility's implications on exports. This study used a longer time frame, 1990-2022, which provided a more comprehensive understanding of the evolving relationship between macroeconomic variables and exports over a longer period.

Karanja and Muli (2022) investigated how terms of trade moderated the relationship between Kenya's export performance and economic growth. The study used a panel data analysis using fixed-effects regression models and annual data from 2000 to 2021, sourced from the KNBS and the World Bank. The findings indicated that terms of trade significantly moderate the association between export performance and economic growth. Specifically, the study found that favourable trade terms can increase the positive impact of exports on the growth of the economy, but negative trade terms can have an adverse impact. While the study centered on the macroeconomic implications of terms of trade, this study sought to delve deeper into the specific mechanisms through which terms of trade moderate the association between macroeconomic variables and export performance at the firm level over a longer time frame.

Federico et al. (2020) investigated the long-term impacts of TOT shocks on trade cycles in emerging nations using the Structural Vector Autoregression (SVAR) technique. The study demonstrated that changes in terms of trade had a major impact on macroeconomic factors as GDP, imports, exports, and currency rates. A long-lasting drop in output resulted   from   the   negative   price   shock   of   exports.

2.1.5 Summary of Research Gaps

Table 1: Summary of the Empirical Literature Review Gaps

Author and Year	Study Purpose	Methodology	Findings	Research Gaps	The focus of the study
Nguyen et al. (2021)	Investigated the impacts of exchange rate on exports and imports using empirical evidence from Vietnam.	Autoregressive Distributed Lag (ARDL) model and the Nonlinear Autoregressive Distributed Lag (NARDL) model	The study comes to the conclusion that trade conflicts are a major factor in raising imports and exports between nations, but exchange rates have little bearing on these activities.	The study focused on export and trade between two countries, Vietnam and the USA Different macroeconomic aspects, population, government policies, and political conditions.	The study focused on Kenyan exports to different countries
Gor et al. (2020)	To ascertain how Armenian exports and the real exchange rate are related	Rolling Regression	The evidence indicated the insignificant impact of exchange rates on exports.	The study focused on establishing the link between real exchange rate and exports Geographical gap-study location Armenia	This study focused on the effect of exchange rates as one of the macroeconomic variables on exports in Kenya
Titus et al. (2022)	Analyzed foreign exchange reserves' moderating role in the relationship between exchange rate volatility and international trade in Kenya	Error Correction Model (ECM)	The results show foreign exchange reserves positively and significantly moderated the impact of foreign currency volatility on international trade		

Solomon, (2020)	Conducted research using new findings from fresh cointegration to determine whether exchange rates have an unbalanced impact on trade balance.	Non-linear Autoregressive Distributed Lag (NARDL)	The results show the asymmetric effect of the exchange rate on the balance of trade in Nigeria	The study investigated the cointegration and causal relationship between the balance of trade and the exchange rate in Nigeria Different macroeconomic aspects, population, government policies, and political conditions	This study established the effect of macroeconomic variables on all exports and was conducted in Kenya.
Rashid Moledina et al. (2023)	Investigated the impact of currency fluctuations on Coffee exports in Kenya	Panel data analysis	Volatility of exchange rates significantly negatively. impacted coffee exports in Kenya.	The two studies differ in scope and methodology	
Sahoo and Seth, (2020)	To examine the relationship between imports, exports, and inflation using actual data from India.	Vector Autoregression	Exports have a positive impact on inflation in India than imports and FDI	The study was conducted in India. India and Kenya have differences in population, consumer culture, and resource availability	The study focused on the effect of inflation on exports in Kenya and examined the causality between inflation and exports.
Kibet and Kiprop (2022)	Analyzed the influence of inflation, investment, and openness on the performance of Kenya's	Autoregressive Distributed Lag (ARDL)	The study highlighted that short term, inflation, exchange	According to the study, inflation has a negative long-run effect on export	This study similarly examines inflation's effect on

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			rates, and real interest rates negatively affected exports	performance, while factors like investment and openness positively influenced exports	exports but focuses on a more extensive dataset spanning from 1990 to 2022 and incorporates a causal research design. Furthermore, this study highlights the moderating effect of terms of trade, offering another perspective as to how external factors could affect the relationship. between inflation and exports.
exports					
Okpe and Ikpesu (2021)	Investigated the effect of inflation on food imports and exports in Nigeria	VECM	The study revealed that inflation had a positive effect on food imports and a negative effect on	The study focused on food imports	the current study investigates the impact of inflation on overall exports in Kenya from 1990

			exports		to 2022. The study focused on food imports, and the present study focused on the broader category of all exports.
Oduor et al. (2021)	Inflation's impact on the growth of the manufacturing sector in Kenya between 2008 and 2017	correlation and regression analysis	the study found that inflation had a statistically significant negative effect on the manufacturing sector, reducing manufacturing value-added by 0.19269 units for a unit increase in inflation	Different period and scope Study only focused on manufacturing sector	The current analysis employed annual data over a longer period of time (1990–2022), while Oduor et al. used quarterly data from 2008 to 2017.
Mukhtarov et al. (2019)	An empirical examination of how foreign direct investment (FDI) affected Jordan's exports from 1980 to 2018.	Autoregressive Distributed Lag Bounds Testing (ARDL BT)	The findings show that the variables exhibit a long-run relationship. In the long run, FDI was observed to have a favourable and statistically significant impact on exports.	The study employed an Autoregressive Distributed Lag Bounds Testing (ARDL BT) cointegration approach to conduct the study in Jordan Differences in population, consumer culture, and resource availability.	This study used a VECM for estimation and is focused on the effect of selected macroeconomic variables on exports in Kenya.

Wamalwa and Were (2022)	Investigated the influence of inflation, investment, and openness on the performance of Kenya's exports	Analysis of Panel Data	The results showed that FDI significantly improves export performance.	The study Panel Data and a different timespan 1997-2021	Time series data and a VECM model were employed in this study's analysis. Additionally, this study examines terms of trade differently, offering insights into the potential moderating effects of external factors on the FDI-export relationship.
Jana et al. (2020)	The relevance of FDI to India's foreign trade growth using a varying parameter model with VAR specification		A significant positive long-run cointegration between FDI and foreign trade was seen using Johansen cointegration test.	The study examined the relevance of FDI on exports in Jordan Geographical gap-study location Jordan	This study intends to find the impact of FDI and other microeconomic variables on export volumes. Geographical gap-study location Kenya
Zheng-Zheng	Conducted a study		The findings show	The study sought to	This study intends

et al., (2019)	investigating whether Foreign Direct Investments promote exports in Slovakia.		a positive correlation between FDI and exports	examine the causal relationship between FDI and exports. The study also aims at investigating the application of the knowledge capital model to the Slovakian context	to find the effect of FDI and other microeconomic variables on export volumes. Geographical gap-study location Kenya
Akwabi's (2020)	Examined the impact of inflation, foreign direct investment (FDI), and fluctuations in foreign exchange rates on Kenya's export industry.	Multiple regression analysis	The findings revealed that foreign currency volatility impacts export trade negatively, while terms of trade significantly moderate this relationship.	The study employed a shorter time frame and different methodology	This study used a longer time frame, 1990-2022, which provided a more comprehensive understanding of the evolving relationship between macroeconomic variables and exports over a longer period.
Karanja and Muli (2022)	investigated how terms	Panel Data Analysis	The findings indicated that terms of trade positively	The study used a shorter time frame and different	The present study sought to delve

	of trade affect the relationship between Kenya's export performance and economic growth.		and significantly moderate the association between export performance and economic growth	methodology	deeper into the specific mechanisms through which terms of trade moderate the association among macroeconomic variables and export performance at the firm level over a longer time frame.
Federico (2020)	The lasting effects of terms of trade shocks on business cycles in developing economies	Structural Vector Autoregression (SVAR) approach	Results showed that terms of trade fluctuations have a significant effect on macroeconomic variables such as exchange rates, GDP, imports and exports	Terms of trade were not included as a moderating variable Geographical gap-study location - developing economies	This study used Terms of trade as a moderating variable Geographical gap-study location Kenya

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2.2 Theoretical Review

A theoretical review looks at existing theories to give a framework that supports the research questions, hypothesis, and the research methodology.

2.2.1 Absolute Advantage Theory

The theory of absolute advantage, introduced by Adam Smith in 1776, offers a framework to understand international trade by highlighting the benefits of focusing on goods a country can produce more efficiently. According to this theory, a nation has an absolute advantage if it can produce a good using fewer resources or at a lower cost than other countries. This framework suggests that countries should specialize in producing goods where they hold a productive edge and import goods that other nations can produce more efficiently. Smith's theory fundamentally rests on the principle of the division of labor, positing that breaking down production into specialized tasks allows workers to build expertise, thereby increasing productivity and enhancing the quality of goods (Smith, 1776).

Smith argued that this division of labour boosts productivity by allowing workers to focus on specific tasks, fostering proficiency and streamlining production. Such specialization encourages technological advancement and leads to economies of scale, ultimately contributing to a country's economic growth and an increase in national wealth. Smith's vision of labor specialization and efficiency set the stage for the concept that production advantage fosters competitiveness in global markets, benefiting the entire economy. Later scholars, such as Schumacher (2012), expanded on these ideas, arguing that labor specialization in the international context drives economic growth. Schumacher contended that international trade expands opportunities for specialization beyond what is achievable in a domestic market, thereby increasing national wealth through heightened production capacities.

In this view, the global market allows a country to optimize its production strengths across a larger economic landscape, enhancing gains from trade and raising the value of exports. This specialization also promotes innovation as domestic industries face competition, which drives quality improvement and efficiency. Nevertheless, a shortcoming of absolute advantage theory is its assumption that every country holds a distinct production advantage, which is not always the case. David Ricardo's

comparative advantage theory, developed later, addresses this gap by suggesting that even without an absolute edge, a nation can still benefit from trade by specializing in goods where it has a relative efficiency.

In relation to this study, the absolute advantage theory is central to understanding how macroeconomic variables such as foreign direct investment (FDI), exchange rates, inflation, and terms of trade affect Kenya's export performance. The theory supports the study's exploration of whether these macroeconomic factors can enhance Kenya's production efficiency, thereby making the nation more competitive internationally. For instance, the research question investigating whether FDI impacts exports aligns with Smith's concept of specialization; an influx of FDI can provide capital, expertise, and technology that improve production efficiency in targeted industries, potentially allowing Kenya to establish a stronger competitive position in global markets.

Furthermore, the study's hypotheses are informed by the theoretical framework of absolute advantage. One hypothesis, suggesting that "FDI positively impacts exports in Kenya," reflects the expectation that foreign investment can drive specialization and production efficiency. This aligns with Smith's view that increased efficiency fosters trade gains. Similarly, the study's exploration of how exchange rates and terms of trade impact exports considers whether favorable macroeconomic conditions can enhance Kenya's capacity to produce competitively. In Smith's framework, a stable macroeconomic environment, characterized by low inflation and stable exchange rates, supports productivity, which is essential for maximizing a country's trade benefits.

To empirically investigate these questions, this study employs a Vector Error Correction Model (VECM), allowing for an assessment of both long-term and short-term relationships between macroeconomic factors and export performance. This methodological approach aligns well with the theory of absolute advantage by enabling a close examination of whether Kenya's macroeconomic landscape supports the production efficiencies that Smith emphasized. Drawing on data from the World Bank and the Kenya National Bureau of Statistics (KNBS), this study aims to provide empirical evidence on how macroeconomic variables shape Kenya's export potential. If data indicate that FDI, exchange rate stability, or favorable terms of trade positively

affect Kenya's exports, it would support the notion that macroeconomic factors play a vital role in enhancing productive efficiency and, by extension, international competitiveness.

Thus, Adam Smith's theory of absolute advantage underpins this study's examination of how macroeconomic factors might bolster Kenya's efficiency in producing and exporting goods. This theoretical framework justifies the study's focus on identifying economic policies or trade arrangements that could strengthen Kenya's capacity to enhance its export performance. In summary, the absolute advantage theory provides a meaningful foundation for analyzing Kenya's potential to develop a competitive export sector, ultimately contributing to national economic growth and prosperity. Through this analysis, the study seeks to clarify how Kenya can leverage macroeconomic factors to improve its position in the global market, consistent with the principles outlined in Smith's theory.

Comparative Advantage Theory

The development of David Ricardo's classical theory of comparative advantage in 1817 seeks to explain why nations trade with each other, regardless of whether workers in one nation may be more productive that workers in another and capable of producing all goods more efficiently. According to the theory, each nation will raise its total consumption by importing the item with which it holds a comparative advantage and exporting the other good if two countries with the capacity to manufacture two distinct commodities participate in free trade (Ricardo, 1991). The basis for this assumption is the notion that labour productivity differs from country to country.

The comparative advantage theory of Ricardo is considered among the greatest and counter-intuitive insights in economics. According to Shiozawa (2020), a significant portion of global trade is driven by comparative advantage as opposed to absolute advantage. In this context, Ricardo introduced the concept of opportunity cost, which takes into account the cost of the next best alternative that is forgone when making production choices.

This theory's strength lies in its ability to rectify the shortcomings of absolute advantage concept. Although the principle of absolute advantage indicates that nations should only produce goods where they are the most efficient, comparative advantage theory allows countries to specialize in producing goods or sectors in where they are relatively less inefficient. This flexibility enables countries that do not possess an absolute advantage in any particular good to still participate in international trade and benefit from specialization (Waseem, 2023). The theory is constrained, though, in that it ignores externalities like transportation costs and assumes that the factors of production are immobile.

By emphasizing specialization based on comparative advantage and opportunity cost, the theory demonstrates how nations can grow their overall consumption and welfare through trade, even if they aren't the most efficient producers of every good (Shiozawa, 2020). Because it provides a framework for elucidating the reasons for international trade, this theory is significant to this investigation.

2.2.2 Relative Price Theory

Relative prices are a fundamental aspect of economics in international trade and macroeconomics, associated with David Ricardo in 1817. This theory provides a crucial framework for comprehending how exchange rate fluctuations might affect a nation's export competitiveness, which is relevant to the study's setting. One way to explain how currency fluctuations may impact exports is through the relative price hypothesis (Huang & Liu, 2022). By emphasising the clear connection between fluctuations in exchange rates and shifts in competitiveness, it enables analysts and policymakers to predict possible effects on trade.

According to the relative pricing theory's tenet, changes in exchange rates have the potential to modify the relative production costs of commodities and services in various nations. A nation's exports become comparatively less expensive for customers abroad as its currency depreciates leading to an increased demand for such products (Ra-vikumar & Sargent, 2021). Conversely, a currency appreciation can raise the prices of a country's exports in international markets, possibly leading to reduced competitiveness.

The application of this theory may be limited in cases like technology innovations, brand reputation, and quality are important in determining a country's export performance. This theory assumes perfect market conditions, which might not hold in reality due to various market imperfections.

2.2.3 Purchasing Power Parity (PPP) Theory

The thought of PPP has deep historical roots in economic thought, although it wasn't formally coined as PPP until later. Early economists, including David Hume in the 18th century, discussed the tendency for price differences to influence trade flows and currency values. However, the modern formalization of the theory is credited to Gustav Cassel, a Swedish economist, who articulated PPP early 20th century. The law of one pricing, which stipulates those similar items should have the exact same price when stated in a common currency, is the foundation of PPP theory (Cassel, 1916).

PPP emphasizes that exchange rates ought to be adjusted to ensure the same basket of commodities has similar prices regardless of the nation's currency (Long & Hong, 2022). The hypothesis states that shifts in exchange rates ought to correspond with shifts in the rates of inflation in two nations. It emphasizes the notion that in order to preserve parity in purchasing power, currency values should adjust.

The PPP theory makes assumptions that could not hold in practice, such as perfect market conditions, total arbitrage, and no transaction costs (Caporale et al., 2018). However, Incorporating PPP theory assists in explaining how currency movements impact the ability of Kenyan goods to compete internationally based on changes in relative prices (inflation rates).

2.2.4 Product Life Cycle Theory

This theory was coined by Raymond Vernon in the 1960s. The Heckscher-Ohlin model's inability to adequately describe patterns of international trade prompted the development of this theory. According to Shahmarichatghieh et al. (2021), a product's life cycle might affect its dynamics of production, consumption, and trade as it progresses from introduction to decline. This concept in economics describes how the life cycle of a product influences international trade patterns and the movement of

production across countries. The life cycle of a product typically goes through several stages: introduction, growth, maturity, and decline. During each stage, the product's production, consumption, and trade patterns can change.

When a new product is introduced, production is often concentrated in the country where the innovation originated. The focus is on domestic production and meeting local demand. The product gains popularity, production starts to expand, and international demand increases. The country of origin becomes an exporter, seeking new markets to satisfy growing demand. The product becomes widely available, and competition intensifies. Trade between nations with various cost structures may result from production shifting to nations with cheaper production costs. As the market becomes saturated, the product may face a decline in demand. Production may decrease or cease altogether in the country of origin, and imports may become more common (Jens et al.,2021).

The theory proposes that trade patterns change as products transition through their life cycle stages. Initially, trade is limited as production is domestic-focused. As products move to the growth and maturity stages, international trade increases. The theory also highlights the role of innovation and investment in shaping trade patterns. Countries with a strong innovation capability often lead in the introduction stage (Dhruv, 2019). The Limitation of this theory is that it oversimplifies the complexity of global trade patterns and the diverse factors that influence a country's comparative advantage. Furthermore, the theory makes the assumption that a product has a set life cycle without considering the impact of globalisation and the quick improvement of technology. In this study, the theory above can be used to analyse how FDI affects Kenya's export performance.

2.2.5 Terms of Trade Theory

In the early 19th century, economist John Stuart Mill created the Theory of Things. It focuses on how shifts in the relative costs of imports and exports might affect a nation's capacity to trade with other countries and its overall economic health. The ratio at which a nation's imports and exports are traded is known as the Terms of Trade (ToT) (World Bank, 2022). A country can purchase more imports for a similar amount

of exports when its ToT improves favorably, which shows that its export prices have increased relative to its import prices.

A "favourable" or "positive" ToT is the outcome of improvements in ToT, which means a country can import more goods for the same quantity of exports. A decline in ToT, on the other hand, is a "unfavourable" or "negative" ToT, suggesting that a nation receives fewer imports for its exports. (Baffes & Koo, 2021). The theory suggests that improvements in ToT enhance a country's economic welfare, as it can obtain more imports without necessarily exporting more. Therefore, a rise in ToT can stimulate export-led growth by boosting a country's export revenues, providing resources for investment and development (IMF, 2023). Industries reliant on imported inputs will also benefit as they can acquire more inputs for the same amount of exports However, the ToT theory does not consider non-price factors and assumes perfect competition which might not hold in all markets. The Terms of Trade theory explains how macroeconomic factors interact to affect exports, which makes it crucial to the study.

2.3 Conceptual Framework

The conceptual framework illustrates how the independent and dependent variables are related to one another. The following graphic illustrates the correlation between Kenya's export volumes and the currency rate, inflation rate, and foreign direct investment (FDI).

Independent Variable

Macroeconomic variables

Foreign Exchange
- Foreign exchange rate

Inflation
- GDP Deflator

Foreign Direct Investment
- FDI, net

Dependent Variable

Exports
- Exports of goods and services (% of GDP)

Terms of trade
- Export price index relative to import price index

Moderating Variable
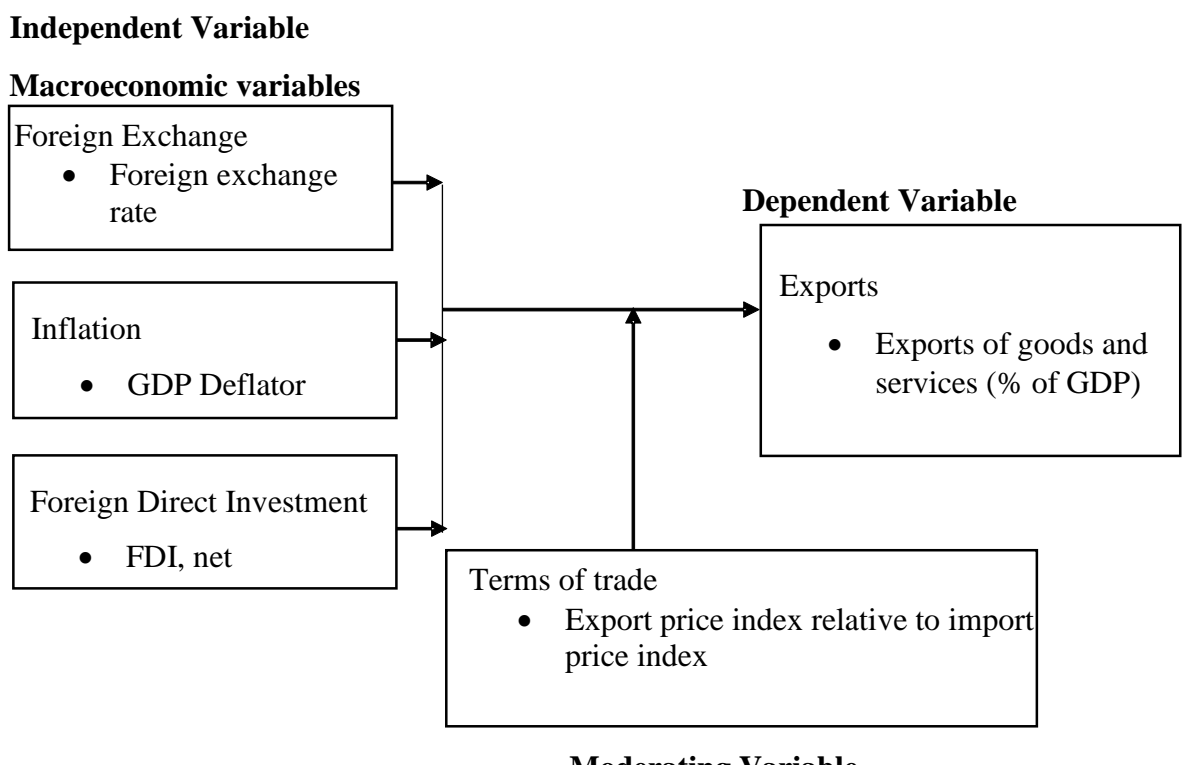
Figure 1 illustrates how exports and macroeconomic factors are related, as well as how the moderating variable influences these factors.

Exports are adversely impacted by inflation rates because domestic goods and services get more expensive when compared to those sold in foreign markets. Higher domestic inflation relative to the rest of the world implies that domestically produced goods are more expensive than imported goods; as a result, high-inflationary domestic countries tend to purchase more imported goods.

When a country's currency depreciates, the currency value declines relative to the worth of another currency, this makes exports from the domestic currency cheaper and hence encourages exports. Exchange rate depreciation will affect exports positively and exchange rate appreciation will affect exports negatively.

FDI affects exports positively because it increases output and stimulates the creation of more quality goods for the export market. If the value is lower than 100% it implies that a country's capital outflow is greater than capital inflow, if it exceeds 100% the country earns more money from exports than imports. A low term of trade will affect exports negatively while a higher term of trade will affect positively.

2.4 Operationalization and Measurement of Study Variables

Table 2: Measurement and Operationalization of Research Variables

Variable	Type	Measurement
Exports	Dependent Variable	measured by the annual value of goods and services exported as a proportion of GDP.
Inflation rate	Independent Variable	Measured by the annual value of producer price index
Exchange Rate	Independent Variable	Measured by the value of United States Dollar/ Kenyan Shilling

Foreign Direct Investment	Independent Variable	Measured by the net FDI inflows expressed as a % of GDP
Terms of Trade	Moderating Variable	Measured by Export price index relative to import price index

CHAPTER THREE
METHODOLOGY

3.1 Introduction

Presented in this chapter are the research design, study population, study location, sample size and sampling methods, data collecting, and analytic processes that are used to estimate diagnostic tests and variable estimation methodologies..

3.2 Research Design

Causal research design was used to determine whether long-term or causal dynamic relationships exist between variables. The design is valuable for examining how variations in one variable influence changes in another variable and to what degree those changes occur.

3.3 Location of the Study

In this study, focus was on Kenyan economy. Kenya is situated at a latitude of approximately 0.0236° South and a longitude of around 37.9062° East. Kenya's economy is focused on exports, making up a significant percentage of its GDP (Rana, 2017).

3.4 Population of the Study

This study covered annual time series data on exchange rate, inflation rate, FDI and export volumes. The understanding that significant GOK measures to shift the economy from import substitution to export substitution were created during this time led to the decision to concentrate on statistics for this period (1990–2022) (Orindi, 2010). Kenya provided valuable insights into how macroeconomic factors impacted export levels during this time due to its diverse exports, export-dependent economy, data accessibility, and policy significance. Exports started experiencing a consistent upward growth trend after the enactment of the export substitution policies (Momanyi, 2020).

3.5 Sampling Procedure and Sample Size

Annual time series data from 1990 to 2022 (N = 33) was selected using purposive sampling, a non-probability sampling strategy, grounded on the data's accessibility. The selected sample and frequency of data allowed for in-depth analysis of the time

series rends, patterns and fluctuation within the study period. The chosen timeframe aligns effectively with significant export promotion reforms that transpired during this period. Notably, 1990s saw the formulation of trade agreements in the 2000s and the inception of the Kenya Export Promotion Council in 1992, among various other initiatives that occurred within this specific span. Kenya has adopted strategies and policies for export promotion including export incentives, export credit guarantees, and trade missions that positively impacted export performance (Murithi &Nzuma, 2017).

3.6 Research Instruments

Time series data was used in the study, and information on both independent and dependent variables was gathered using a checklist. A checklist ensures a systematic and organized approach, this promotes reliability, quality and interpretability of data results.

3.7 Data Collection

For the years 1990–2022, information was gathered from the World Bank's World Development Index (WDI) database, KNBS, and CBK. The KNBS, CBK, and WDI were requested to provide time series data on export volume, foreign direct investments, inflation rate, and currency rate.

3.8 Ethical Consideration

Ethics are standards of behaviour or norms that guide our interactions and guide our moral decisions. (Cooper & Schindler, 2011). To address ethical issues the researcher got consent from Tharaka University Ethics Review Committee and a research authorization from NACOSTI to undertake the study. In addition, any source of information for literature review was acknowledged effectively by citations or referencing to avoid plagiarism.

3.9 Data Analysis

Regression analysis was employed to determine the impact of macroeconomic variables on exports. E-views software version 10 was used to analyze the data. The VECM model was used because of its ability to combine the dynamics of the short- and long-term models in an even system to create flexibility (Narayan and Smyth,

2019). Using the unit root test, the Augmented Dickey-Fuller test (ADF) was employed to ascertain whether the data was stationary. To make the data steady, differencing was then applied if needed. Cointegration was utilized to ascertain long-term equilibrium, and Granger Causality was investigated to ascertain whether a relationship existed between the variables. Additionally, diagnostic tests for autocorrelation, heteroscedasticity, and multicollinearity were performed to confirm that the Classical Linear Regression Model's (CLRM) presumptions are true.

3.9.1 Model Specification

Model specification is the process of defining the variables included or excluded from a model. To ascertain the effect of the factors chosen on exports, the VECM model was used to assess the short- and long-term connection of the variables when the data was co-integrated and non-stationary. According to Wang et al. (2018), the model approximates variables with long-term equilibrium relationships. This model is appropriate since it can create flexibility in a homogeneous system by combining short-run and long-run dynamic models.

Specifications of the model were as follows;

$$\Delta lnX_t = \beta_0 + \beta_1 \Delta lnX_{t-j} + \beta_2 \Delta lnEXCR_{t-j} + \beta_3 \Delta lnINFL_{t-j} + \beta_4 \Delta lnFDI_{t-j}$$
$$+ \beta_5 \Delta lnTOT_{t-j} + ECT_{t-j}$$
$$+ \mu_t \tag{1}$$

Where;

Δ Is the difference operator

ΔlnX_t Represents the logarithmic difference of the variable Exports at time t

β_0 Represents the constant term

ΔlnX_{t-j} Represents the lagged differences of Exports capturing the impact of the variable Exports' previous values on the present change ΔlnX_t in a time series

$(\beta_1, \beta_2, \beta_3, \beta_4, \beta_5)$ Represents elasticity parameters of the independent variables

$\Delta EXCR_{t-j}$ Exemplifies the lagged differences of the variable Exchange rate

$\Delta INFL_{t-j}$ Stands for lagged differences of the variable Inflation

$\Delta lnFDI_{t-j}$ Denotes the lagged differences of the variable Foreign Direct Investment

$\Delta lnTOT_{t-j}$ Represents the lagged differences of the variable Terms of Trade

ECT_{t-j} represents error correction term at time *t-j*

μ_t -represents the error term at time t

3.9.2 Model Identification

Model identification encompasses conducting procedures on data to specify the representational model fitness for further investigation. The [VECM (p)] was used due to its flexibility in including Autoregressive and Moving Averages.

3.9.2.1 Lag Order Selection

The lag length was calculated using the Akaike Information Criterion (AIC). The AIC produces the least probability of underestimation and maximizes the chance of establishing the true lag length in the case of small samples of 60 observations and below (Liew & Venus, 2004). This was done by choosing the smallest values to indicate the best lag length. A smaller AIC score is chosen over a large score. Langrage Multiplier (LM) test using the Breusch-Godfrey LM test was conducted to check whether error terms exhibit serial correlation. (autocorrelation).

3.9.2.2 Stationarity Test

The variables under consideration are assumed to remain stationary by OLS. Spurious or non-sense regression is the term used to describe the erroneous findings that arise when a regression is performed using a non-stationary series (Jin et al., 2016). The ADF test, which is applied even in cases of serial correlation, was utilized in the study. The ADF test is established on the following hypothesis:

H_0: $\delta = 0$ (non-stationary)

H_1: $\delta < 1$ (stationary)

When the test statistic falls below the critical level (5% significance level) then the series is stationary. Otherwise, the series is nonstationary and should be differenced to attain Stationarity when the test is done again. Since the data proved to be stationary, a p-value that is equivalent to or below the critical value would imply the rejection of null hypothesis. The null hypothesis is not rejected when the p-value exceeds the critical value, suggesting that there is insufficient evidence to conclude that the data is stationary.

3.9.2.3 Co-integration Test

Cointegration was used to identify the long-run equilibrium that exists when two or more stationary time series possess a similar order of integration and the linear combination of the series is stationary. The tests were done for non-stationary time series to establish long-run relationships. Long-run equilibrium is a relationship that holds between individually non-stationary variables. When the parameters were integrated in a similar order (testing was done using the Engle-Granger (EG) approach, the OLS method was employed to estimate the model (Gujarati & Porter, 2003). If the parameters are integrated with different orders, cointegrated vectors were estimated using Johansen Juselius' maximum likelihood technique.. The calculated p-value was compared to the critical value at a 5% significance level. In the case that the p-value was below 0.05, the null hypothesis was accepted; otherwise, it was rejected, suggesting the presence of cointegration.

3.9.2.4 Granger Causality Test

Following the completion of the cointegration tests, the variables were subjected to Granger Causality association testing. At a 5% significance level, the researcher compared P-value with the 0.05. The alternative hypothesis is not rejected if the p-value >0.05, but the null hypothesis is if it is < 0.05. The model estimation process employed variables with both unidirectional and bidirectional causation.

Unidirectional causality occurs when changes in one variable, denoted as X, significantly predict changes in another variable Y, without the reverse being true. Specifically, if the previous values of X enhance the prediction of Y, but the previous values of Y do not similarly enhance prediction of X, it can be concluded that X Granger causes Y. This scenario reflects a one-way causal relationship, where X exerts influence on Y but not vice versa.

On the other hand, when both variables exhibit mutual impact, bidirectional causation is found. In this instance, previous values of X predict Y, and at the same time, previous values of Y predict X.

The two regression models are estimated in the general Granger causality test form:Model 1: $Y_t = a_1 + b_2 Y_{t-1} + c_2 X_{t-1} + \varepsilon_{1t}$ (6)

Model 2: $Y_t = a_2 + b_2Y_{t-1} + \varepsilon_{2t}$ (7)

In these models, Y(t) represents the dependent variable at time t, X(t-1) represents The independent variable's lagged value at time t-1, and e1(t) and e2(t) represent the error terms.

Granger's test of causality compares each model's sum of squared residuals (SSR). The lagged value of X_(t-1) enhances the predictive power of the model, suggesting that X Granger causes Y, if the total of squared residuals for Model 1 is substantially less than the sum of squared residuals for Model 2.

Alternatively, if the SSR for Model 2 is significantly lower than the sum of squared residuals for Model 1, it suggests that with the lagged value of Y_{t-1} improves the predictive power of the model, indicating that Y Granger causes X.

3.10 Diagnostic Tests

The model should be linear, independent variables should be uncorrelated with the stochastic term and the variance should be zero. The diagnostic tests include tests for heteroscedasticity, autocorrelation, multicollinearity, and normality.

3.10.1 Normality Test

The conventional OLS states that the error component must be normally distributed across all values, have a 0 mean, and a constant variance. To ascertain whether the error term was normal, kurtosis and skewness tests were used. Acceptance or rejection of the null hypothesis, which holds that the mean does not differ statistically significantly from zero, would depend on the skewness statistic. The data is regarded as normal and unbiased if the skewness statistic is within the range of ±3.

Skewness test:

H_0: E(residuals) = 0 (null hypothesis of normality)

H_1: E(residuals) ≠ 0 (alternative hypothesis of non-normality)

The residuals would be regarded as normally distributed and the H_0 would be accepted if the skewness statistic fell between -3 and 3. Otherwise, the H_0 would be rejected and the residuals would be regarded as non-normal if the skewness statistic fell beyond the range of -3 to 3.

Kurtosis test:

H_0: excess kurtosis of residuals $= 0$ (null hypothesis of normality)

H_1: excess kurtosis of residuals $\neq 0$ (alternative hypothesis of non-normality)

The H_0 of normalcy was accepted and the residuals were regarded as normally distributed since the kurtosis statistic fell between -3 and 3. Otherwise, the H_0 would be rejected and the residuals would be regarded as non-normal if the kurtosis statistic fell beyond the range of -3 to 3.

3.10.2 Multicollinearity Test

Multicollinearity is the generic intercorrelation between independent variables (Mohamed, 2011). High levels of multicollinearity make it challenging to isolate the independent variables' effects. The CLRM's premise is broken when multicollinearity arises. To detected multicollinearity R^2 and the VIF are used. If the VIF is more than 10, the R^2 is high over 0.8, and there are few significant t-ratios, multicollinearity is most likely present. It is challenging to determine the true value of OLS estimators due to multicollinearity, which causes significant variances and standard errors. By eliminating the associated variables, multicollinearity is eliminated.

3.10.3 Heteroskedasticity Test

When the error term's variance is heteroscedastic, it varies across all independent variable values and time periods. The event goes against the CLRM's premise that error term variances don't change (Mueller & Rigdon, 2015). The dependent variable's log transformation would be used to address heteroscedasticity. The Breusch-Pagan test was used to assess heteroscedasticity and establish a constant variance of the residuals. Heteroscedasticity is present when the P-value < 0.05. The null hypothesis would be rejected if the p-value < 0.05, whereas the alternative hypothesis would not be rejected if it was more than 0.05.

3.10.4 Autocorrelation Test

When error term variances are sequentially reliant on one another, autocorrelation occurs. Autocorrelation causes the parameter estimates to be biased and inconsistent. The Autocorrelation LM test is used to measure autocorrelation. The residuals show evidence of serial correlation when the LM > 0.05. The LM < 0.05 if the residuals

show no serial correlation. Autocorrelation would be eliminated by ensuring that the model's functional form is appropriately described.

3.11 Data Analysis Matrix

Table 3 : Data Analysis Matrix

Hypothesis	Independent Variable	Dependent Variable	Test Statistic
H_{01}: Inflation rate has no statistically significant effect on Export volumes in Kenya	Inflation Rate	Exports	t-test
H_{02}: Exchange rate has no statistically significant effect on Export volumes in Kenya	Exchange rate	Exports	t-test
H_{03}: Foreign Direct Investment has no statistically significant effect on Export volumes in Kenya	FDI	Exports	t-test
H_{04}: There is no statistically significant effect of terms of trade on the relationship between macroeconomic variables and exports in Kenya	Terms of trade	Exports	t-test

An F-statistic at a 5% level of significance was used to assess the model's overall relevance.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

Granger causality tests, stationarity tests, cointegration tests, normality tests, lag order selection, diagnostic tests, and descriptive statistics were all used in analysis. The estimation and explanation of the VECM models' output for export volumes and macroeconomic variables are also included in this chapter. Additionally, conclusions are drawn about the reasons behind disparities between the results of the current study and those of other studies conducted in the same field.

4.2 Descriptive and Normality Test

To draw trustworthy conclusions, data must be disseminated on a regular basis. Data on exports (XT), exchange rates (EXCR), inflation (INFL), foreign direct investment (FDI), and terms of trade (TOT) were examined for central trends, dispersion, and normalcy. The Skewness, Kurtosis, and Jarque-Bera tests were used to assess the data's normality. A symmetric distribution is indicated by a skewness statistic near zero. A kurtosis score between +3 and -3 indicates a normal distribution. The Jarque-Bera test's null hypothesis is that the data has a normal distribution. The data is considered regularly distributed if the p-value is higher than 0.05, which means that the null hypothesis cannot be refuted. However, if the p-value is less than 0.05, which indicates that the data does not have a normal distribution, the null hypothesis is rejected.

Table 4: Test Results for Descriptive Statistics and Normality

	XT	EXCR	INFL	FDI	TOT
Mean	21.36103	0.355364	9.476212	0.779740	0.718371
Median	21.58757	0.364215	7.581934	0.467475	0.691011
Std. Dev.	7.102815	0.059287	7.793779	0.802801	0.154249
Skewness	0.430782	-0.249936	2.517585	1.518111	1.075467
Kurtosis	3.079443	1.959167	10.62475	4.221719	3.706540
Jarque-Bera	1.029329	1.833159	114.7983	14.72796	7.047861
Probability	0.597701	0.399885	0.000000	0.000634	0.029483
Sum	704.9141	11.72702	312.7150	25.73143	23.70623
Sum Sq. Dev.	1614.399	0.112478	1943.776	20.62366	0.761364

The mean and median for XT and EXCR are closely aligned indicating symmetric distributions. However, INFL and FDI have a significant difference between mean and median indicating skewed distributions. Inflation has a significant variation of a standard deviation of 7.79 suggesting fluctuations over time. EXCR has the lowest standard deviation (0.06) suggesting stability during the study period. INFL and FDI are positively skewed with INFL reflecting more significant skewness and also a high kurtosis (10.62), implying frequent extreme values. It's important to note that when a dataset contains outliers, the mean can be significantly influenced by these extreme values, causing it to be skewed. The skewness statistics were within a range of -3 and +3 indicating that the data was normal. Notably, INFL and FDI exhibit higher kurtosis of 10.62475 and 4.221719 respectively, suggesting potential deviations from a normal distribution. With respective p-values of 0.60 and 0.40, the Jarque-Bera test shows that XT and EXCR have a normal distribution. However, p-values less than 0.05 indicate that INFL, FDI, and ToT do not follow a normal distribution; they will be altered in subsequent research.

4.3 Tests for Stationarity

According to the OLS assumption, the variables being studied must stay steady. The use of non-stationary data produces erroneous or misleading findings. The ADF test for stationarity was employed in the study. According to the stationarity null hypothesis, there is a unit root present since the data is non-stationary. If the p-value is greater than the critical value at the significance level (5%), the null hypothesis is accepted. Conversely, if the p-value is below the crucial threshold, the null hypothesis is refuted. Specifically, if the p-value is more than 0.05, which indicates the presence of a unit root (non-stationarity), we cannot rule out the null hypothesis.

Table 5 : Unit Root Test at Level

Variable	P-value	Status
XT	0.5019	Non-Stationary
EXCR	0.5135	Non-Stationary
INFL	0.0018	Stationary
FDI	0.0013	Stationary
ToT	0.8552	Non-Stationary

With p-values higher than 0.05, XT, EXCR, and ToT are non-stationary and will need differencing to become stationary. The p-values for FDI and INFL are less than 0.05, suggesting that they are stationary.

Table 6: Unit Root Test at First Difference

Variable	P-value	Status
DXT	0.0211	Stationary
DEXCR	0.0002	Stationary
DTot	0.0013	Stationary

Table 6 shows the unit root test after differencing. The previous non-stationary variables (XT, EXCR and ToT) became stationary.

4.4 Lag Order Selection

The Akaike Information Criterion (AIC) was utilized to determine the best appropriate lag time to apply for the model estimate. Since it suggests a better model fit, the lag with the shortest value is selected.

Table 7: AIC Lag order selection

Lag	AIC
0	8.074654
1	7.565985
2	7.323726*

The lag duration that minimizes the AIC value is a lag of 2, according to Table 7.

4.5 Test for Cointegration

A test was performed to see if the variables in the estimation model were cointegrated. Tests were performed on non-stationary data to identify long-term correlations among independently non-stationary variables. The cointegrated vectors were estimated using Johansen Juselius's maximum likelihood technique because the order in which the factors were integrated was different.

Table 8: Johansen Cointegration Test

Hypothesized No. of CE(s)	Prob.**
None *	0.0000
At most 1 *	0.0000
At most 2 *	0.0009
At most 3 *	0.0229
At most 4 *	0.0153

Five cointegrating equations are shown by the trace test at the 0.05 level, which * indicates that the hypothesis is rejected at the 0.05 level. **p-values for MacKinnon-Haug-Michelis (1999)

The results of the cointegration test conducted on the variables using Johansen Juselius' maximum likelihood method are displayed in Table 8. Cointegration between all the variables is present, according to the test. Notably, p-values less than 0.05 indicate that the null hypothesis is rejected for each of the five tested hypotheses.

4.6 Granger Causality Test

Once the long-term relationship between the variables was established, the Granger test for causality was conducted. The null hypothesis, according to which X is not caused by Granger cause variable Y, was evaluated by comparing the p-value to the critical value at a significance level of 5% following the Granger causality test. Since there was a causal relationship between the variables, we reject the null hypothesis if the p-value is less than 0.05. However, if the p-value is higher than 0.05, the null hypothesis is not ruled out. Neutral causality exists when there is no association between the variables. Unidirectional causation occurs when just one variable influences the other.

Table 9: Granger Causality Test

Null Hypothesis:	Obs	F-Statistic	Prob.
DXT does not grant because DEXCR does not provide because DXT does not grant because DEXCR Does not grant because DXT	30	1.34635	0.2784
DINFL DFDI does not Granger Because DXT DXT does not Granger Because DINFL		1.61244	0.2195
DFDI is not Granger Caused by DXT.	30	0.38317	0.6856
Granger Cause is not Granger by DINFL. DEXCR		0.41191	0.6668
DINFL does not cause DEXCR to grant.	30	0.11546	0.8914

There is no Granger Cause in DFDI. DEXCR		0.66876	0.5213
DFDI is not Granger Caused by DEXCR	30	0.36357	0.6988
DINFL is not Granger Caused by DFDI.		1.00047	0.3820
DFDI is not Granger Caused by DINFL.	30	3.56122	0.0436
DXT does not grant because DEXCR does not provide because DXT does not grant because DEXCR Does not grant because DXT		0.96771	0.3937
DINFL DFDI does not Granger Because DXT DXT does not Granger Because DINFL	30	0.28010	0.7580
DFDI is not Granger Caused by DXT.		0.07229	0.9305

The examination of the factors' interactions is displayed in Table 9. Pairs like Exchange Rate (DEXCR) and exports (DXT) and Inflation (DINFL) and exports (DXT) were subjected to Granger causality tests, which produced p-values above the significance level of 0.05. In particular, the respective p-values were 0.2784 and 0.2195. There is no proof that either variable Granger causes the other, as indicated by the failure to reject the null hypothesis. Analyses of additional correlations, such as those between foreign direct investment (DFDI) and inflation (DINFL) and exports (DXT), also revealed similar non-significant results. There was no causal relationship between these variables, as indicated by the computed p-values of 0.8914 and 0.7580, respectively. However, an exception was noted in the case of DFDI and Exchange Rate (DEXCR), where the Granger causality test produced a statistically significant p-value of 0.0436. This result implies evidence of a causal relationship, suggesting that fluctuations in DFDI influence changes in DEXCR. Overall, the findings show that the variables did not significantly correlate with one another.

4.7 Diagnostic Tests

Before presenting the model estimate results, analytical checks were performed to make sure that the assumptions of ordinary least squares were satisfied. This was completed prior to the publication of the model estimation results. The diagnostic tests included tests for heteroscedasticity, autocorrelation, multicollinearity, and normality.

4.7.1 Normality Test for Residuals

To be utilized with OLS estimation, the error term must be spread appropriately, with a zero mean and non-varying variance for each value. The null hypothesis states that the random variable is normal. The kurtosis and skewness tests were used to

determine if the random variable was normal. The distribution of the er-ror term is symmetric when the skewness statistic is near zero. A distribution is considered normal if its kurtosis value falls between +3 and -3. The error term's normal distribution is the null hypothesis of the Jarque-Bera test. Given the normal distribution of the error term, the null hypothesis cannot be disproved if the p-value exceeds 0.05. If the p-value is less than 0.05, it is not appropriate to accept the null hypothesis.

Table 10: Test for Normality of Residual Results

Component	Skewness	Chi-sq	df	Prob.*
1	-0.698452	2.357872	1	0.1247
2	0.345620	0.577358	1	0.4473
3	0.443900	0.952394	1	0.3291
4	0.252810	0.308912	1	0.5783
Joint		4.196535	4	0.3801
Component	Kurtosis	Chi-sq	df	Prob.
1	2.928206	0.006228	1	0.9371
2	2.376020	0.470466	1	0.4928
3	2.552789	0.241664	1	0.6230
4	2.961049	0.001833	1	0.9658
Joint		0.720191	4	0.9488
Component	Jarque-Bera	df	Prob.	
1	2.364100	2	0.3066	
2	1.047824	2	0.5922	
3	1.194057	2	0.5504	
4	0.310745	2	0.8561	
Joint	4.916726	8	0.7664	

Kurtosis and skewness test results are displayed in Table 10. and Jarque-Bera test values for components 1,2,3 and 4 have skewness values close to zero, an indication that the distributions are symmetric. Kurtosis values are near the predicted value of three in a normal distribution for all of the values. This suggests that there are no heavy tails or peakedness in the residuals that could cause them to depart from the normal distribution. The Chi-square statistics are small for all the components indicating that observed distributions do not deviate from normality significantly. The Jarque – Bera statistics are small and p-values are statistically insignificant, thus, the null hypothesis cannot be rejected.

4.7.2 Test for Multicollinearity

The general intercorrelation between explanatory variables is known as multicollinearity (Mohamed, 2011). The multicollinearity of the explanatory factors contradicts the classic linear regression model's assumption that the explanatory variables shouldn't be multicollinear. Using R2 and the VIF, the multicollinearity test was conducted. If R2 is larger than 0.8 and VIF is greater than 10, multicollinearity is likely, indicating that there aren't many significant t-ratios. The metric is called the centered VIF after the data has been adjusted to zero mean. The null hypothesis states that there is no multicollinearity among the explanatory factors. The table below displays the VIF results.

Table 11: Multicollinearity

Variable	Centered VIF
DXT(-1)	2.816440
DEXCR	1.487348
DEXCR(-1)	2.914259
DINFL	1.846501
DFDI	1.484798
DFDI(-1)	1.436463

Table 11 demonstrates that the VIF values for every variable in each model were less than 10. This indicates that no Multicollinearity is present among explanatory variables.

4.7.3 Autocorrelation Test

Autocorrelation was detected using the Autocorrelation LM test. The residuals exhibit serial correlation, according to the null hypothesis. If the LM test statistic is higher than the crucial value (0.05), serial correlation is present in the residuals. If the LM test statistic is less than the threshold value (0.05), serial correlation is not evident in the residuals.

Table 12: VEC Residual Serial Correlation LM Tests

Lag	LRE* stat	Df	Prob.
1	16.25154	16	0.4355
2	20.98046	16	0.1793

The p-values of 0.4355 and 0.1793 in Table 12 demonstrate that autocorrelations exist in models 1 and 2, so the null hypothesis cannot be rejected. The VECM can accommodate serial correlation and give accurate results.

4.7.4 Test for Heteroscedasticity

In this analysis, VEC's test for residual heteroskedasticity was used to determine whether or not the residuals possessed a constant variance, which would suggest the presence of heteroscedasticity. The presence of heteroscedasticity is shown by a P-value below 0.05. The null hypothesis states that there is no heteroscedasticity and that the residuals have constant variance.

Table 13 : VEC Residual Heteroskedasticity Tests (Levels and Squares)

Joint test:		
Chi-sq	Df	Prob.
195.6936	180	0.2007

The null hypothesis, that there was no heteroscedasticity, cannot be rejected because the joint test yields a p-value greater than 0.05, demonstrating the lack of heteroscedasticity. This suggests that there was no violation of the OLS's hypothesis that the residuals shouldn't be heteroscedastic.

4.8 Estimation of the Model and Discussion of the Key Findings

Model 1 examined how macroeconomic factors affected exports, and Model 2 examined how macroeconomic factors affected exports in Kenya with the moderating influence of terms of trade. Both models were analysed using the VECM. The summary of hypothesis testing is also discussed in this section.

4.8.1 VECM Results for Effect of Macroeconomic Variables on Exports

The examination of one model under investigation is presented in this section. The link between chosen macroeconomic variables and exports is depicted in Model 1. This section also includes a discussion of each explanatory factor's coefficient estimates and moderating variable per the objectives. Additionally, the portion comprises connecting the findings with empirical literature to fill in any gaps present.

Table 14: Vector Error Correction Model Results for Macroeconomic Variables and Exports

Dependent Variable: DXT

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DEXCR	-91.474371	43.3710	-2.1091	0.0497
INFL	-0.118544	0.1633	-0.7266	0.4765
FDI	4.142891	1.5436	2.6836	0.0142
DTOT	-34.884940	12.2032	-2.8587	0.0096
C	-0.615226	0.43685	-1.40833	0.1757
R-squared	0.787043			
Adjusted R-squared	0.649247			
F-statistic	5.711656			
Prob(F-statistic)	0.000700			
Durbin-Watson stat	2.067000			

For the relationship between macroeconomic factors and exports, the regression findings are shown in Table 14. Three independent variables exchange rates, foreign direct investment, and inflation rates as well as the dependent variable were subjected to regression, with a constant C inserted for the intercept. The estimations for FDI, terms of trade, inflation rate, exchange rate, and constant were -91.474371, -0.118544, 4.142891, and -34.884940, respectively. The exchange rate and exports (DXT) have a statistically significant and negative relationship, as indicated by the exchange rate coefficient (DEXCR), which is -91.47. This suggests that a 91.47-unit decrease in exports results from a one-unit increase in the exchange rate, all other things being equal.

The t-statistic of approximately -2.97 and the p-value of 0.0160, both of which are below the 0.05 significance level, show that the effect is statistically significant. An

increase in the exchange rate (currency depreciation) has a negative impact on exports, as indicated by the coefficient's negative value, which suggests that a declining currency frequently leads to a fall in export competitiveness.

This study's findings are the same as those of Rashid Moledina et al.'s (2023) investigation of the effect of exchange rate volatility on Kenyan coffee exports. They discovered a strong inverse link between coffee exports and fluctuations in exchange rates. Both studies, despite focusing on different sectors and time frames, reached similar conclusions about the detrimental impact of currency fluctuations on export performance.

Exports (DXT) and inflation are negatively correlated, as indicated by the inflation coefficient (DINFL) of -0.118544. It also demonstrates that, when all other variables are held constant, exports decrease by roughly 0.12 units for every unit increase in inflation. However, both the t-statistic of -1.07 and the corresponding p-value of 0.4713 are above the crucial 0.05 threshold. The findings indicate that, according to this model, there is no statistically significant relationship between exports and inflation. As a result, the study cannot rule out the null hypothesis, indicating that there is not enough data to conclude that Kenyan exports are impacted by inflation. The lack of statistical significance, notably despite the negative coefficient, indicates that either other factors have a higher impact on export performance or that the impact of inflation on exports may not be substantial. These results align with the findings of Oduor et al. (2021), who examined how inflation affected the expansion of Kenya's manufacturing industry from 2008 to 2017. According to the study, for every unit increase in inflation, manufacturing value-added decreases by 0.19269 units, indicating a negative and statistically significant impact of inflation on manufacturing. Despite not being statistically significant, the effect is in line with the findings of the current study.

The combined DFDI coefficient of 4.142891 (DXT) suggests a favorable correlation between FDI and exports. This shows that a one-unit increase in FDI translates into a rise in exports of about 4.14 units when all other factors are held constant. The t-statistic of 2.6836 and the corresponding p-value of 0.0142 show that the results are below the significance level of 0.05. Since this shows that FDI's effects on exports are

statistically significant in this model, we reject the null hypothesis, offering strong evidence that FDI significantly affects Kenyan exports. The positive coefficient, which shows that larger FDI inflows generally enhance export performance, supports the idea that foreign investment may lead to greater productivity, knowledge transfer, and export capacity. This result is consistent with a 2019 study by Mukhtarov et al. that examined the impact of FDI on Jordanian exports from 1980 to 2018. The study found that FDI is statistically significant and has a positive long-term effect on exports; for instance, a 1% increase in FDI leads to a 0.13% rise in exports. Both studies highlight the importance of FDI in increasing exports.

For terms of trade and exports (DXT), the DTOT (terms of trade) value of -34.884940 indicates a statistically significant and negative association. Keeping everything else equal, this indicates that a one-unit increase in terms of commerce is associated with a 34.88-unit drop in exports. The corresponding p-value is 0.0096 and the t-statistic is -2.8587, both of which are below the significance level of 0.05. This shows a statistically significant association between exports and terms of trade. An unfavorable change in the terms of trade, such as a relative increase in import prices or a decrease in export prices, appears to have a negative impact on export performance, according to the negative coefficient. This might be because a decline in trade could make Kenyan exports less competitive on the international market since consumers would have to pay more for the same items, which would lower demand. These are in line with a study by Akwabi (2020), which looked into how inflation, FDI, and fluctuations in foreign exchange rates affected Kenyan export commerce. The research highlighted the significant moderating role of terms of trade, demonstrating that improved terms of trade can mitigate the negative effects of foreign currency fluctuations on exports.

The regression equation intercept is represented by the constant term. In this instance, the constant's coefficient is -0.615226. The p-value for the constant is 0.1757, and its t-statistic is -1.40833. There is no statistical significance in the constant. This means that even when all of the independent variables are present, the dependent variable still has a baseline level. There is no evidence to support the presence of a non-zero intercept because all variables are zero.

The whole model can account for 64.92% of the variance in exports (DXT), according to the adjusted R-squared value. The model's modified R-squared, which accounts for the number of predictors, is 0.649247. The significant F-statistic (5.711656) (p-value = 0.000700) indicates that the model is statistically significant. This suggests that at least one independent variable and the dependent variable have a statistically significant connection. The Durbin-Watson statistic test of 2.067000, which is close to 2, suggests that the residuals have little to no autocorrelation. Overall, there is evidence that the model provides useful information about export forecasts.

4.8.2 VECM Results for Moderating Effect of Terms of Trade on the Relationship Between Macroeconomic Variables and Exports

Table 15 : The moderating impact of terms of trade on the relationship between macroeconomic variables and exports.

Variable	Coefficient	t-Statistic	Prob.*
XT (-1)	1.319818	7.008996	0.0000
XT (-2)	-0.363487	-1.989166	0.0593
EXCR_TOT	-28.21263	-0.965160	0.3450
EXCR_TOT(-1)	55.65202	1.724755	0.0986
INFL_TOT	-0.162439	-1.664312	0.1102
FDI_TOT	2.262592	2.338863	0.0288
FDI_TOT(-1)	-1.146128	-1.179867	0.2507
FDI_TOT(-2)	-1.855528	-2.032998	0.0543
C	-4.561487	-0.841107	0.4093
R-squared	0.895533		
Adjusted R-squared	0.857545		
F-statistic	23.57410		
Prob(F-statistic)	0.000000		
Durbin-Watson stat	1.997547		

The model of exports, macroeconomic variables, and the relationship between the moderating variable and macroeconomic variable—using terms of trade as the moderating variable—is as follows:

$$XT = -4.561487 + 1.319818\, XT_{-1} - 28.21263\, EXCR * TOT - 0.162439 * INFL * TOT + 2.262592\, FDI * TOT + \mu t$$

Table 15 above shows the moderating impact of terms of trade on the connection between exports and macroeconomic variables. The fourth objective of the study was to examine how terms of trade work as moderators. the relationship between macroeconomic factors and exports. Table 13 shows that current exports (XT) are considerably impacted by the lagged export levels (XT-1). With a positive coefficient of 1.319818, XT (-1) shows that exports from the prior period have a positive impact on exports from the presentA one-unit increase in exports over the previous period corresponds to a 1.32-unit increase in exports for the present period. With a t-statistic of 7.008996, this finding is statistically significant. With a coefficient of -0.363487, XT (-2) indicates that exports from two periods ago have a negligible but negative effect on exports today (t-statistic of -1.989166). The factors are statistically negligible in explaining differences in exports, as indicated by the p-values of 0.3450 and 0.0986 for the interaction term EXCR_TOT and its lagged value EXCR_TOT (-1). It appears that TOT has no statistically significant moderating effect on the link between exports and currency rates. This interaction term is not statistically significant, as indicated by the fact that the p-value for INFL_TOT is greater than 0.05. This suggests that Kenyan exports are not greatly impacted by the correlation between the inflation rate and TOT. Despite being insignificant, this negative relationship suggests that inflation may reduce export performance, likely due to rising domestic prices reducing competitiveness. All the p-values for the interaction terms FDI_TOT, FDI_TOT (-1), and FDI_TOT (-2) are less than 0.05, signifying their statistical significance. The combined effects of FDI and TOT are represented by these interaction terms, which significantly boost exports. This indicates that FDI, when moderated by TOT, is a crucial driver of export growth. The constant term is -4.561487, with a t-statistic of -0.841107 and a p-value of 0.4093. This implies that if all other variables are zero, exports would decrease by 4.56 units, though this result is statistically insignificant.

Taking into consideration the total number of variables, the Adjusted R-squared score of 0.8575 indicates that the independent variables in the model can account for 85.75% of the variance in exports. Most of the model's predictors are significant and contribute to the explanation of export performance, as indicated by the fact that this number is close to the R-squared value (0.8955). This suggests a good fit between the

model and the data. Using the F-statistic, the overall significance of the model is examined. The model is statistically significant, indicating that the independent variables taken together have a substantial effect on exports, as indicated by the F-statistic of 23.57410 and the p-value of 0.000000. The residuals' autocorrelation was examined using the Durbin-Watson statistic.

CHAPTER FIVE
SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter offers an overview of the research, recommendations, and findings in relation to the goals of the study. The results of the analysis are explored in detail in the summary section. In relation to the objectives of the study, the conclusion and suggestion sections offer a comprehensive analysis and inferences based on the data.

5.2 Summary

In the context of Kenya's export sector, The study looks at the effects of macroeconomic factors on Kenya's export industry. Despite its potential, Kenya's export sector confronts difficulties because of a number of economic concerns. The study examines the effects of currency rates, inflation, foreign direct investment, and terms of trade on a nation's export performance. The study's objective is to provide a comprehensive understanding of how the selected macroeconomic factors affect Kenya's exports. It investigates the relationships between these factors and the export trends of the country. By doing this, the study advances our knowledge of the complex interactions between Kenya's export industry and macroeconomic circumstances.

The impact of the chosen macroeconomic factors on exports was evaluated using the VECM Model. The Jacque-Bera, Kurtosis, and Skewness tests were used to confirm that all of the variables' data were normal. Stationarity testing at the unit root was employed to evaluate whether the variables were endogenous or stationary. Conclusions were drawn from the test's findings. While some variables were stationary at level, others needed to be differentiated before they could be considered stationary. This was one of the conclusions of the study. The cause-and-effect link between the variables was determined using the Granger-causality test. To determine whether or not the model showed cointegration, the cointegrated vectors were estimated using Johansen Juselius' maximum likelihood technique. The test revealed that all of the variables were cointegrated. Several long-term equilibrium connections are implied by the four cointegrating equations.

The following is a summary of the hypothesis based on the study results: According to the first hypothesis, Kenyan exports and exchange rates do not statistically significantly correlate. The results demonstrate a substantial and positive relationship between the two variables, with the exchange rate having a constant estimate of - 91.474371 and a p-value of 0.0497. This implies that, when all other variables are held constant, a one-unit increase in the exchange rate results in a 91.47-unit drop in exports. These results are consistent with The relative price hypothesis states that a country's export prices may increase on global markets as a result of a currency appreciation, potentially resulting in a decrease in exports. Given the results showing a strong negative association between exports and exchange rates, the null hypothesis is consequently rejected.

The second hypothesis suggests that inflation rates have no statistically significant effect on exports in Kenya. The results indicate that there is a negative correlation between exports (DXT) and inflation, with a coefficient of -0.118544. This implies that, while all other variables are held equal, a unit increase in inflation results in a decline of roughly 0.12 units in exports. These findings suggest that Kenya's export volume was not directly impacted by variations in inflation over the study period. As a result, we are unable to rule out the null hypothesis, which suggests that exports and inflation do not significantly correlate.

The third hypothesis examined the relationship between foreign direct investment and exports. The results show that FDI and exports have a statistically significant positive association, with a p-value of 0.0142 and a coefficient of 4.1429. Because of this, exports grow by about 4.14 units for every unit increase in foreign direct investment. These findings are in line with the foreign direct investment (FDI) product life cycle theory, which holds that more investment promotes the transfer of capital, technology, and knowledge, ultimately boosting a country's export capacity. We thus reject the null hypothesis, proving that foreign direct investment (FDI) boosts Kenyan exports.

The fourth objective examined the moderating effect of terms of trade on the relationship between macroeconomic variables on exports in Kenya. The null hypothesis stated that terms of trade have no substantial moderating impact on the relationship amongst macroeconomic variables on exports in Kenya. The findings

found a coefficient of -34.8849 with a p-value of 0.0096, indicating a significant negative relationship between TOT and exports. Specifically, a one-unit deterioration in TOT results in a 34.88-unit decline in exports. This outcome suggests that when the price of exports decreases relative to imports, the volume of exports tends to decline. Consequently, it is established that decreasing terms of trade have a negative effect on Kenya's export performance and thus the null hypothesis is rejected.

5.3 Conclusions

The examination of the connection between Kenyan exports and macroeconomic factors provides information about the ways in which FDI, inflation, and currency rates affect export performance. One important factor that showed a detrimental effect on exports was the exchange rate. This finding aligns with the relative price theory, suggesting that a weaker domestic currency results to exports being less competitive in international markets, reducing export volumes. Although not statistically significant, inflation also had a negative impact on exports, suggesting that rising inflation raises production costs and reduces the competitiveness of local goods.

According to the Product Life Cycle Theory, it was found that FDI positively and statistically significantly affected exports. New money, cutting-edge technology, and managerial know-how are brought in by FDI, which raises the export sector's productivity and competitiveness. This study shows that foreign investment strengthens a country's competitiveness in global markets by emphasizing the role that FDI plays in export expansion.

Additionally, the moderating effect of terms of trade was statistically significant, playing a critical role in shaping how the selected macroeconomic variables affect exports. Improved terms of trade can help cushion the adverse effects of unfavorable exchange rate movements and inflation, enhancing overall export performance.

The study emphasized how crucial stable currency rates and inflation management are to preserving export competitiveness.

While exchange rates and inflation directly affect the price competitiveness of goods, FDI fosters long-term export growth by improving productivity and economic resilience. To further improve Kenya's export performance, the government should diversify its export portfolio, enhance export promotion strategies, and strengthen bilateral and multilateral trade relationships. In addition to increasing export quantities, these actions will accelerate the economy's overall growth and development.

5.4 Recommendations

The study's conclusions led to the following recommendations:

i. The government should develop and enhance policies and strategies to stabilize exchange rates and inflation rates to boost the country's export competitiveness.

ii. Businesses should consider sector-specific strategies in response to macroeconomic changes. Certain sectors may be more sensitive to exchange rate fluctuations or inflation, and tailoring strategies accordingly can enhance resilience.

iii. Shareholders should engage in international collaboration to understand how global economic trends and policies may influence Kenya's export dynamics. Collaborative research and information sharing may provide crucial information for policymakers and businesses.

5.5 Suggestions for Further Research

The study's findings point to the following areas that require more research:

i. Explore how different components of exchange rates (nominal, real, etc.) impact exports differently.

ii. To conduct a sector-specific analysis to know how various sectors within the economy respond to changes in exchange rates, inflation, FDI, and terms of trade.

iii. Conduct a comparison study with other nations. or regions to identify whether the observed relationships are unique to Kenya or are part of broader global or regional trends to ascertain the findings

iv.   To investigate how changes in economic policies, trade agreements, or investment incentives influence the dynamics between macroeconomic variables and exports in Kenya.

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APPENDICES

Appendix 1: Data Collection Checklist

YEAR	Exports	Exchange Rate	Inflation Rate	Foreign Direct Investment	Terms of Trade
	(Measured by the value of annual value of exports of goods and services expressed as a percentage of GDP)	(Measured by the value of a country's currency versus that of another country or economic zone)	(Measured) by annual value of producer price index)	(Measured by the net FDI inflows expressed as a percentage of GDP)	Measured by percentage ratio of exports unit value indexes to import value indexes
1990	25.69260596	0.3694225	10.63719874	0.6658738	0.8201084
1991	27.04163232	0.3349761	12.5319619	0.231012732	0.9469663
1992	26.26037419	0.332486123	18.89723408	0.07751297	0.9846227
1993	38.90363017	0.2267641	25.69848361	2.532352686	1.145745873
1994	37.04028084	0.268845379	17.01641479	0.103976749	1.082231283
1995	32.59170122	0.3191847	11.22107084	0.4674746	0.8323969
1996	25.20060195	0.3079765	41.98877335	0.9021596	0.7847841
1997	22.68638735	0.328087956	11.43521633	0.4734517	0.7231705
1998	20.16926083	0.337528855	6.931402669	0.1883656	0.7020772
1999	20.8327352	0.2976844	4.193939049	0.402864546	0.7614432
2000	21.58757114	0.2850764	6.079848489	0.8728964	0.680534959
2001	22.93157636	0.2745751	1.573120297	0.04083336	0.6945751
2002	24.89797261	0.2722398	0.933205556	0.21006237	0.8224019
2003	24.08681531	0.294021	6.197313239	0.548412561	0.8016793
2004	26.61025858	0.294195175	7.126841555	0.286194265	0.8096408
2005	28.50903021	0.313562	4.899649721	0.113202073	0.7925816
2006	22.98493964	0.343564779	7.786740571	0.196219638	0.7126772

2007	21.91899129	0.387421131	8.129485596	2.281243	0.6854869
2008	22.67405755	0.42596963	15.15117496	0.26629132	0.6496019
2009	18.77494549	0.422564238	11.6373037	0.274534225	0.69101125
2010	20.12435965	0.414314747	1.639199648	0.3921643	0.664830148
2011	21.54947707	0.39855665	10.06501297	3.094711	0.584745765
2012	19.86494772	0.4492945	9.522972212	2.447259426	0.6254954
2013	17.79218055	0.43737337	7.337562234	1.814170361	0.5996193
2014	16.47280447	0.4354904	7.635031901	1.2022084	0.5546831
2015	15.1287339	0.397648126	9.238654684	0.8837999	0.600378752
2016	13.2497448	0.3880124	5.849628946	0.627591252	0.6129806
2017	12.73665994	0.388598144	7.581934028	1.640837	0.5476155
2018	12.54197533	0.403701425	4.215028415	0.8326862	0.5734057
2019	11.42799666	0.4107453	4.275234239	0.468168557	0.562084138
2020	9.640399923	0.4076938	4.948852833	0.4235205	0.54787606
2021	10.77418122	0.395229042	4.330747559	0.422364146	0.5410056
2022	12.21524288	0.3642149	6.008764133	0.3470138	0.567773

Appendix 2: Introductory Letter

THARAKA

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OFFICE OF THE DIRECTOR
BOARD OF POSTGRADUATE STUDIES

REF: TUN/BPGS/PL/ CMT12/00812/20   18th   October 2023

To Whom It May Concern,

Dear Sir/Madam,

RE: INTRODUCTORY LETTER FOR WENDY M. MICHENI OF ADMISSION NUMBER: CMT12/00812/20

The above named is our postgraduate student undertaking a master of Science (Msc) in **Economics**. The student has finished coursework and is expected to collect data. The title of the research is **"Effects of Selected Macroeconomic Variables on Exports in Kenya."**

The candidate has defended the proposal successfully at the Faculty and has submitted the required number of corrected copies to the Office of the Director, Board of Postgraduate Studies. The candidate is expected to begin collecting data, analyse and write a report on the findings. The study is expected to be completed within one year.
Any assistance accorded to him will be highly appreciated.

Thank you in advance.

Yours faithfully,

Dr. Denis Obote, Ph.D.
Director,
Board of Postgraduate Studies.

Appendix 3: ISERC Approval Letter

THARAKA

P.O BOX 193-60215,
MARIMANTI, KENYA

UNIVERSITY

Telephone: +(254)-0202008549
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Email: info@tharaka.ac.ke

INSTITUTIONAL SCIENTIFIC AND ETHICS REVIEW COMMITTEE

17th October, 2023

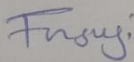**REF: TUNISERC/NSEC/M006**
Dear, Wendy M. Micheni

RE: Effects of selected Macroeconomic variables on exports in Kenya

This is to inform you that *Tharaka University ISERC* has reviewed and approved your above research proposal. Your application approval number is *ISERC04023.* The approval period is 17th *October 2023 –17th October, 2024.*

This approval is subject to compliance with the following requirements;

  i.   Only approved documents including (informed consents, study instruments, MTA) will be used

  ii.   All changes including (amendments, deviations, and violations) are submitted for review and approval by *Tharaka University ISERC.*

  iii.   Death and life threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to *Tharaka University ISERC* within 72 hours of notification

  iv.   Any changes, anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to *Tharaka University ISERC* within 72 hours

  v.   Clearance for export of biological specimens must be obtained from relevant institutions.

  vi.   Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal.

  vii.   Submission of an executive summary report within 90 days upon completion of the study to *Tharaka University ISERC*.

Prior to commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology and Innovation (NACOSTI) https://research-portal.nacosti.go.ke and also obtain other clearances needed.

Yours sincerely,

Dr. Fidelis Ngugi
Chair, ISERC Tharaka University

Appendix 4: NACOSTI Permit

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION

Ref No: 520123

Date of Issue: 03/November/2023

RESEARCH LICENSE

This is to Certify that Miss., Wendy mwende micheni of Tharaka University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Baringa, Bomet, Bungoma, Busia, Elgeyo-Marakwet, Embu, Garissa, Homabay, Isiolo, Kajiado, Kakamega, Kericho, Kiambu, Kilifi, Kirinyaga, Kisii, Kisumu, Kitui, Kwale, Laikipia, Lamu, Machakos, Makueni, Mandera, Marsabit, Meru, Migori, Mombasa, Muranga, Nairobi, Nakuru, Nandi, Narok, Nyamira, Nyandarua, Nyeri, Samburu, Siaya, Taita-Taveta, Tanariver, Tharaka-Nithi, Transmoia, Turkana, Uasin-Gishu, Vihiga, Wajir, Westpokot on the topic: EFFECT OF SELECTED MACROECONOMIC VARIABLES ON EXPORTS IN KENYA for the period ending : 03/November/2024.

License No: NACOSTI/P/23/30921

520123

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION

Verification QR Code

NOTE: This is a computer generated License. To verify the authenticity of this document, Scan the QR Code using QR scanner application.

See overleaf for conditions

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